Group 20

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Integrated Cancer Care System

Purpose

Cancer care involves a multifaceted process that brings together healthcare professionals, labs, pharmacies, insurance agencies, and government bodies. Managing such a complex system often leads to communication delays, errors in treatment protocols, and inefficient resource allocation

This system serves as a unified digital hub to simplify complex oncology workflows. It facilitates secure, real-time access to essential patient data while promoting seamless coordination between care teams, labs, insurers, and government units.

Problem Statement

Treating cancer demands continuous coordination among multiple stakeholders, each playing a vital role in a patient's recovery. However, without a unified platform, care delivery often suffers from diagnostic delays, repeated procedures, and suboptimal allocation of hospital resources. The challenge is to create a secure, role-based digital system that unifies the cancer care ecosystem and supports smarter, faster decision-making.

Approach

The solution adopts a modular Java Swing-based architecture. Developed using Java Swing. Each user role is provided with a tailored interface and functionalities aligned with real-world responsibilities. To mimic realistic scenarios, synthetic datasets are

generated using data simulation tools. Role-based access ensures that users only see and interact with the data relevant to their responsibilities.

Project Objectives

1. Implement a Swing-based desktop application supporting 9 unique roles.
2. Develop interactive dashboards for doctors, patients, labs, and admins.
3. Design a multi-enterprise ecosystem with interconnected organizations.
4. Provide support for cross-enterprise and cross-organization workflows.
5. Provide a reporting and dashboard module for system-level insights.
6. Enable CRUD operations for all entities and requests.
7. Deliver a robust, error-handled, modular solution with clear design patterns.

Network

- **Healthcare Network**

Enterprises

- **Hospitals**
- **Laboratory**
- **Pharmacy**
- **Insurance Company**
- **Administration**

Organizations

Hospital

- **Department -** Includes departments such as oncology and radiology units.

Pharmacy

- **In-House Medication Team -** Manages and Dispenses medications and prescription taking

Diagnostic Lab

- **Diagnostic Imaging and Lab -** Processes X-rays, MRIs, CT scans

Insurance Provider

- **Claims Processing Division -** Approves billing and manages insurance documents

System Admin

- **IT/Admin Unit -** Maintains roles, user accounts, and system-level maintenance

Administration Health Department

- **Cancer Surveillance Office -** Collects and analyzes statistical data for reports and regulation

Roles in the System

1. Receptionist
2. Patient
3. Doctor
4. Nurse
5. Lab Technician
6. Pharmacist
7. Insurance Officer
8. System Administrator
9. Administration Health Department Official

Core Features

1. **Secure Login & Role-Based Access**
    - Distinct login credentials for each role.
    - Dynamic interface rendering based on the logged-in role.

2. **Patient Information Management**
    - Maintain and view medical history, diagnostic reports, vitals, and treatment progress.
    - Doctors can update case details and assign care instructions.

3. **Personalized Treatment Plan Module**
    - Enables oncologists to design personalized treatment plans that evolve with patient progress.
    - Integration with lab and pharmacy data for better decision-making.
4. **Communication System**
    - Doctors can message nurses or technicians.
    - Administrators can issue system-wide announcements.
5. **Reporting & Visual Insights**
    - Generate visual insights into cancer trends and treatment efficacy.
    - Dashboards for both clinical and administrative staff.
6. **Resource Allocation**
    - Manage and track the availability of beds, specialists, medical equipment, and medicines.
7. **Inter-Department Workflow Handling**
    - Diagnostic labs are prompted to process tests and push results into the patient's treatment timeline.
    - Pharmacies receive prescriptions; insurance officers process approvals.
    - Work request tracking with status updates.
8. **Test Data & Workflow Simulation**
    - Use of Faker or similar libraries to generate realistic test cases and data sets.
    - Ensures robust testing of system workflows and components.

Role Responsibilities

- **Receptionist:** Register new patients into the system and schedule appointments with doctors
- **Patient:** Access personal records, appointment details, and treatment updates.
- **Doctor:** Create/adjust care plans, assess diagnostic reports.
- **Nurse:** Record vitals, assist in treatment delivery based on instructions.
- **Lab Technician: Uploads** diagnostic reports and flags abnormal results.
- **Pharmacist:** Manages and dispenses medications and tracks inventory.
- **Administrator:** Manages user access, hospital infrastructure, and communication.
- **Insurance Officer:** Validates policy details and handles billing/claim approvals.
- **Health Department Official:** Gathers statistical data for analysis and regulation enforcement.

