

Group 35

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Cancer Treatment System

Purpose

Cancer is a leading cause of death worldwide, and its treatment involves a complex interplay of multiple stakeholders, including patients, healthcare professionals, laboratories, and hospital administrators. Effective management of cancer care is essential to improve patient outcomes, reduce delays, and optimize the utilization of hospital resources. However, the current systems often struggle with fragmented communication, lack of centralized data management, and inefficiencies in resource allocation.

The **Cancer Treatment Management System (CTMS)** aims to address these challenges by providing a comprehensive digital platform that integrates various roles and functions within the healthcare ecosystem. This system seeks to streamline the treatment workflow, enhance communication, and deliver actionable insights to stakeholders.

Problem Statement

Cancer treatment is a complex process requiring coordinated efforts between multiple roles in the healthcare system. The challenge lies in managing the vast amount of information, ensuring timely communication, and analyzing patient and hospital data for better treatment outcomes. Additionally, a robust authentication mechanism is critical

to safeguard sensitive patient data.

Approach

The application follows an **Ecosystem Model** where multiple roles interact in a shared digital platform to address patient care needs efficiently. The system uses Java Swing for the UI, with modular panels for each functionality. Predefined or randomly generated datasets simulate real-world scenarios, ensuring consistent and realistic data ranges.

Project Objectives

1. Design and implement a **role-based Swing application** to simulate the cancer treatment management process.
2. Create **dashboards** for summarizing patient treatment details, hospital resource allocation, and overall progress tracking.

3. Enable communication between various stakeholders, including doctors, nurses, lab technicians, and administrators.
4. Implement robust **authentication** for secure access to the system.
5. Provide a **reporting module** to generate analytics and identify trends in treatment effectiveness and hospital resource usage.

Network

- **Healthcare Network**

Enterprises

- **Hospitals:** Manage patient admissions, treatment plans, and doctor-patient interactions.
- **Diagnostic Labs:** Perform and manage tests like biopsies, blood work, and imaging.
- **Pharmacies:** Track and dispense prescribed medication.
- **Insurance Providers:** Validate claims and ensure timely financial support.
- **Government:** Oversee cancer statistics and enforce healthcare compliance

Organizations

Hospital:

- Includes departments such as oncology, radiology, and chemotherapy units.

Pharmacy:

- Manages medication distribution and prescription tracking.

Diagnostic Lab:

- Handles patient tests, including blood work, imaging, and biopsies.

Insurance Provider:

- Processes patient insurance claims and payments.

System Administration:

- Responsible for managing users, roles, and overall application maintenance.

Government Health Department:

- Oversees cancer statistics and health policy recommendations.

Roles

1. Patient
2. Doctor
3. Nurse
4. Lab Technician
5. Pharmacist
6. Insurance Agent
7. System Administrator
8. Government Health Official

Implemented Features

1. Role-Based Authentication:

- Secure login system authenticates users based on roles (e.g., doctor, nurse, lab technician, administrator, pharmacist, insurance agent).
- Role-specific dashboards loaded dynamically, providing personalized interfaces for each user type.

2. Patient Management:

- CRUD operations for managing patient data, including demographics, medical history, diagnosis, and treatment plans.
- Search and filter functionality for patient records.
- Displays comprehensive patient details, including vital signs, test results, and progress.

3. Treatment Plan Management:

- Doctors can create, update, and review personalized treatment plans.
- Integration with lab results to refine treatment decisions based on diagnostics.

4. Communication Module:

- Enables role-based communication between stakeholders.
- Doctors can send alerts to nurses regarding patient-specific needs.
- Administrators can broadcast hospital-wide updates.

5. Reporting and Analytics:

- Summarized views of critical patient and hospital data with graphical insights.
- Key metrics such as average recovery time, hospital resource utilization, and patient demographics.
- Predictive analytics to identify trends and potential bottlenecks in treatment workflows.

6. Resource Management:

- Tracks and manages hospital resources like beds, equipment, staff availability, and medications.

7. Work Request Management:

- Cross-organization and cross-enterprise work requests, such as lab orders, pharmacy requisitions, and insurance approvals.
- Status tracking and updates for transparency in the workflow.

8. Test Case Configuration:

- Integration with the Faker module to generate random yet realistic data points.
 - Comprehensive test cases to validate workflows, ensuring system robustness and accuracy.
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Architecture (Roles and Responsibilities)

1. Patient:

- Provides initial data, including symptoms and medical history.
- Can view their treatment plans, progress updates, and scheduled appointments.

2. Doctor:

- Creates, reviews, and updates patient treatment plans.
- Analyzes lab results and communicates directly with nurses and lab technicians.
- Monitors patient progress and modifies plans as necessary.

3. Nurse:

- Monitors and records patient vital signs and daily progress.
- Administers treatments based on doctor's orders.
- Communicates with doctors for updates or concerns regarding patient care.

4. Lab Technician:

- Uploads lab results and diagnostic reports.
- Alerts doctors regarding abnormal test findings.
- Ensures the accuracy and timeliness of lab report submissions.

5. Administrator:

- Oversees hospital resource management, including bed availability, equipment, and medication inventory.
- Manages user access and monitors overall system performance.

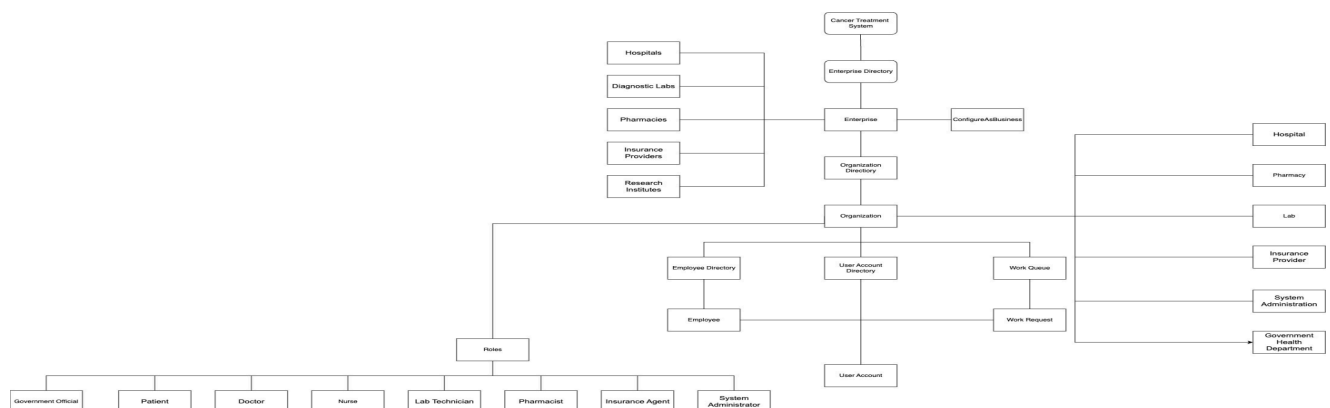
6. Pharmacist:

- Manages medication inventory and dispensation based on treatment plans.
- Communicates with doctors for prescription clarifications and updates.
- Alerts administrators about low stock levels of critical medicines.

7. Insurance Agent:

- Validates patient insurance details and processes claims.
- Coordinates with doctors and administrators for coverage of treatment plans.
- Provides financial approvals or queries for ongoing treatments.

UML Diagram:



High Level Component Diagram:

