Grop 4 Final Project:
Pandemic Reporting and Emergency Management System (PREMS)

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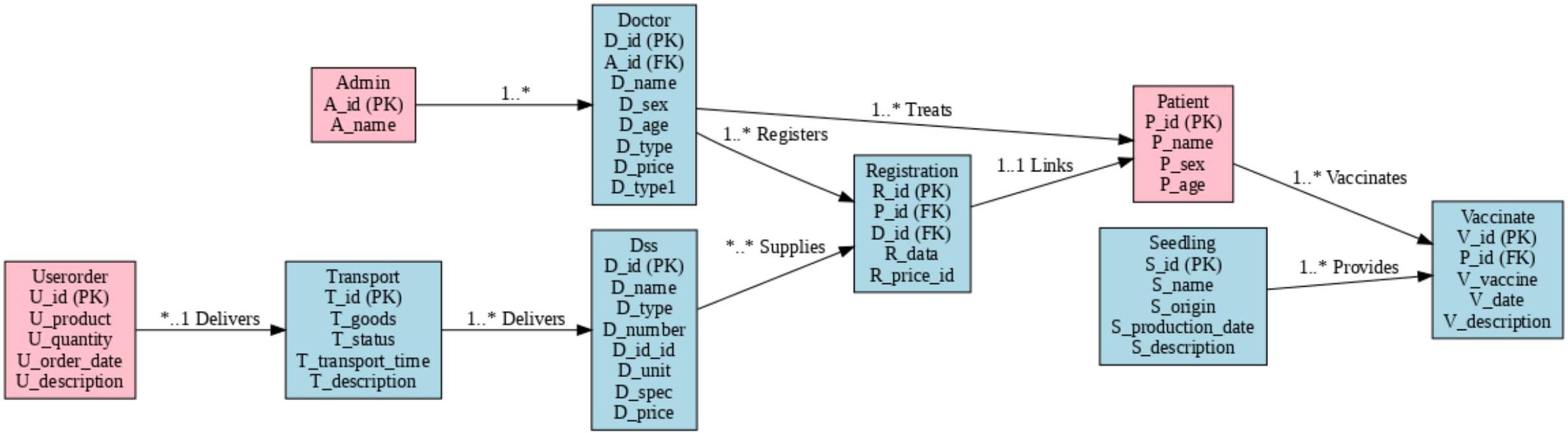
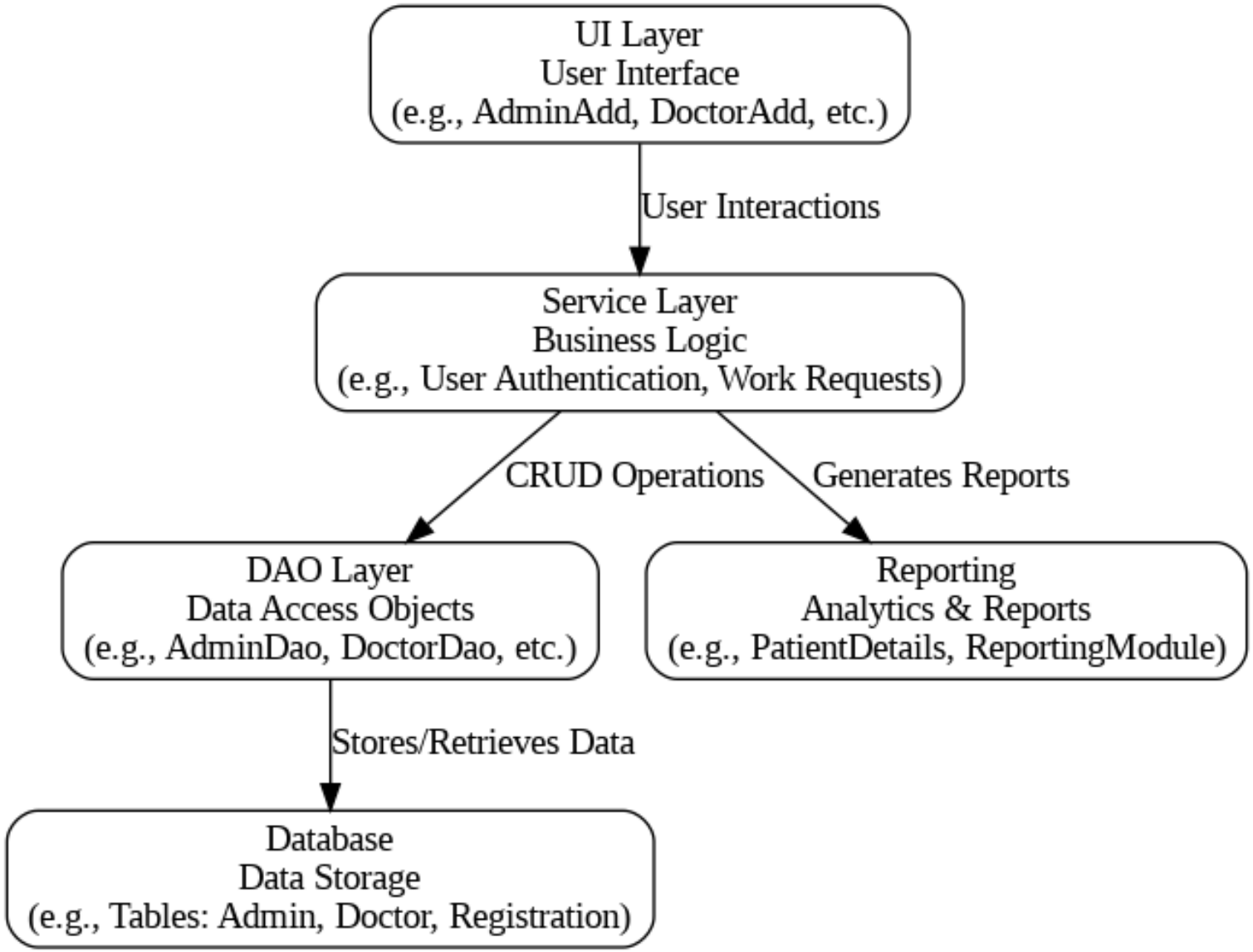
Problem Statement and Solution