Technology Stack

Frontend

- **Java Swing (built using NetBeans GUI Builder)— used for creating the desktop-based user interface for each role with dynamic panel loading based on user type.**

Backend Logic

- **Java OOP principles with layered architecture for modeling ecosystems, enterprises, organizations, employees, user accounts, and work requests.**

Database

- **SQLite—used to store persistent data such as patient records, appointments, prescriptions, test reports, and user credentials. JDBC is used for database connectivity.**

Reporting and Visualization

- **JFreeChart—used to build interactive graphical reports and dashboards such as patient recovery trends, bed occupancy, and insurance claim statistics.**

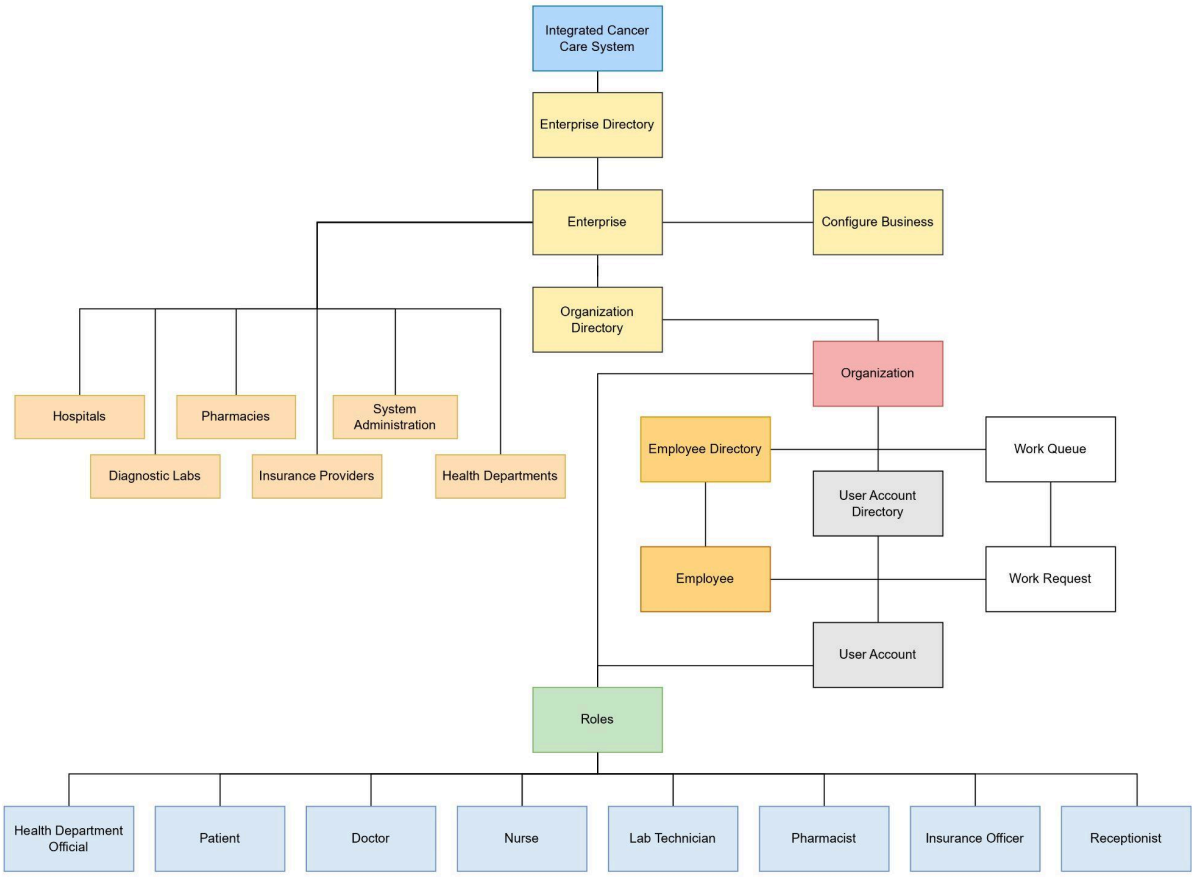
Build and Deployment Tool

- **Apache Ant—used for compiling, building, and packaging the application.**

Version Control

- **Git and GitHub—used for source code management, team collaboration, and version tracking of the project repository.**

UML Diagram


Integrated Cancer Care System
Enterprise Directory
Enterprise
Configure Business
Organization Directory
Organization
Hospitals
Pharmacies
System Administration
Diagnostic Labs
Insurance Providers
Health Departments
Employee Directory
Work Queue
User Account Directory
Employee
Work Request
User Account
Roles
Health Department Official
Patient
Doctor
Nurse
Lab Technician
Pharmacist
Insurance Officer
Receptionist

High Level Diagram