Group 12

Test Plan — PropEase Real Estate Management System

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Purpose

This document outlines comprehensive test scenarios for the PropEase Real Estate Management System, covering three distinct user roles:

- **Client Side** (Current Implementation)
- **Owner Side** (To be added)
- **Admin Side** (To be added)

It defines the testing strategy and execution plan for unit tests, integration tests, and UI (end-to-end) tests for the PropEase project. It also indicates where to merge the existing test_sccenarios.md content and how to capture UI snapshots for inclusion.

Scope

- Test Scenarios for every role, security and performace tests.
- Unit tests for business logic, utilities, services, reducers, and small components.
- Integration tests for server API endpoints, DB interactions, and cross-module flows.
- UI tests (E2E) for main user flows: auth, property listing, property creation/editing, search/filtering, and file uploads.

Client Side Test Scenarios

C1. User Registration & Authentication

C1.1 - User Registration

Priority: HIGH
Test Case ID: CLIENT-REG-001

Preconditions: User is not registered

Test Steps:

1. Navigate to registration page
2. Fill in registration form with:
   - Full Name: "John Doe"
   - Email: "john.doe@example.com"
   - Password: "SecurePass123!"
3. Submit registration form

4. Verify success message
5. Verify user is logged in automatically
6. Verify access token is received

Expected Results:

- User account is created successfully
- User receives access token
- User is redirected to home page
- User can access client-side features

Test Data:

- Valid email addresses
- Strong passwords (8+ chars, uppercase, lowercase, number, special char)
- Invalid email formats
- Weak passwords

C1.2 - User Sign In

Priority: HIGH
Test Case ID: CLIENT-LOGIN-001

Preconditions: User account exists

Test Steps:

1. Navigate to sign-in page
2. Enter valid email and password
3. Click "Sign In"
4. Verify successful authentication
5. Verify JWT token is stored
6. Verify redirect to dashboard

Expected Results:

- User is authenticated successfully
- Token is stored in localStorage/sessionStorage
- User sees personalized dashboard
- User can access protected routes

Negative Test Cases:

- Invalid email format
- Incorrect password
- Non-existent user
- Empty fields
- Account locked after multiple failed attempts (if implemented)

C1.3 - Google OAuth Authentication

Priority: MEDIUM
Test Case ID: CLIENT-AUTH-001

Test Steps:

1. Click "Sign in with Google"
2. Complete Google OAuth flow
3. Verify user account is created/linked
4. Verify authentication token received

Expected Results:

- OAuth flow completes successfully
- User account is created if new
- Existing user is authenticated
- Token is received and stored

C2. Property Browsing & Search

C2.1 - View Property List

Priority: HIGH
Test Case ID: CLIENT-PROP-001

Preconditions: Properties exist in database

Test Steps:

1. Navigate to properties page
2. Verify property list is displayed
3. Verify property cards show:
    - Property image
    - Property name
    - Price
    - Location/Address
    - Property type
    - Transaction type (sale/rent)

Expected Results:

- Properties are displayed in grid/list view
- All required information is visible
- Images load correctly
- Properties are paginated (if applicable)

C2.2 - Search Properties

Priority: HIGH
Test Case ID: CLIENT-PROP-002

Test Steps:

1. Navigate to properties page
2. Enter search term in search bar
3. Verify search results
4. Test various search terms:
    - Property name
    - Location/address
    - Property type keywords

Expected Results:

- Search returns relevant results
- Search is case-insensitive
- Partial matches are found
- Empty state shown when no results

C2.3 - Filter Properties

Priority: HIGH
Test Case ID: CLIENT-PROP-003

Test Steps:

1. Navigate to properties page
2. Apply filters:
    - Property type (residential, commercial)
    - Transaction type (sale, rent)
    - Price range
    - Features
3. Verify filtered results

Expected Results:

- Filters work correctly
- Multiple filters can be combined
- Results update in real-time
- Filter state is maintained

C2.4 - Sort Properties

Priority: MEDIUM
Test Case ID: CLIENT-PROP-004

Test Steps:

1. Navigate to properties page
2. Test sort options:
    - Latest first
    - Price: Low to High
    - Price: High to Low

    - Name: A to Z
3. Verify sorting works correctly

Expected Results:

- Properties are sorted correctly
- Sort order is visually indicated
- Sort persists during navigation

C2.5 - View Property Details

Priority: HIGH
Test Case ID: CLIENT-PROP-005

Test Steps:

1. Click on a property card
2. Verify property detail page displays:
    - Full property description
    - All images (gallery)
    - Detailed features
    - Location on map
    - Contact information
    - Enquiry form

Expected Results:

- All property information is displayed
- Image gallery works (swipe/arrow navigation)
- Map displays correct location
- Contact form is accessible

C3. Property Enquiries

C3.1 - Create Property Enquiry

Priority: HIGH
Test Case ID: CLIENT-ENQ-001

Preconditions: User is logged in, viewing property details

Test Steps:

1. Navigate to property detail page
2. Fill in enquiry form:
    - Message
    - Contact preference
3. Submit enquiry
4. Verify confirmation message

