Project Proposal: HealthNet

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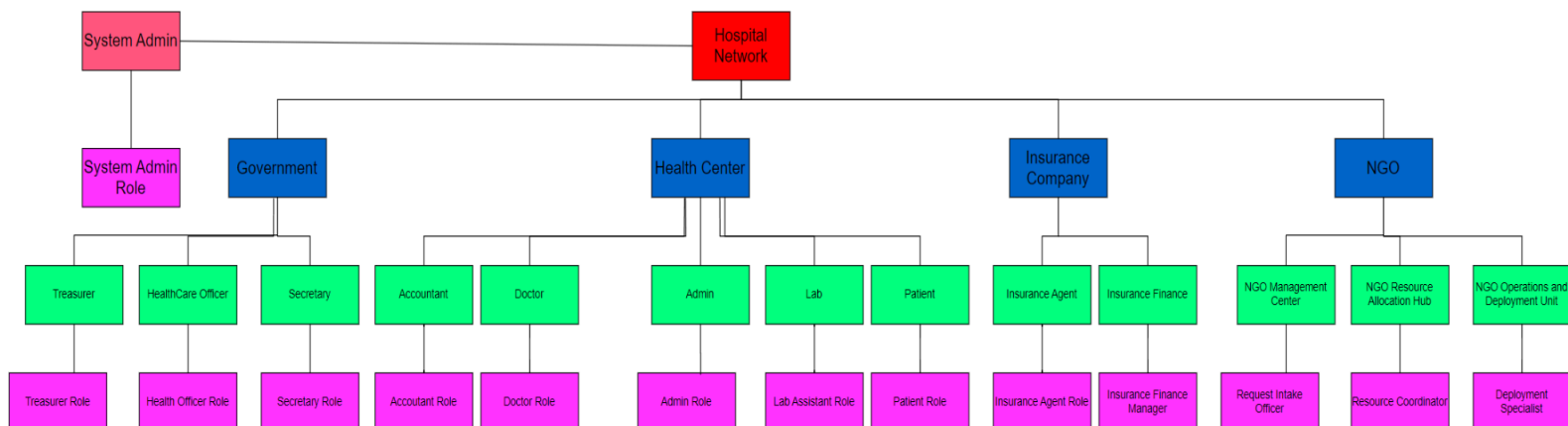
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Problem Statement

The **HealthNet** project streamlines patient care, staff management, and financial operations while offering a unique crisis-response feature. By bridging healthcare providers, government agencies, and NGOs, it enables hospitals to request funds and volunteers swiftly during emergencies. This ensures rapid mobilization of resources, reducing staff burnout, improving response times, and enhancing patient outcomes. With its seamless integration of day-to-day efficiency and crisis preparedness, **HealthNet** empowers healthcare facilities to be resilient, adaptable, and well-equipped to handle any challenges they face.
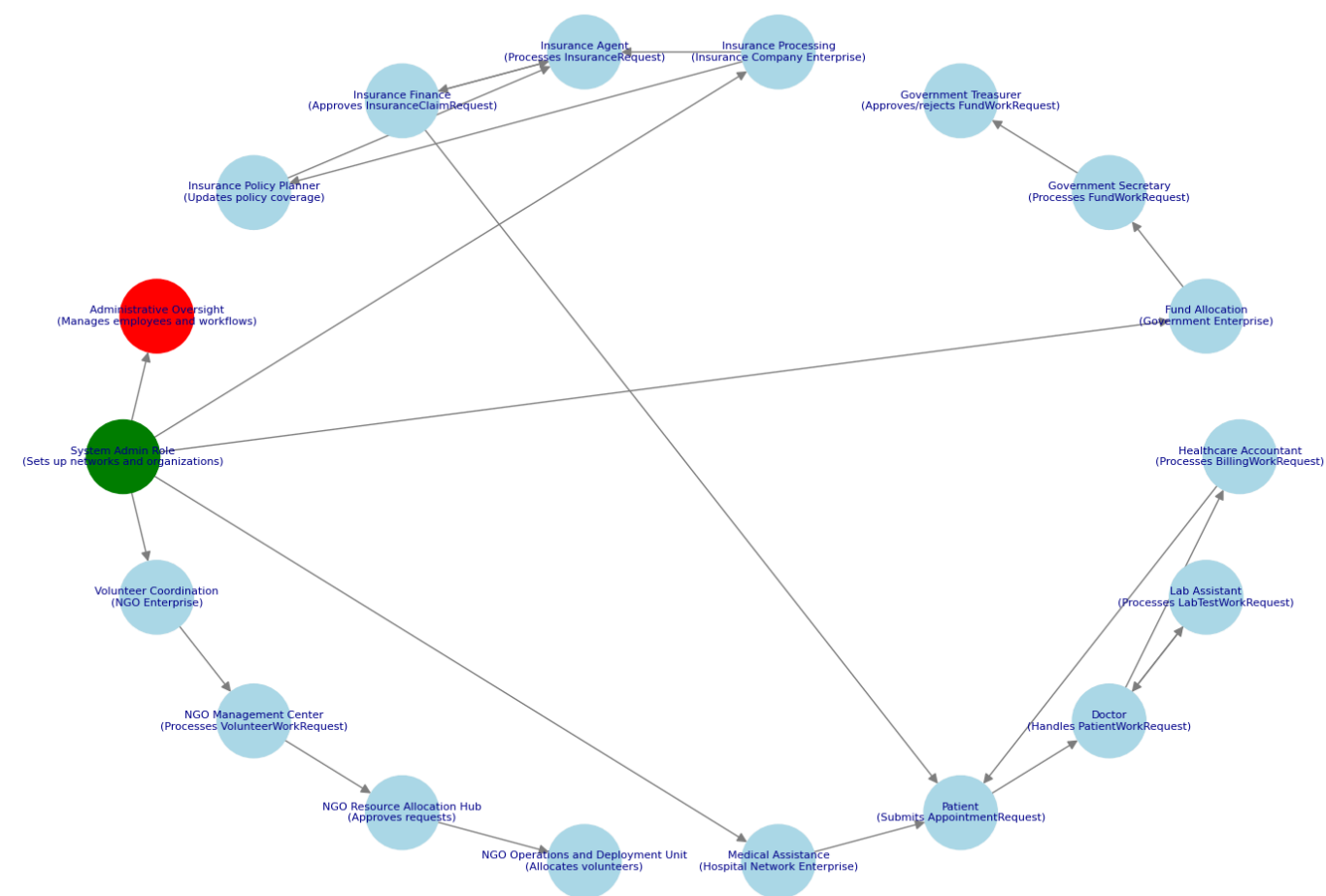
Solution

