

Project: HousingAid - Affordable Housing & Urban Shelter Management System

1. Introduction

HousingAid is a web-based platform designed for housing boards, municipalities, and welfare agencies to manage affordable housing programs, urban shelter allocation, and compliance. It enables citizens to apply for housing schemes, track applications, and receive updates, while administrators and officers can monitor compliance, manage housing projects, and generate reports.

The system supports workflows for citizen registration, housing application submission, shelter allocation, resource management, compliance monitoring, and analytics. It ensures transparency and accountability by maintaining audit trails, dashboards, and performance metrics across housing and shelter operations.

Actors / Users

- **Citizen:** Registers, applies for housing, tracks application status.
- **Housing Officer:** Validates applications, allocates housing units, updates status.
- **Program Manager:** Oversees housing projects, monitors budgets, tracks performance.
- **Administrator:** Configures workflows, manages users, oversees reporting.
- **Compliance Officer:** Ensures adherence to housing policies, audits records.
- **Government Auditor:** Reviews compliance reports, monitors housing program utilization.

2. Module Overview

- 2.1 Identity & Access Management
- 2.2 Citizen Registration & Profile Management
- 2.3 Housing Application & Eligibility Validation
- 2.4 Shelter Allocation & Unit Management
- 2.5 Housing Project & Resource Management
- 2.6 Compliance & Audit Management
- 2.7 Reporting & Analytics
- 2.8 Notifications & Alerts

3. Architecture Overview

- **Frontend:** Angular or React for responsive dashboards.

- **Backend:** REST API-based microservices (Identity, Citizens, Applications, Housing, Projects, Compliance, Reports).
- **Database:** Relational DB (MySQL/PostgreSQL/SQL Server).
- **Deployment:** Cloud/on-prem with API gateway, WAF, centralized logging.

4. Module Wise Design

4.1 Identity & Access Management

Features

- Secure authentication and role-based access control.
- Audit logging of all actions.

Entities

- **User**(UserID, Name, Role [Citizen/Officer/Manager/Admin/Compliance/Auditor], Email, Phone, Status)
- **AuditLog**(AuditID, UserID, Action, Resource, Timestamp)

4.2 Citizen Registration & Profile Management

Features

- Registers citizens and maintains profiles.
- Validates identity and residence documents.

Entities

- **Citizen**(CitizenID, Name, DOB, Gender, Address, ContactInfo, Status)
- **CitizenDocument**(DocumentID, CitizenID, DocType [IDProof/Residence], FileURI, UploadedDate, VerificationStatus)

4.3 Housing Application & Eligibility Validation

Features

- Citizens apply for housing programs.
- Officers validate eligibility and track application status.

Entities

- **HousingApplication**(ApplicationID, CitizenID, ProgramID, SubmittedDate, Status)
- **EligibilityCheck**(CheckID, ApplicationID, OfficerID, Result, Date, Notes)

4.4 Shelter Allocation & Unit Management

Features

- Allocate housing units to citizens.
- Track occupancy and availability.
- Manage shelters and urban housing units.

Entities

- **HousingUnit**(UnitID, Location, Type [Apartment/Shelter], Capacity, Status)
- **Allocation**(AllocationID, ApplicationID, UnitID, OfficerID, Date, Status)

4.5 Housing Project & Resource Management

Features

- Manage housing projects (construction, renovation).
- Track resources and utilization.
- Monitor project outcomes.

Entities

- **HousingProject**(ProjectID, Title, Description, StartDate, EndDate, Budget, Status)
- **Resource**(ResourceId, ProjectID, Type [Funds/Materials], Quantity, Status)

4.6 Compliance & Audit Management

Features

- Ensure adherence to housing policies.
- Maintain compliance records.
- Conduct audits with findings.

Entities

- **ComplianceRecord**(ComplianceID, EntityID, Type [Application/Unit/Project], Result, Date, Notes)
- **Audit**(AuditID, OfficerID, Scope, Findings, Date, Status)

4.7 Reporting & Analytics

Features

- Generate dashboards for applications, allocations, projects, and compliance.
- Provide analytics on housing program efficiency.

Entities

- **Report**(ReportID, Scope [Application/Unit/Project], Metrics, GeneratedDate)

4.8 Notifications & Alerts

Features

- Send alerts for application status, housing allocation updates, compliance deadlines.
- Notify citizens about housing program updates.

Entities

- **Notification**(NotificationID, UserID, EntityID, Message, Category [Application/Unit/Project/Compliance], Status, CreatedDate)

5. Deployment Strategy

- **Local**: Angular/React frontend, Spring Boot/.NET Core backend, local DB.
- **Production**: Cloud/on-prem deployment, API gateway, WAF, centralized logging.

6. Database Design

Tables & Attributes

- **User**(UserID, Name, Role, Email, Phone, Status)
- **AuditLog**(AuditID, UserID, Action, Resource, Timestamp)
- **Citizen**(CitizenID, Name, DOB, Gender, Address, ContactInfo, Status)
- **CitizenDocument**(DocumentID, CitizenID, DocType, FileURI, UploadedDate, VerificationStatus)
- **HousingApplication**(ApplicationID, CitizenID, ProgramID, SubmittedDate, Status)
- **EligibilityCheck**(CheckID, ApplicationID, OfficerID, Result, Date, Notes)
- **HousingUnit**(UnitID, Location, Type, Capacity, Status)
- **Allocation**(AllocationID, ApplicationID, UnitID, OfficerID, Date, Status)
- **HousingProject**(ProjectID, Title, Description, StartDate, EndDate, Budget, Status)
- **Resource**(ResourceID, ProjectID, Type, Quantity, Status)
- **ComplianceRecord**(ComplianceID, EntityID, Type, Result, Date, Notes)
- **Audit**(AuditID, OfficerID, Scope, Findings, Date, Status)
- **Report**(ReportID, Scope, Metrics, GeneratedDate)
- **Notification**(NotificationID, UserID, EntityID, Message, Category, Status, CreatedDate)

7. User Interface Design

- **Citizen Portal:** Housing application submission, allocation tracking, notifications.
- **Housing Officer Dashboard:** Application validation, unit allocation, compliance tracking.
- **Program Manager Console:** Project oversight, resource monitoring, reporting.
- **Administrator Panel:** Workflow setup, compliance monitoring, reporting.
- **Compliance Officer Console:** Policy monitoring, audits, compliance reporting.
- **Government Auditor Dashboard:** Housing program review, compliance monitoring.

8. Non-Functional Requirements

- **Performance:** Handle 100,000 concurrent users across housing networks.
- **Security:** Role-based access, encrypted data storage, immutable audit logs.
- **Scalability:** Support multi-city, multi-program rollout.
- **Availability:** 99.9% uptime.
- **Maintainability:** Modular microservices, API versioning, automated migrations.
- **Observability:** Centralized logging, KPIs (application approval rate, allocation success rate, compliance adherence).

9. Assumptions & Constraints

- Initial rollout for a single housing program before multi-region expansion.
- Notifications limited to in-app and SMS/email alerts.
- Fully implementable using Java Spring Boot/ASP.NET Core, Angular/React, and relational DB.