Expected Results:

- Enquiry is created successfully
- Owner is notified (if implemented)
- Confirmation message is shown
- Enquiry appears in user's enquiry list

C3.2 - View My Enquiries

Priority: MEDIUM
Test Case ID: CLIENT-ENQ-002

Preconditions: User has created enquiries

Test Steps:

1. Navigate to "My Enquiries" page
2. Verify list of enquiries is displayed
3. Click on an enquiry to view details
4. Verify enquiry status (pending, replied, closed)

Expected Results:

- All user enquiries are listed
- Enquiry details are accurate
- Status is correctly displayed
- Replies from owner are visible

C3.3 - Update Enquiry

Priority: LOW
Test Case ID: CLIENT-ENQ-003

Test Steps:

1. Navigate to enquiry detail page
2. Click "Edit" (if allowed)
3. Modify enquiry message
4. Save changes

Expected Results:

- Enquiry can be updated (if allowed by status)
- Changes are saved
- Owner is notified of update (if implemented)

C3.4 - Delete Enquiry

Priority: LOW
Test Case ID: CLIENT-ENQ-004

Test Steps:

1. Navigate to enquiry detail page

2. Click "Delete"
3. Confirm deletion
4. Verify enquiry is removed

Expected Results:

- Enquiry is deleted successfully
- User cannot delete enquiries with replies (if implemented)
- Confirmation dialog is shown

C4. User Profile Management

C4.1 - View Profile

Priority: MEDIUM
Test Case ID: CLIENT-PROF-001

Preconditions: User is logged in

Test Steps:

1. Navigate to profile page
2. Verify profile information displays:
   - Full name
   - Email
   - Profile picture (if available)
   - Account verification status

Expected Results:

- All profile information is displayed correctly
- Profile is editable

C4.2 - Update Profile

Priority: MEDIUM
Test Case ID: CLIENT-PROF-002

Test Steps:

1. Navigate to profile settings
2. Update profile information:
   - Full name
   - Profile picture
   - About section
   - Address
3. Save changes

Expected Results:

- Changes are saved successfully
- Success message is shown
- Updated information is displayed immediately

C4.3 - Change Password

Priority: HIGH
Test Case ID: CLIENT-PROF-003

Preconditions: User is logged in with password-based account

Test Steps:

1. Navigate to security settings
2. Enter current password
3. Enter new password (meeting requirements)
4. Confirm new password
5. Submit change

Expected Results:

- Password is changed successfully
- User must re-authenticate with new password
- Email notification is sent (if implemented)

Negative Test Cases:

- Incorrect current password
- New password doesn't meet requirements
- New password same as current password

C5. Map & Location Features

C5.1 - View Properties on Map

Priority: MEDIUM
Test Case ID: CLIENT-MAP-001

Test Steps:

1. Navigate to map page
2. Verify map loads correctly
3. Verify property markers are displayed
4. Click on a marker
5. Verify property popup/info window

Expected Results:

- Map loads with correct view
- All properties are marked

- Markers are clickable
- Property information is shown on click

C5.2 - Search Location on Map

Priority: MEDIUM
Test Case ID: CLIENT-MAP-002

Test Steps:

1. Navigate to map page
2. Use location search
3. Enter location name
4. Verify map centers on location
5. Verify nearby properties are shown

Expected Results:

- Location search works correctly
- Map centers on searched location
- Properties in area are highlighted

C6. Notifications

C6.1 - View Notifications

Priority: MEDIUM
Test Case ID: CLIENT-NOT-001

Preconditions: User has notifications

Test Steps:

1. Click notification bell icon
2. Verify notification list is displayed
3. Verify unread notifications are marked
4. Click on a notification

Expected Results:

- Notifications are displayed
- Unread count is shown
- Clicking notification marks it as read
- User is redirected to relevant page

C6.2 - Real-time Notifications

Priority: MEDIUM
Test Case ID: CLIENT-NOT-002

Test Steps:

1. User is logged in
2. Owner replies to enquiry (or admin sends notification)
3. Verify notification appears in real-time
4. Verify notification sound/alert (if implemented)

Expected Results:

- Notifications appear without page refresh
- WebSocket connection is maintained
- Notification count updates automatically

Owner Side Test Scenarios

O1. Owner Registration & Authentication

O1.1 - Owner Registration

Priority: HIGH
Test Case ID: OWNER-REG-001

Preconditions: Owner is not registered

Test Steps:

1. Navigate to owner registration page
2. Fill in registration form:
   - Business/Company name
   - Owner full name
   - Email
   - Password
   - Business license (if required)
   - Contact information
3. Submit registration
4. Verify account verification process

Expected Results:

- Owner account is created
- Verification email is sent
- Account requires admin approval (if implemented)
- Owner can access owner dashboard after verification

Test Data:

- Business licenses
- Company information
- Multiple owner accounts per business

O1.2 - Owner Sign In

Priority: HIGH
Test Case ID: OWNER-LOGIN-001

Preconditions: Owner account exists and is verified

Test Steps:

