Gram Panchayat Management System
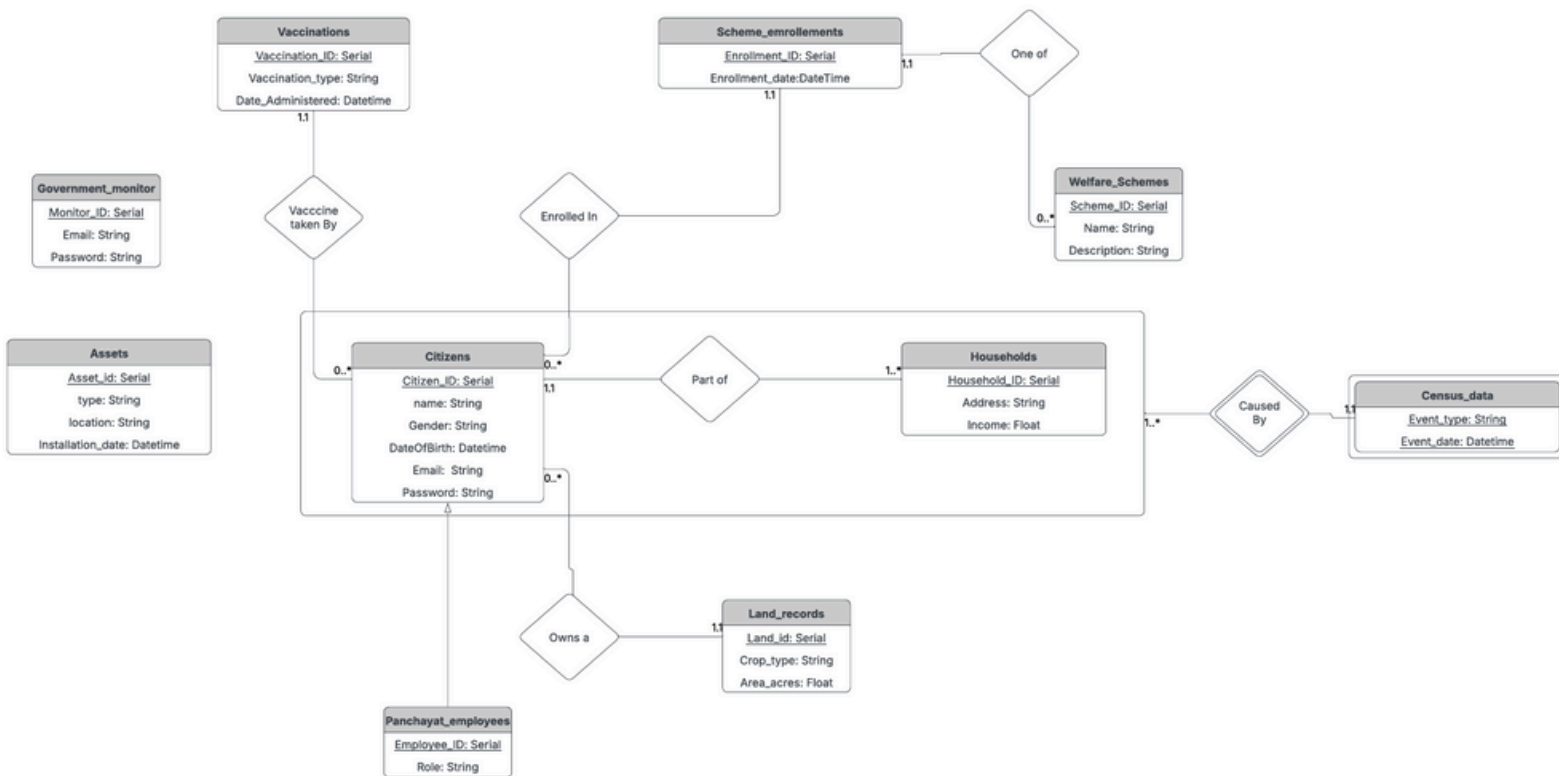
PREPARED BY	ROLL NUMBER
Sumit Kumar	22CS30056
Aviral Singh	22CS30015
Mayash Nayak	22CS30064

Overview

The **Gram Panchayat Management System** is a comprehensive **Citizen Management System** designed to streamline administrative processes, manage citizen data, and oversee government welfare programs. It provides **role-based access** to different users, ensuring secure and efficient handling of village records.

