**Donor Information:**

Donor ID

Name

Contact Information

Date of Birth

Blood Type

Medical History

**Blood Inventory:**

Blood Bag ID

Blood Type

Quantity

Expiry Date

Donation Date

Donor ID

Storage Location

**Recipient Information:**

Recipient ID

Name

Contact Information

Blood Type

Medical History

Doctor's Prescription

**Transfusion Records:**

Transfusion ID

Donor ID

Recipient ID

Transfusion Date

Blood Bag ID

Doctor's Notes

**2. Entity-Relationship (ER) Diagram:**

Please note that I can't create visual diagrams, but I can provide a textual representation:

Donor (1) --- (1..n) Blood Donation

Recipient (1) --- (1..n) Transfusion

Blood Bag (1) --- (1..n) Transfusion

**3. Initial Data Security and Access Controls:**

Data security is crucial, especially in a medical context. The following measures should be implemented:

**Access Control:** Role-based access control, limiting access to authorized personnel only. Different users (e.g., doctors, nurses, administrators) will have varying levels of access to the system.

**Encryption:** All sensitive data should be encrypted both in transit (using HTTPS for communication) and at rest (using encryption for the database). This ensures that data is protected even if the physical server is compromised.

**Authentication**: Implement strong user authentication, including multi-factor authentication, to prevent unauthorized access to the system.

**Regular Backups:** Regularly back up the database to ensure data can be restored in case of any accidental data loss or system failure.

**Auditing and Logging**: Implement a comprehensive logging and auditing system to monitor and track access to sensitive data. This is crucial for maintaining accountability.

**4. Mapping Functional Requirements to Data Storage:**

**Donor Management**: Data on donors, including their medical history, will be stored to maintain a record of who has donated, their eligibility, and contact information.

**Blood Inventory Management**: Information about each blood bag, including blood type, quantity, and expiration date, will be stored to ensure efficient tracking of available blood units.

**Recipient Management**: Recipient data, such as their medical history and doctor's prescription, is stored to facilitate blood matching and transfusion coordination.

**Transfusion Records**: This data stores information about each transfusion, such as the donor, recipient, and doctor's notes, which is essential for maintaining a comprehensive medical history and ensuring safe transfusions.