1. Navigate to owner sign-in page
2. Enter credentials
3. Verify access to owner dashboard
4. Verify owner-specific features are available

Expected Results:

- Owner is authenticated
- Owner dashboard is accessible
- Owner can manage properties
- Owner can view enquiries

O2. Property Management (Owner)

O2.1 - Create New Property Listing

Priority: HIGH
Test Case ID: OWNER-PROP-001

Preconditions: Owner is logged in and verified

Test Steps:

1. Navigate to "Add Property" page
2. Fill in property form:
   - Property name
   - Property type
   - Transaction type (sale/rent)
   - Address
   - Description
   - Price
   - Features
   - Upload images (multiple)
   - Set location on map
3. Submit property
4. Verify property is created

Expected Results:

- Property is saved successfully
- Property appears in owner's property list

- Property is visible to clients (if approved)
- Images are uploaded correctly

Validation Tests:

- Required fields validation
- Image file type validation
- Image size limits
- Price format validation
- Location coordinates validation

O2.2 - View My Properties

Priority: HIGH
Test Case ID: OWNER-PROP-002

Preconditions: Owner has created properties

Test Steps:

1. Navigate to "My Properties" page
2. Verify property list displays:
   - Property name
   - Status (active, pending, sold)
   - Number of enquiries
   - Views/impressions (if tracked)
3. Test sorting and filtering

Expected Results:

- All owner's properties are listed
- Property status is accurate
- Statistics are displayed correctly

O2.3 - Edit Property

Priority: HIGH
Test Case ID: OWNER-PROP-003

Test Steps:

1. Navigate to property detail page
2. Click "Edit"
3. Modify property information:
   - Update price
   - Add/remove features
   - Update description
   - Add/remove images
4. Save changes

Expected Results:

- Changes are saved successfully
- Property status may change (e.g., pending review)
- Clients see updated information
- Change history is tracked (if implemented)

O2.4 - Delete Property

Priority: MEDIUM
Test Case ID: OWNER-PROP-004

Test Steps:

1. Navigate to property detail page
2. Click "Delete"
3. Confirm deletion
4. Verify property is removed

Expected Results:

- Property is deleted successfully
- Property is removed from client view
- Associated enquiries are handled (archived or notified)
- Confirmation dialog is shown

O2.5 - Upload Property Images

Priority: HIGH
Test Case ID: OWNER-PROP-005

Test Steps:

1. Navigate to property edit page
2. Click "Upload Images"
3. Select multiple image files
4. Upload images
5. Verify images are displayed
6. Set primary/profile image
7. Reorder images (if implemented)

Expected Results:

- Images upload successfully
- Image preview is shown
- Primary image is set correctly
- Image order can be changed
- Invalid file types are rejected

O3. Enquiry Management (Owner)

O3.1 - View Property Enquiries

Priority: HIGH
Test Case ID: OWNER-ENQ-001

Preconditions: Owner has properties with enquiries

Test Steps:

1. Navigate to enquiries page
2. Verify enquiry list displays:
   - Enquirer name
   - Property name
   - Enquiry message
   - Date/time
   - Status (new, replied, closed)
3. Filter enquiries by property
4. Filter enquiries by status

Expected Results:

- All enquiries are displayed
- Filters work correctly
- Enquiries are sorted by date (newest first)
- Unread enquiries are highlighted

O3.2 - Reply to Enquiry

Priority: HIGH
Test Case ID: OWNER-ENQ-002

Test Steps:

1. Click on an enquiry
2. View enquiry details and client information
3. Compose reply message
4. Send reply
5. Verify client receives notification

Expected Results:

- Reply is sent successfully
- Client receives notification
- Enquiry status changes to "replied"
- Reply history is maintained

O3.3 - Mark Enquiry as Closed

Priority: MEDIUM
Test Case ID: OWNER-ENQ-003

Test Steps:

1. Navigate to enquiry detail page
2. Click "Mark as Closed"
3. Select reason (if applicable)
4. Confirm closure

Expected Results:

- Enquiry is marked as closed
- Client is notified (if implemented)
- Enquiry is archived
- Statistics are updated

O3.4 - View Enquiry Analytics

Priority: LOW
Test Case ID: OWNER-ENQ-004

Test Steps:

1. Navigate to analytics/dashboard
2. View enquiry statistics:
    - Total enquiries
    - Enquiries per property
    - Response rate
    - Conversion rate (if tracked)

Expected Results:

- Statistics are accurate
- Charts/graphs display correctly
- Data can be filtered by date range

O4. Owner Dashboard & Analytics

O4.1 - View Dashboard

Priority: HIGH
Test Case ID: OWNER-DASH-001

Preconditions: Owner is logged in

Test Steps:

1. Navigate to owner dashboard
2. Verify dashboard displays:
    - Total properties
    - Active listings
    - Total enquiries

    - Pending enquiries
    - Recent activity
    - Statistics graphs

Expected Results:

- All dashboard widgets load correctly
- Data is accurate and up-to-date
- Charts/graphs render properly
- Quick actions are accessible