ER Diagram

Entities, attributes, relationships, cardinality, keys, and constraints to model, structure, and maintain database integrity efficiently.

Table Schema

Structure, columns, data types, constraints, relationships, keys, and rules to organize, store, and maintain database integrity efficiently.

The table schema for the Gram Panchayat Management System, built using PostgreSQL, defines the structure of essential database tables such as citizens, households, land records, welfare schemes, vaccinations, and census data. It specifies columns, data types, primary keys, foreign keys, constraints, and relationships to ensure efficient storage, data integrity, and seamless retrieval. The schema enables structured management of citizen records, land ownership, welfare enrollments, and administrative processes. It also ensures role-based access control, allowing citizens, employees, and government monitors to interact securely with the system while maintaining data consistency, scalability, and secure authentication mechanisms for efficient governance.

Database Tables and Structure

Table Name	Primary Key	Description	Key Fields	Relations
citizens	citizen_id (auto-increment)	Stores personal information about village residents	• name: Full name • gender: Gender • dob: Date of birth • household_id: Foreign key to households • educational_qualification: Education level • email: Unique email (for authentication) • password: Password	• Belongs to one household • Can own multiple land records • Can have multiple vaccinations • Can enroll in multiple welfare schemes • Can be a panchayat employee • Can have multiple census events
households	household_id (auto-increment)	Represents family units within the village	• address: Physical location • income: Family income (decimal)	• Contains multiple citizens • Has multiple census events
census_data	Composite: (household_id, citizen_id, event_date)	Tracks demographic events for citizens and households	• household_id: Foreign key to households • citizen_id: Foreign key to citizens • event_type: Type of demographic event • event_date: When the event occurred	• Links citizens to households • Each record represents a specific demographic event
land_records	land_id (auto-increment)	Maintains information about agricultural land ownership	• citizen_id: Foreign key to land owner • area_acres: Land size (decimal) • crop_type: Crop being grown	• Each record belongs to one citizen owner
			• citizen_id:	

vaccinations	vaccination_id (auto-increment)	Tracks health interventions for citizens	Foreign key to vaccinated citizen • vaccine_type: Type of vaccine • date_administered: When administered	• Each record belongs to one citizen
welfare_schemes	scheme_id (auto-increment)	Contains information about government benefit programs	• name: Scheme name • description: Details about the program	• A scheme can have multiple citizen enrollments
scheme_enrollments	enrollment_id (auto-increment)	Tracks citizen participation in welfare programs	• citizen_id: Foreign key to citizen • scheme_id: Foreign key to welfare scheme • enrollment_date: When enrolled	• Links citizens to welfare schemes
panchayat_employees	employee_id (auto-increment)	Identifies citizens who work in village administration	• citizen_id: Foreign key to citizen • role: Administrative position	• Each record belongs to one citizen
assets	asset_id (auto-increment)	Catalogs public infrastructure in the village	• type: Asset category • location: Where installed • installation_date: When installed	• Standalone table (no direct relationships)
government_monitor	monitor_id (auto-increment)	Manages external oversight accounts	• email: Unique email (for authentication) • password: Password	• Standalone table (no direct relationships)

Authentication System

User Type	Authentication Table	Login Fields	Access Purpose
Citizens	citizens table	email and password	Access personal records and services
Government Officials	government_monitor table	email and password	Monitor and manage village data

Key Data Flows

Process	Tables Involved	Description
Citizen Registration	citizens, households	New citizen is added with link to existing or new household
Land Ownership Record	citizens, land_records	Land parcels are recorded with citizen ownership
Vaccination Campaign	citizens, vaccinations	Health interventions are tracked for citizens
Welfare Distribution	citizens, welfare_schemes, scheme_enrollments	Citizens are enrolled in applicable welfare programs
Census Event Recording	citizens, households, census_data	Demographic events (births, deaths, migrations) are recorded
Village Administration	citizens, panchayat_employees	Citizens are assigned administrative roles
Infrastructure Management	assets	Public infrastructure is catalogued and tracked

Functionalities

Features, actions, permissions, processes, interactions, and rules to define, execute, and enhance system operations efficiently.

User Roles

1. Citizens
   - Can view their personal dashboard
   - Access their family information
   - View enrolled welfare schemes
   - Check vaccination records
   - View land records
2. Employees
   - Manage citizen records
   - Handle household information
   - Process vaccinations
   - Manage land records
   - Enroll citizens in welfare schemes
3. Monitors
   - View comprehensive statistics
   - Generate reports
   - Monitor demographic data
   - Track welfare scheme distribution
   - Analyse household economics

Citizen Dashboard Features

1. Personal Information
   - Basic details (name, gender, DOB)
   - Educational qualification
   - Contact information
2. Household Information
   - Family members list
   - Household address
   - Annual household income
   - Family member details (age, education, gender)
3. Health Records
   - Vaccination history
   - Vaccine types
   - Dates administered
4. Land Records
   - Land ownership details
   - Area in acres
   - Crop types
   - Location information
5. Welfare Schemes

- Current enrollments
- Scheme details
- Enrollment dates
- Benefits information

Employee Dashboard Features

1. Citizen Management
   - View citizen list
   - Access detailed citizen profiles
   - Update citizen information
2. Household Management
   - View all households
   - Edit household details
   - Update address and income
   - View family members
   - Group view of related citizens
3. Vaccination Management
   - Record new vaccinations
   - Track vaccination history
   - Select vaccine types
   - Set administration dates
4. Land Record Management
   - Register new land records
   - Update existing records
   - Track crop types
   - Manage area information
5. Scheme Management
   - Enroll citizens in schemes
   - Track scheme participation
   - Manage enrollments
   - View scheme details

Monitor Dashboard Features

1. Statistical Overview
   - Total citizen count
   - Gender distribution
   - Age demographics
   - Educational statistics
2. Household Analytics
   - Total households
   - Average household income
   - Income distribution charts
   - Family size statistics
3. Health Metrics
   - Vaccination coverage

- Vaccine type distribution
- Timeline analysis
- Health trends
4. Agricultural Data
   - Total land area
   - Crop distribution
   - Agricultural patterns
   - Land usage statistics
5. Welfare Analysis
   - Scheme enrollment rates
   - Benefit distribution
   - Coverage metrics
   - Impact assessment
6. Reporting Tools
   - Export dashboard as PDF
   - Generate detailed reports
   - Custom date range analysis
   - Data visualization

Technical Features

1. Authentication & Security
   - Role-based access control
   - Secure login system
   - Protected API routes
   - Session management
2. Data Management
   - Real-time updates
   - Data validation
   - Error handling
   - Audit logging
3. User Interface
   - Responsive design
   - Mobile-friendly
   - Interactive charts
   - Intuitive navigation
4. Integration
   - API endpoints for all functions
   - Database integration
   - Chart.js integration
   - PDF generation

Additional Features

1. Search & Filter
   - Search citizens
   - Filter by various parameters

- Sort capabilities
 - Advanced search options
2. Data Visualization
 - Interactive charts
 - Statistical graphs
 - Distribution plots
 - Trend analysis
3. Error Handling
 - User-friendly error messages
 - Form validation
 - Data integrity checks
 - Recovery procedures

Front end tools

Frameworks, libraries, languages, components, design, and features to build, style, and optimize user interfaces efficiently.

- **Prisma** – A modern ORM that simplifies database access with type safety and query optimization.
- **Next.js** – A React framework for building fast, scalable, and SEO-friendly web applications.
- **PostgreSQL** – A powerful, open-source relational database known for reliability, scalability, and performance.
- **Tailwind CSS** – A utility-first CSS framework for creating responsive and customizable UI designs efficiently.