**4.1 System Design**

This section presents the architectural blueprint of the BloodLink system through a series of Unified Modeling Language (UML) and data-flow diagrams. These models provide a comprehensive visual representation of the system's structure, user interactions, process workflows, and data movement, ensuring a clear and consistent understanding of the software's design.

**Use Case Diagram**

The Use Case diagram identifies the primary actors of the system and illustrates their interactions with the system's core functionalities. It defines the system's boundary and shows how different users, such as the **Donor**, **Hospital Staff**, **Blood Bank Staff**, and **Administrator**, will utilize the platform to achieve their respective goals.

*A diagram of a diagram

AI-generated content may be incorrect.*

**Class Diagram**

The Class Diagram below models the static structure of the BloodLink system. It identifies the main classes, such as **User**, **Donor**, **BloodBankStaff**, **Appointment**, and **Inventory**, along with their attributes and operations. The diagram also maps the essential relationships between these classes, including inheritance (e.g., Administrator, HospitalStaff, and Donor are specialized types of User) and associations (e.g., a Donor can have one or more Appointments), providing a clear foundation for the system's object-oriented design.

A screenshot of a computer screen

AI-generated content may be incorrect.

**Activity Diagram**

This Activity Diagram illustrates the dynamic workflows within the BloodLink system. It visualizes the flow of control from one activity to another, showing the parallel processes available to different user roles after they log in. Each vertical swimlane represents a primary actor—such as a **Donor**, **Blood Bank Staff**, **Campaign Organizer**, **Hospital Staff**, **Administrator**, and **Delivery Personnel**—and details the sequence of actions they can perform within the system before logging out.

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AI-generated content may be incorrect.

**Data Flow Diagram (DFD)**

The Data Flow Diagram provides a high-level view of how information moves through the BloodLink system. It showcases the interactions between external entities (e.g., **Donor**, **Bloodbank staff**), key processes (e.g., **Inventory / Request management**), and data stores (e.g., **Campaign and venue data**). This diagram effectively maps the path of data from its origin to its destination, highlighting how different components of the system exchange information to function cohesively.

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