O4.2 - View Property Performance

Priority: MEDIUM
Test Case ID: OWNER-DASH-002

Test Steps:

1. Navigate to property analytics
2. View property-specific metrics:
    - Views/impressions
    - Enquiries received
    - Click-through rate
    - Time on listing page

Expected Results:

- Metrics are tracked accurately
- Data visualization is clear
- Date range filters work

O5. Owner Profile Management

O5.1 - Update Business Profile

Priority: MEDIUM
Test Case ID: OWNER-PROF-001

Test Steps:

1. Navigate to business profile settings
2. Update business information:
    - Company name
    - Business description
    - Contact information
    - Business license
    - Logo
3. Save changes

Expected Results:

- Changes are saved
- Business information is updated
- Verification may be required for certain changes

Admin Side Test Scenarios

A1. Admin Authentication

A1.1 - Admin Login

Priority: HIGH
Test Case ID: ADMIN-LOGIN-001

Preconditions: Admin account exists

Test Steps:

1. Navigate to admin login page
2. Enter admin credentials
3. Verify access to admin dashboard
4. Verify admin-only features are available

Expected Results:

- Admin is authenticated
- Admin dashboard is accessible
- All admin features are available
- Security measures are in place (2FA, if implemented)

Security Tests:

- Failed login attempts are tracked
- Account lockout after multiple failures
- IP whitelisting (if implemented)

A2. User Management

A2.1 - View All Users

Priority: HIGH
Test Case ID: ADMIN-USER-001

Preconditions: Admin is logged in

Test Steps:

1. Navigate to user management page
2. Verify user list displays:
    - User name
    - Email

    - User type (client, owner, admin)
    - Registration date
    - Account status
    - Activity status
3. Test search and filters

Expected Results:

- All users are listed
- Search functionality works
- Filters work correctly
- User types are clearly distinguished

A2.2 - View User Details

Priority: HIGH
Test Case ID: ADMIN-USER-002

Test Steps:

1. Click on a user
2. View user profile:
    - Account information
    - Activity history
    - Properties (if owner)
    - Enquiries (if client)
    - Account status

Expected Results:

- All user information is displayed
- Activity history is accurate
- Related data is accessible

A2.3 - Suspend/Activate User

Priority: HIGH
Test Case ID: ADMIN-USER-003

Test Steps:

1. Navigate to user detail page
2. Click "Suspend User" or "Activate User"
3. Enter reason (if required)
4. Confirm action
5. Verify user status changes

Expected Results:

- User status is updated
- Suspended users cannot log in

- User is notified (if implemented)
- Action is logged in admin activity log

A2.4 - Delete User

Priority: MEDIUM
Test Case ID: ADMIN-USER-004

Preconditions: User has no active properties/enquiries (or handle cascade)

Test Steps:

1. Navigate to user detail page
2. Click "Delete User"
3. Confirm deletion
4. Verify user is removed

Expected Results:

- User is deleted successfully
- Associated data is handled (archived or deleted)
- Confirmation dialog is shown
- Action cannot be undone (or undo option available)

A3. Owner Verification & Management

A3.1 - Verify Owner Account

Priority: HIGH
Test Case ID: ADMIN-OWNER-001

Preconditions: Owner has registered and submitted verification documents

Test Steps:

1. Navigate to pending owner verifications
2. Review owner application:
    - Business information
    - Business license
    - Identity documents
    - Contact information
3. Approve or reject verification
4. Add notes (if applicable)

Expected Results:

- Owner verification is processed
- Owner is notified of decision
- Verified owners can access owner features
- Rejected owners receive feedback

A3.2 - Manage Owner Accounts

Priority: MEDIUM
Test Case ID: ADMIN-OWNER-002

Test Steps:

1. View owner list
2. Filter by verification status
3. View owner properties
4. Manage owner permissions
5. Suspend/activate owner accounts

Expected Results:

- Owner management features work correctly
- Permissions are managed properly

A4. Property Management (Admin)

A4.1 - View All Properties

Priority: HIGH
Test Case ID: ADMIN-PROP-001

Test Steps:

1. Navigate to properties management page
2. Verify property list displays:
    - Property name
    - Owner name
    - Property type
    - Status (pending, approved, rejected)
    - Created date
3. Test search and filters

Expected Results:

- All properties are listed
- Filters work correctly
- Properties are searchable

A4.2 - Approve/Reject Property

Priority: HIGH
Test Case ID: ADMIN-PROP-002

Preconditions: Owner has submitted property for approval

Test Steps:

1. Navigate to pending properties
2. Review property details:
    - Property information
    - Images
    - Location
    - Owner information
3. Approve or reject property
4. Add rejection reason (if rejected)

Expected Results:

- Property status is updated
- Owner is notified
- Approved properties are visible to clients
- Rejected properties are hidden

A4.3 - Edit Property (Admin Override)

Priority: MEDIUM
Test Case ID: ADMIN-PROP-003

Test Steps:

1. Navigate to property detail page
2. Click "Edit as Admin"
3. Make necessary corrections
4. Save changes
5. Notify owner (if applicable)