To address these challenges, the Hospital Management System is designed to automate and streamline healthcare management activities. It provides efficient, centralized access for all stakeholders, ensuring smooth communication, improved patient care, and better financial management. The system also facilitates integration with government and insurance entities for comprehensive support, and now includes pharmacy services for effective medication management.
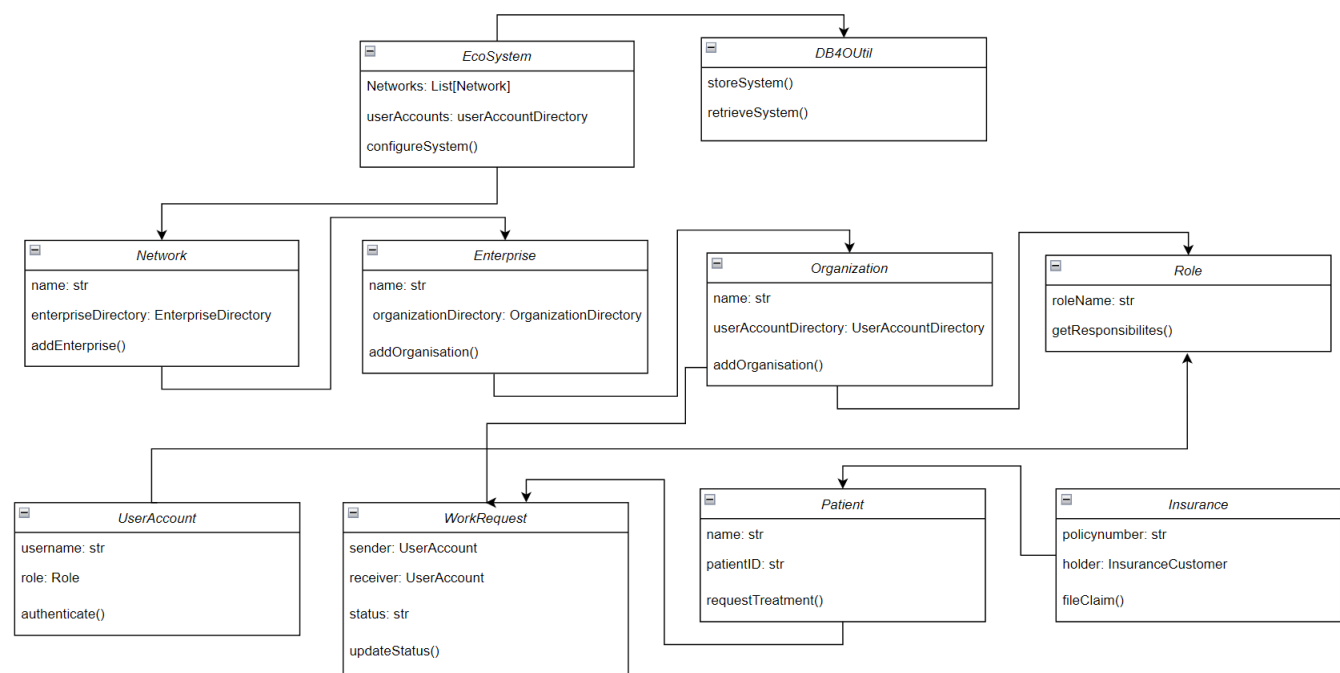
High-level component diagram