- **Problem Statement**:
  - Challenges in managing multi-party collaborative healthcare systems:
    - Fragmentation of medical data across organizations.
    - Inefficient collaboration among administrators, and logistics teams.
    - Lack of integrated reporting and analytics for decision-making.
- **Solution**:
  - A **centralized healthcare management system** that:
    - **Streamlines operations** for vaccinations, prescriptions, supplies, and transportation.
    - **Facilitates secure collaboration** with role-based authentication and communication.
    - **Supports decision-making** with tools for tracking work requests, status updates, and analytics.

UML class diagram



High-level component diagram



Network Information

Network Information	
NetworkID	NetworkName
1	GlobalHealthNet

Organization/Enterprise Information

Organization/Enterprise Information	
Organization Name	Enterprise Name
Headquarters	FDA
IT Department	WHO
Regulatory Affairs	FDA
Healthcare Operations	WHO
Pharmacy	Merck
Compliance	Pfizer
Logistics	Fedex
Research & Development	Merck
Transportation	Fedex
Public Relations	Pfizer

User data

User Information				
User ID	Username	Role Name	Organization Name	Enterprise Name
1	Alice	Admin	Headquarters	FDA
2	Bob	Network Admin	IT Department	WHO
3	Charlie	Enterprise Admin	Regulatory Affairs	FDA
4	David	Organization Admin	Logistics	Fedex
5	Eve	Manager	Healthcare Operations	WHO
6	Frank	Employee	Pharmacy	Merck
7	Grace	Auditor	Compliance	Pfizer
8	Hank	Organization Admin	Research & Development	Merck
9	Ivy	Employee	Transportation	Fedex
10	Jack	Guest	Public Relations	Pfizer

Role Information

UserID	Username	RoleName	OrganizationName	EnterpriseName	Accessible Features (Menus)
1	Alice	Admin	Headquarters	FDA	Full Access: All menus including Patient Management, Doctor Management, Medicine Management, etc.
2	Bob	Network Admin	IT Department	WHO	- Pandemic Management (Add Pandemic, Manage Pandemics, Pandemic Report). - Vaccine Management (Add Vaccine, Manage Vaccines).
3	Charlie	Enterprise Admin	Regulatory Affairs	FDA	- Medicine Management (Add Medicine, Manage Medicines). - Pandemic Management (Add Pandemic, Manage Pandemics, Pandemic Report).
4	David	Organization Admin	Logistics	Fedex	- Hospital Management (Add Hospital, Manage Hospitals). - Transport Management (Add Transport, Manage Transports).
5	Eve	Manager	Healthcare Operations	WHO	- Hospital Management (Add Hospital, Manage Hospitals).
6	Frank	Employee	Pharmacy	Merck	- Medicine Management (Add Medicine, Manage Medicines). - Work Requests (Add Work Request, Manage Work Requests).
7	Grace	Auditor	Compliance	Pfizer	- Work Requests (Add Work Request, Manage Work Requests).
8	Hank	Organization Admin	Research & Development	Merck	- Medicine Management (Add Medicine, Manage Medicines). - Work Requests (Add Work Request, Manage Work Requests).
9	Ivy	Employee	Transportation	Fedex	- Transport Management (Add Transport, Manage Transports). - Work Requests (Add Work Request, Manage Work Requests).
10	Jack	Guest	Public Relations	Pfizer	No Access: Displays "No Access" and "Contact Admin".