Expected Results:

- Property can be edited by admin
- Changes are logged
- Owner is notified (if implemented)

A4.4 - Remove Property

Priority: MEDIUM
Test Case ID: ADMIN-PROP-004

Test Steps:

1. Navigate to property detail page
2. Click "Remove Property"
3. Enter reason
4. Confirm removal

Expected Results:

- Property is removed from public view
- Owner is notified

- Action is logged

A5. Enquiry Management (Admin)

A5.1 - View All Enquiries

Priority: MEDIUM
Test Case ID: ADMIN-ENQ-001

Test Steps:

1. Navigate to enquiries management page
2. View all system enquiries
3. Filter by:
    - Property
    - Owner
    - Client
    - Status
    - Date range

Expected Results:

- All enquiries are visible
- Filters work correctly
- Admin can view full enquiry history

A5.2 - Moderate Enquiry

Priority: LOW
Test Case ID: ADMIN-ENQ-002

Test Steps:

1. View enquiry details
2. Flag inappropriate content (if needed)
3. Take action:
    - Delete enquiry
    - Hide enquiry
    - Warn user

Expected Results:

- Enquiry moderation works correctly
- Actions are logged

A6. System Configuration & Settings

A6.1 - Manage System Settings

Priority: MEDIUM
Test Case ID: ADMIN-CONF-001

Test Steps:

1. Navigate to system settings
2. Configure:
   - Site name and branding
   - Email templates
   - Notification settings
   - Feature flags
   - Payment settings (if applicable)
3. Save changes

Expected Results:

- Settings are saved successfully
- Changes take effect immediately (or after restart)
- Settings are validated

A6.2 - Manage Categories & Types

Priority: MEDIUM
Test Case ID: ADMIN-CONF-002

Test Steps:

1. Navigate to property categories/types
2. Add new property type
3. Edit existing type
4. Delete unused type
5. Reorder categories

Expected Results:

- Categories are managed correctly
- Changes reflect in property forms
- Deletion is prevented if types are in use

A7. Analytics & Reports

A7.1 - View System Analytics

Priority: MEDIUM
Test Case ID: ADMIN-ANAL-001

Test Steps:

1. Navigate to analytics dashboard
2. View system-wide statistics:

    - Total users (clients, owners)
    - Total properties
    - Total enquiries
    - Active listings
    - User growth
    - Property views
    - Conversion rates

Expected Results:

- Analytics are accurate
- Charts/graphs display correctly
- Data can be filtered by date range
- Reports can be exported (if implemented)

A7.2 - Generate Reports

Priority: LOW
Test Case ID: ADMIN-ANAL-002

Test Steps:

1. Navigate to reports page
2. Select report type:
    - User activity report
    - Property listing report
    - Enquiry report
    - Financial report (if applicable)
3. Set date range
4. Generate report
5. Export report (PDF/CSV)

Expected Results:

- Reports are generated correctly
- Data is accurate
- Export functionality works
- Reports are formatted properly

Cross-Role Integration Tests

I1. Client-Owner Interaction

I1.1 - Client Enquiry to Owner Notification

Priority: HIGH
Test Case ID: INTEG-001

Test Steps:

1. Client creates enquiry on property
2. Verify owner receives notification
3. Owner views enquiry
4. Owner replies to enquiry
5. Verify client receives notification

Expected Results:

- Notifications are delivered in real-time
- Both parties can communicate
- Enquiry history is maintained

I1.2 - Property Status Change Notification

Priority: MEDIUM
Test Case ID: INTEG-002

Test Steps:

1. Owner updates property (price, status)
2. Clients with saved/enquired properties are notified
3. Verify notifications are sent

Expected Results:

- Relevant clients are notified
- Notifications are accurate
- Clients can view updated property

I2. Admin-Owner Interaction

I2.1 - Property Approval Workflow

Priority: HIGH
Test Case ID: INTEG-003

Test Steps:

1. Owner creates and submits property
2. Property appears in admin pending queue
3. Admin reviews and approves property
4. Owner receives approval notification
5. Property becomes visible to clients

Expected Results:

- Workflow is smooth
- All parties are notified
- Property status is updated correctly

I2.2 - Owner Verification Workflow

Priority: HIGH
Test Case ID: INTEG-004

Test Steps:

1. Owner registers and submits verification documents
2. Admin reviews documents
3. Admin approves/rejects verification
4. Owner receives notification
5. Verified owner can create properties

Expected Results:

- Workflow is complete
- Verification status is tracked
- Owners are notified appropriately

I3. Admin-Client Interaction

I3.1 - Account Suspension Notification

Priority: MEDIUM
Test Case ID: INTEG-005

Test Steps:

1. Admin suspends client account
2. Client receives notification
3. Client attempts to log in
4. Verify client cannot access system

Expected Results:

- Client is notified
- Account access is restricted
- Suspension reason is communicated

Security & Authorization Tests

S1. Authentication Security

S1.1 - Password Security

Priority: HIGH
Test Case ID: SEC-001

Test Cases:

- Password requirements enforcement
- Password hashing verification
- Password reset functionality
- Account lockout after failed attempts
- Password change requires current password

S1.2 - JWT Token Security

Priority: HIGH
Test Case ID: SEC-002

Test Cases:

- Token expiration
- Token refresh mechanism
- Token invalidation on logout
- Token validation on protected routes
- Secure token storage

S2. Authorization & Access Control

S2.1 - Role-Based Access Control (RBAC)

Priority: HIGH
Test Case ID: SEC-003

Test Cases:

- Clients cannot access owner features
- Owners cannot access admin features
- Admins can access all features
- Unauthorized API access is blocked
- Route protection works correctly

S2.2 - Resource Ownership

Priority: HIGH
Test Case ID: SEC-004

Test Cases:

- Owners can only edit their own properties
- Clients can only view their own enquiries
- Admins can access all resources
- Cross-owner data access is prevented

S3. Data Security

S3.1 - Input Validation

Priority: HIGH
Test Case ID: SEC-005

Test Cases:

- SQL injection prevention
- XSS attack prevention
- File upload validation
- Input sanitization
- CSRF protection

S3.2 - Data Privacy

Priority: MEDIUM
Test Case ID: SEC-006

Test Cases:

- Email addresses are not exposed
- Contact information is protected
- Personal data is encrypted
- GDPR compliance (if applicable)

Performance Tests

P1. Load Testing

P1.1 - API Response Times

Priority: MEDIUM
Test Case ID: PERF-001

Test Scenarios:

- Property list API: < 500ms
- Property detail API: < 300ms
- Search API: < 1s
- Enquiry creation: < 500ms

P1.2 - Concurrent Users

Priority: MEDIUM
Test Case ID: PERF-002

Test Scenarios:

- 100 concurrent users browsing properties
- 50 concurrent users creating enquiries

- 20 concurrent owners managing properties
- 10 concurrent admins performing operations

P2. Scalability Tests

P2.1 - Database Performance

Priority: MEDIUM
Test Case ID: PERF-003

Test Scenarios:

- Large property database (10,000+ properties)
- Complex search queries
- Pagination performance
- Index optimization

Unit Tests

Objectives

- Validate individual functions, modules and components in isolation.
- Fast feedback during development.

Scope

- Services, helpers, validators, reducers, and pure UI component logic.
- Mock external dependencies (DB, HTTP, file system).

Structure & Conventions

- tests/unit/.spec.ts
- Use fixtures and factories for repeated test data.
- Aim for meaningful assertions and >80% coverage on critical modules.
- Fail build if coverage thresholds drop below agreed baseline.

Example commands (Windows, VS Code terminal)

- npm run test:unit
- npx jest tests/unit --watch

Example Unit Test

```
// tests/unit/validator.spec.ts
import { validateListing } from '../../src/services/listingValidator';

test('validateListing returns error for missing title', () => {
    const input = { title: '', price: 100 };
    const res = validateListing(input);
    expect(res.valid).toBe(false);
    expect(res.errors).toContain('title');
});
```

Integration Tests

Objectives

- Verify interactions between modules (API -> DB, services -> repositories).
- Catch integration regressions before UI/E2E.

Scope

- REST API endpoints, DB CRUD operations, authentication flows, file handling.
- Use a dedicated test DB (local or Docker) and run migrations/seeds per run.

Commands

- npm run test:integration
- npx jest tests/integration --runInBand

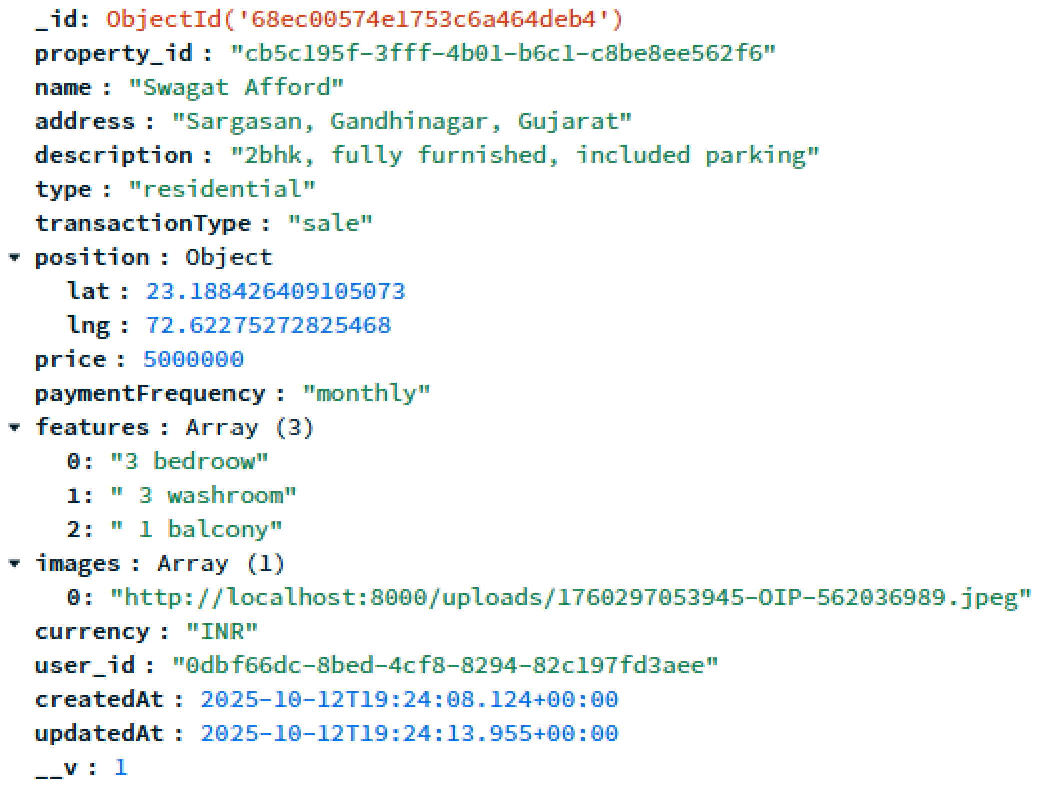
Example integration test (Supertest)

```
// Example: tests/integration/auth.int.spec.ts
import request from 'supertest';
import app from '../../src/app';

describe('Auth API', () => {
  test('POST /api/auth/login returns token on valid credentials', async () => {
    const res = await request(app)
      .post('/api/auth/login')
      .send({ email: 'test@example.com', password: 'password' })
      .expect(200);
    expect(res.body).toHaveProperty('token');
  });
});
```