Workflow Diagram

Insurance Agent
(Processes InsuranceRequest)

Insurance Processing
(Insurance Company Enterprise)

Insurance Finance
(Approves InsuranceClaimRequest)

Government Treasurer
(Approves/rejects FundWorkRequest)

Insurance Policy Planner
(Updates policy coverage)

Government Secretary
(Processes FundWorkRequest)

Administrative Oversight
(Manages employees and workflows)

Fund Allocation
(Government Enterprise)

System Admin Role
(Sets up networks and organizations)

Healthcare Accountant
(Processes BillingWorkRequest)

Volunteer Coordination
(NGO Enterprise)

Lab Assistant
(Processes LabTestWorkRequest)

NGO Management Center
(Processes VolunteerWorkRequest)

Doctor
(Handles PatientWorkRequest)

NGO Resource Allocation Hub
(Approves requests)

Patient
(Submits AppointmentRequest)

NGO Operations and Deployment Unit
(Allocates volunteers)

Medical Assistance
(Hospital Network Enterprise)

UML Class Diagram :

EcoSystem
Networks: List[Network]
userAccounts: userAccountDirectory
configureSystem()

DB4OUtil
storeSystem()
retrieveSystem()

Network
name: str
enterpriseDirectory: EnterpriseDirectory
addEnterprise()

Enterprise
name: str
organizationDirectory: OrganizationDirectory
addOrganisation()

Organization
name: str
userAccountDirectory: UserAccountDirectory
addOrganisation()

Role
roleName: str
getResponsibilites()

UserAccount
username: str
role: Role
authenticate()

WorkRequest
sender: UserAccount
receiver: UserAccount
status: str
updateStatus()

Patient
name: str
patientID: str
requestTreatment()

Insurance
policynumber: str
holder: InsuranceCustomer
fileClaim()

System Hierarchy

System Admin

- **Action:** Manages networks, enterprises, organizations, and user accounts.
- **WorkRequest Type:** Administrative.
- **Next Step:** Sets up networks and organizations for government and NGO entities.

Doctor

- **Action:** Handles patient work requests, creates lab test and billing requests.
- **WorkRequest Type:** PatientWorkRequest.
- **Next Step:** Sends requests to Lab Assistant and Healthcare Accountant.

Lab Assistant

- **Action:** Processes lab test requests submitted by doctors.
- **WorkRequest Type:** LabTestWorkRequest.
- **Next Step:** Updates test results and sends them back to the Doctor.

Healthcare Accountant

- **Action:** Processes billing requests and emails billing details to patients.
- **WorkRequest Type:** BillingWorkRequest.
- **Next Step:** Finalizes billing and updates the Patient role.

Patient

- **Action:** Submits appointment requests, receives billing and insurance updates.
- **WorkRequest Type:** AppointmentRequest, BillingRequest.
- **Next Step:** Follows up with the Doctor or Healthcare Accountant.

NGO Request Intake Officer

- **Action:** Manages and verifies incoming aid and volunteer requests.
- **WorkRequest Type:** AidRequest, VolunteerWorkRequest.
- **Next Step:** Forwards verified requests to the Resource Coordinator.

NGO Resource Coordinator

- **Action:** Allocates volunteers and resources based on verified requests.
- **WorkRequest Type:** ResourceAllocationRequest.
- **Next Step:** Sends allocation details to the Deployment Specialist.

NGO Deployment Specialist

- **Action:** Ensures timely deployment of volunteers and aid.
- **WorkRequest Type:** DeploymentRequest.
- **Next Step:** Confirms deployment and updates request status.