Use case

- **Tracking Pandemic Data and Vaccine Distribution**
- **Actors**:
  - **Username**: Bob
    Role Name: Network Admin
    Organization Name: IT Department
    Enterprise Name: WHO
- **Description**: Monitor and update pandemic-related data and vaccine availability for public awareness.
- **Objective**: Ensure accurate and real-time pandemic updates across regions.
- **Features Accessed**: Pandemic Management, Vaccine Management.

Use case

- **Supporting R&D for Vaccine Development**
- **Actors**:
  - **Username**: Hank
    Role Name: Organization Admin
    Organization Name: Research & Development
    Enterprise Name: Merck
- **Description**: Collaborate on research and monitor work requests for vaccine development.
- **Objective**: Support innovation in vaccine production through efficient resource allocation.
- **Features Accessed**: Medicine Management, Work Requests.

Work Request

Work Request ID	Request Type	Requester Role	Requester Organization	Requester Enterprise	Receiver Role	Receiver Organization	Receiver Enterprise	Status	Description
1	Lab Test Request	Employee	Pharmacy	Merck	Organization Admin	Research & Development	Merck	Pending	Request for lab test on new medicine.
2	Equipment Request	Manager	Healthcare Operations	WHO	Organization Admin	Logistics	Fedex	In Progress	Request to deliver medical equipment to healthcare center.
3	Pandemic Data Update	Network Admin	IT Department	WHO	Manager	Healthcare Operations	WHO	Completed	Request to update pandemic statistics and reports.
4	Transport Coordination	Organization Admin	Logistics	Fedex	Employee	Transportation	Fedex	Pending	Request to arrange vaccine delivery logistics.

System Design

- **Presentation Layer (UI):**
  - Swing-based user interfaces like MrescriptionAdd are used for collecting and displaying data to users. This layer handles user interactions and validation.
- **Business Logic Layer (DAO):**
  - Classes such as MrescriptionDao and HospitalDao act as intermediaries between the UI and the database. They handle all CRUD (Create, Read, Update, Delete) operations.
- **Data Layer (Database):**
  - A MySQL database stores all persistent data. The schema includes structured tables such as hospital, mrescription, and registration.
- **Role-based Access Control:**
  - Role-based menu filtering ensures users access only their permitted features, improving security and usability.

Advanced Database Feature in the System

- **Centralized Design:**
- A unified database (db_prems) integrates healthcare data, eliminating silos and ensuring efficient data management across organizations.
- **Role-Based Access Control (RBAC):**
- The user table and related structures enforce secure, role-specific access, aligning features and data visibility with organizational roles.
- **Efficient Data Relationships:**
- Tables like registration, mrescription, and hospital leverage relational integrity (primary and foreign keys) to connect patients, doctors, and services seamlessly.
- **Comprehensive Use Cases:**
- Supports pandemic tracking, vaccine logistics, patient registrations, and hospital management through dedicated tables like prevention, transport, and hospital.

Implementation Techniques

1. **Database Operations:**
   - SQL queries are used for CRUD operations.
   - Prepared statements ensure secure and efficient interactions, preventing SQL injection.
2. **UI Components:**
   - Java Swing components like JTextField, JButton, and JComboBox are used for user input and interaction.
   - Layouts are manually defined for precise placement.
3. **Error Handling:**
   - Exceptions are caught and handled gracefully, displaying user-friendly error messages (e.g., JOptionPane).
4. **Validation:**
   - Input validation ensures data integrity (e.g., checking if fields are empty before database operations).
5. **Dynamic Data Loading:**
   - Dropdowns dynamically load data from the database using DAOs, ensuring up-to-date options for users.
6. **Integration with Database:**
   - MySQL serves as the backend database.
   - Database connection is managed through a BaseDao class, ensuring centralized control.
7. **Role-based Access Control:**
   - Menus and features are dynamically filtered based on user roles and organizational context using logic like filterMenusForRole.

Thanks