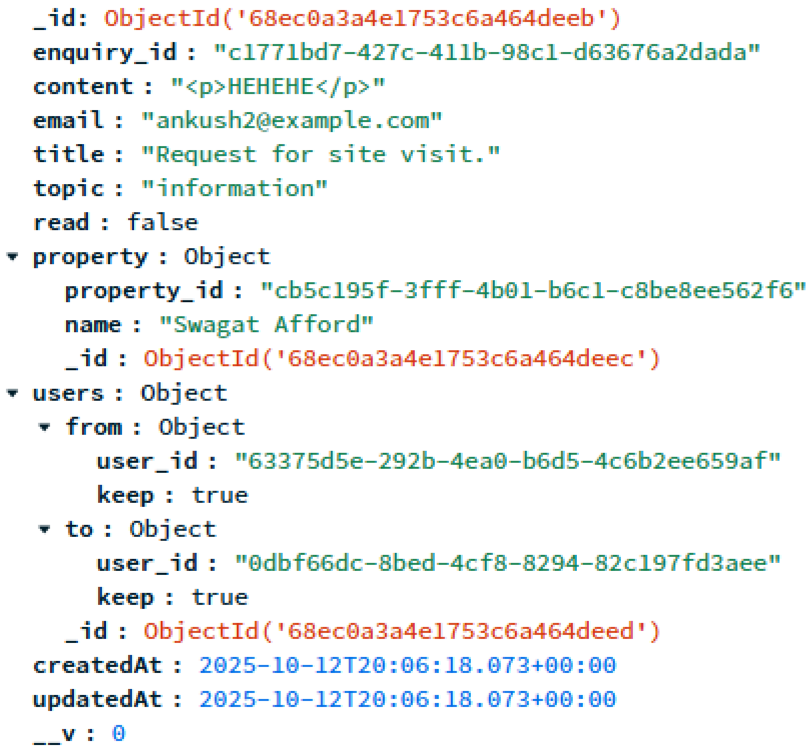
Populating DB with meaningful records

Properties



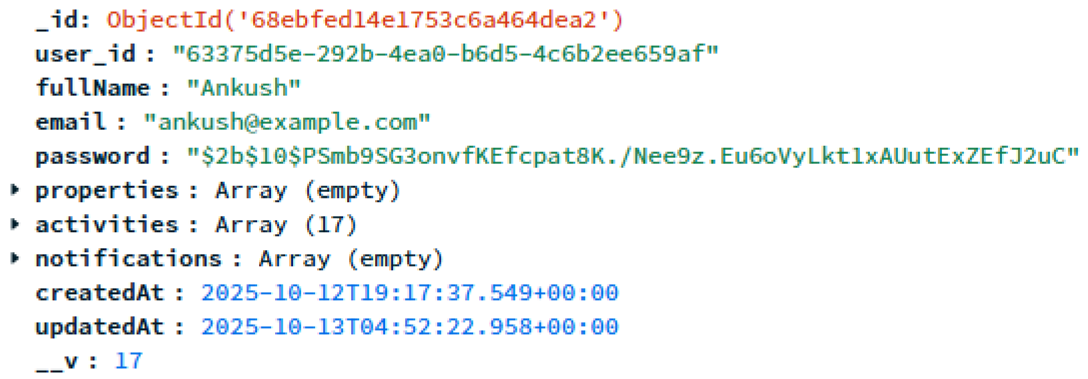
```
  _id: ObjectId('68ec00574e1753c6a464deb4')
  property_id : "cb5c195f-3fff-4b01-b6c1-c8be8ee562f6"
  name : "Swagat Afford"
  address : "Sargasan, Gandhinagar, Gujarat"
  description : "2bhk, fully furnished, included parking"
  type : "residential"
  transactionType : "sale"
▾ position : Object
    lat : 23.188426409105073
    lng : 72.62275272825468
  price : 5000000
  paymentFrequency : "monthly"
▾ features : Array (3)
    0: "3 bedroow"
    1: " 3 washroom"
    2: " 1 balcony"
▾ images : Array (1)
    0: "http://localhost:8000/uploads/1760297053945-OIP-562036989.jpeg"
  currency : "INR"
  user_id : "0dbf66dc-8bed-4cf8-8294-82c197fd3aee"
  createdAt : 2025-10-12T19:24:08.124+00:00
  updatedAt : 2025-10-12T19:24:13.955+00:00
  __v : 1
```

Enquiries



```
  _id: ObjectId('68ec0a3a4e1753c6a464deeb')
  enquiry_id : "c1771bd7-427c-411b-98c1-d63676a2dada"
  content : "<p>HEHEHE</p>"
  email : "ankush2@example.com"
  title : "Request for site visit."
  topic : "information"
  read : false
▾ property : Object
    property_id : "cb5c195f-3fff-4b01-b6c1-c8be8ee562f6"
    name : "Swagat Afford"
    _id : ObjectId('68ec0a3a4e1753c6a464deec')
▾ users : Object
  ▾ from : Object
      user_id : "63375d5e-292b-4ea0-b6d5-4c6b2ee659af"
      keep : true
  ▾ to : Object
      user_id : "0dbf66dc-8bed-4cf8-8294-82c197fd3aee"
      keep : true
    _id : ObjectId('68ec0a3a4e1753c6a464deed')
  createdAt : 2025-10-12T20:06:18.073+00:00
  updatedAt : 2025-10-12T20:06:18.073+00:00
  __v : 0
```

Users



```
  _id: ObjectId('68ebfed14e1753c6a464dea2')
  user_id : "63375d5e-292b-4ea0-b6d5-4c6b2ee659af"
  fullName : "Ankush"
  email : "ankush@example.com"
  password : "$2b$10$PSmb9SG3onvfKEfcpat8K./Nee9z.Eu6oVyLkt1xAUutExZEfJ2uC"
▸ properties : Array (empty)
▸ activities : Array (17)
▸ notifications : Array (empty)
  createdAt : 2025-10-12T19:17:37.549+00:00
  updatedAt : 2025-10-13T04:52:22.958+00:00
  __v : 17
```

UI Testing

Objectives

- Validate real user flows through the UI (login, listing browse, create/edit listing, search, upload).
- Capture screenshots and optionally visual diffs.

Test Locations

- tests/ui/
- page objects (optional): tests/ui/pages/

Test examples (high level)

- Login flow (valid/invalid credentials).
- Property listing page loads and paginates.
- Create listing: fill form, upload images, submit, assert DB/API created record.
- Search & filters: verify results match filters.
- File upload error handling.

Example snippet (tests/ui/login.spec.ts)

```
// Example: tests/ui/login.spec.ts
const { test, expect } = require('@playwright/test');

test('user can log in and see dashboard', async ({ page }) => {
  await page.goto('http://localhost:3000/login');
  await page.fill('#email', 'test@example.com');
  await page.fill('#password', 'password');
  await page.click('button[type="submit"]');
  await expect(page).toHaveURL(/dashboard/);
  await page.screenshot({ path: 'docs/ui-snapshots/login/dashboard.png', fullPage:
true });
});
```

Test Execution Priority

Phase 1: Critical (Must Pass)

- C1.1, C1.2 - Client Registration & Login
- C2.1, C2.2 - Property Browsing & Search
- C3.1 - Create Enquiry
- O1.1, O1.2 - Owner Registration & Login
- O2.1, O2.2 - Create & View Properties
- O3.1, O3.2 - View & Reply to Enquiries
- A1.1 - Admin Login
- A2.1, A2.2 - User Management
- A3.1 - Owner Verification
- A4.1, A4.2 - Property Approval
- S2.1 - RBAC

Phase 2: High Priority

- All remaining Client, Owner, and Admin core features
- Integration tests
- Security tests

Phase 3: Medium Priority

- Analytics and reporting
- Performance optimization
- Advanced features

Test Data Requirements

Test Users

- 10+ Client accounts
- 5+ Owner accounts (verified and unverified)
- 2 Admin accounts
- Test accounts with various statuses (active, suspended, deleted)

Test Properties

- 50+ Properties across all types
- Various statuses (pending, approved, rejected)
- Properties with images
- Properties with enquiries

Test Enquiries

- 20+ Enquiries across different properties
- Various statuses (new, replied, closed)
- Enquiries from different clients

Notes

- All test scenarios should be executed in both development and staging environments
- Test data should be reset between test runs
- Automated tests should be integrated into CI/CD pipeline
- Manual exploratory testing should supplement automated test
- Test results should be documented and tracked