Government Secretary

- **Action:** Processes fund requests submitted by NGOs, hospitals, or other entities.
- **WorkRequest Type:** FundWorkRequest.
- **Next Step:** Sends processed requests to the Government Treasurer.

Government Treasurer

- **Action:** Approves or rejects fund requests.
- **WorkRequest Type:** FundWorkRequest.
- **Next Step:** Updates request status and informs the requesting entity.

Insurance Agent

- **Action:** Manages policyholder data and processes insurance requests.
- **WorkRequest Type:** InsuranceRequest.
- **Next Step:** Approves or forwards requests to Insurance Finance for claims.

Insurance Finance

- **Action:** Processes insurance claims and approves or rejects them.
- **WorkRequest Type:** InsuranceClaimRequest.
- **Next Step:** Updates status and notifies the relevant Insurance Agent and Policyholder.

Insurance Policy Planner

- **Action:** Plans and updates insurance policies.
- **WorkRequest Type:** InsurancePolicyUpdateRequest.
- **Next Step:** Communicates updates to the Insurance Agent.

Administrative Role

- **Action:** Manages employees, organizations, user accounts, and submits requests for funds or volunteers as needed.
- **WorkRequest Type:** AdministrativeRequest.
- **Next Step:** May trigger workflows involving NGOs or Government roles.

Overview of Workflow:

System Admin Role (System Admin Enterprise):

The System Admin sets up networks and ensures all enterprises, organizations, and roles are active for disaster management.

Step 1: Volunteer Coordination (NGO Enterprise):

- NGO Healthcare Officer receives a VolunteerWorkRequest from a hospital for volunteers to assist in the affected region.
- The Healthcare Officer processes the request and sends it to the NGO Secretary.
- The NGO Secretary reviews the request, approves it, and forwards it to the NGO Treasurer.
- The NGO Treasurer allocates available volunteers to the hospital and marks the request as completed.

Step 2: Medical Assistance (HealthCenter Enterprise):

- A Patient submits an AppointmentRequest to the hospital for storm-related injuries.
- The Doctor processes the request, assigns necessary LabTestWorkRequests to the Lab Assistant, and creates a BillingWorkRequest for the services.
- The Lab Assistant completes the lab tests and sends the results to the Doctor.
- The Healthcare Accountant processes the BillingWorkRequest, sends the bill to the patient, and updates the status.

Step 3: Fund Allocation (Government Enterprise):

- The hospital submits a FundWorkRequest to the Government Secretary for additional funding to purchase medical supplies.
- The Government Secretary processes the request and forwards it to the Government Treasurer.
- The Government Treasurer reviews and approves the fund request, updating the hospital about the allocated funds.

Step 4: Insurance Processing (Insurance Company Enterprise):

- The Patient files an InsuranceRequest for the treatment costs.
- The Insurance Agent processes the request, verifies the policyholder data, and forwards it to the Insurance Finance department.
- The Insurance Finance team reviews the claim, approves it, and notifies both the Insurance Agent and the Patient.
- Simultaneously, the Insurance Policy Planner updates the policy to include disaster-related coverage and communicates it to the Insurance Agent.

Step 5: Administrative Oversight:

- The Administrative Role (Hospital Network) manages employee and organizational updates, ensuring all workflows are functioning efficiently.

Use Cases for Disaster Response and Resource Management

1. Patient Registration and Record Management
- Patients register through the system, and their data is maintained within the patient organization. This information is accessible to doctors and relevant healthcare providers.

2. Diagnosis and Lab Testing
- Doctors create diagnostic requests, and lab assistants conduct tests. Results are uploaded to the system for doctor review.

3. Billing Management

- Doctors create billing requests, and healthcare accountants process and send billing details to patients. The system maintains transparency for patients and the organization.

4. Insurance Management
- Patients can apply for insurance policies, make claims, and manage payments through the insurance organizations. Agents assist patients with policy queries.

5. Fund and Aid Allocation
- NGOs receive AidRequests from disaster-affected areas. The NGO Request Intake Officer verifies these requests and forwards them to the Resource Coordinator. Verified requests are addressed by allocating volunteers and resources.

6. Volunteer Deployment
- NGOs allocate and deploy volunteers and resources to hospitals or disaster-affected areas based on the verified requirements.

7. Government Oversight
- The healthcare secretary manages public health requests, while the treasurer organization oversees government grants to healthcare institutions. NGOs can also request government funds for disaster response efforts.

8. Administrative Oversight
- The System Admin oversees the entire hierarchy, ensuring workflows between enterprises, organizations, and roles function smoothly.