**UCT-402 DATABASE MANAGEMENT SYSTEMS**

**Lab Assignment-2**

****

THAPAR INSTITUTE OF ENGINEERING AND TECHNOLOGY, PATIALA

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Course: Computer Science and Business System

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**Organ Donation and Procurement Network Management System**

Organ transplantation is a medical procedure in which an organ is removed from one body and placed in the body of a recipient, to replace a damaged or missing organ. The donor and recipient may be at the same location, or organs may be transported from a donor site to another location. Organ Donation and Procurement Organizations play a pivotal role in today’s medical institutions. Such organizations are responsible for the evaluation and procurement of organs for organ transplantation. These organizations represent the front-line of organ procurement, having direct contact with the hospital and the family of a recently deceased donor. The work of such organizations includes to identify the best candidates for the available organs and to coordinate with the medical institutions to decide on each organ recipient. They are also responsible for educating the public to increase the awareness of and participation in the organ donation process. Also, it keeps track of all transplantation operations carried till date.

The Organ Donation and Procurement Network Management System is a database management system that uses database technology to construct, maintain and manipulate various kinds of data about a person’s donation or procurement of a particular organ. It maintains a comprehensive medical history and other critical information of every person in the database design. In short, it maintains a database containing statistical information regarding network of organ donation and procurement.

**ER Diagram:**

**Entity Sets:**

**A. User**

1. User ID
2. Name (First Name, Last Name)
3. Date of birth
4. Phone Number (multi-valued)
5. Medical Insurance
6. Medical History
7. Address (Street, City, State)
8. Zip-Code

**B. Patient**

1. Patient ID
2. Organ Required
3. Reason of procurement
4. User ID (foreign key)

**C. Donor**

1. Donor ID
2. Organ Donated
3. Reason of donation
4. User ID (foreign key)

**D. Organ Available**

1. Organ ID
2. Organ Name
3. Donor ID (foreign key)

**E. Organization**

1. Organization ID
2. Organization Name
3. Address (Street, City, State)
4. Government approved organization or not
5. Phone Number (multi-valued)
6. Zip-Code

**F. Doctor**

1. Doctor ID
2. Name (First Name, Last Name)
3. Phone Number (multi-valued)
4. Address (Street, City, State)
5. Zip-Code

**Relationship Sets:**

**A. Donates** – The act of donation of an organ from a donor

**B. Procures** - The act of procuring an organ by the patient

**C. Transaction**

1. Date of transaction
2. Bill

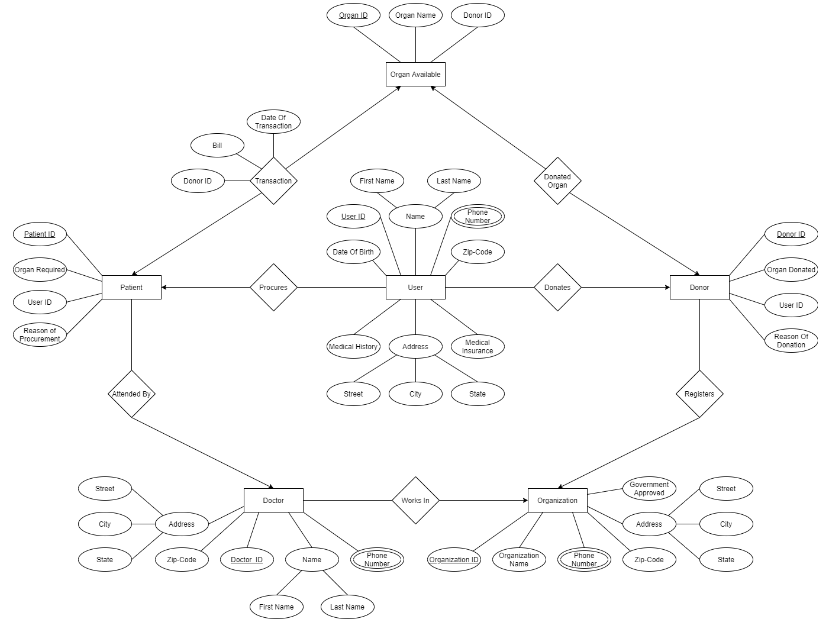
**D. Organ Donated** -The organ donated by a donor

**E. Attended By** -The transplantation performed by doctor

**F. Registers** - Donor is registered in which organization

**G. Works in** – The organization where the doctor works.

**ER Diagram:**



**Tables:**

1. **User**(User ID, First Name, Last Name, Date of birth, Medical Insurance, Medical History, Street, City, State, Zip-code)

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| User ID  (Primary Key) | First Name  (Not Null) | Last Name  (Not Null) | Date of birth  (Not Null) | Medical Insurance  (Not Null) | Medical History  (Default, Not Null) | Street  (Not Null) | City  (Not Null) | State  (Not Null) | Zip-code  (Not Null) |
|  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |

1. **User Phone** **Number**(User ID, Phone Number)

|  |  |
| --- | --- |
| User ID  (Foreign Key) | Phone Number  (Not Null) |
|  |  |
|  |  |

1. **Patient** (Patient ID, Reason Of Procurement ,Organ Required, Doctor ID ,User ID)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Patient ID  (Candidate Key) | Reason Of Procurement  (Candidate Key) | Organ Required  (Not Null) | Doctor ID  (Foreign Key) | User ID  (Foreign Key) |
|  |  |  |  |  |
|  |  |  |  |  |

1. **Donor**(Donor ID, Organ Donated, Reason Of Donation, Organization ID, User ID)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Donor ID  (Primary Key) | Organ Donated  (Not Null) | Reason Of Donation  (Not Null) | Organization ID  (Foreign Key) | User ID  (Foreign Key) |
|  |  |  |  |  |
|  |  |  |  |  |

1. **Transaction**(Patient ID, Organ ID, Donor ID, Date of transaction, Bill)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Patient ID  (Foreign Key) | Organ ID  (Foreign Key) | Donor ID  (Foreign Key) | Date of transaction  (Not Null) | Bill  (Not Null) |
|  |  |  |  |  |
|  |  |  |  |  |

1. **Organ Available**(Organ ID, Organ Name, Donor ID)

|  |  |  |
| --- | --- | --- |
| Organ ID  (Primary Key) | Organ Name  (Not Null) | Donor ID  (Foreign Key) |
|  |  |  |
|  |  |  |
|  |  |  |

1. **Organization**(Organization ID, Organization Name, Street, City, State, Zip-code, Government Approved)

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Organization ID  (Primary Key) | Organization Name  (Unique) | Street  (Not Null) | City  (Not Null) | State  (Not Null) | Zip-code  (Not Null) | Government Approved  (Not Null) |
|  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |

1. **Organization Phone Number**(Organization ID, Phone Number)

|  |  |
| --- | --- |
| Organization ID  (Foreign Key) | Phone Number  (Not Null) |
|  |  |
|  |  |

1. **Doctor**(Doctor ID, First Name, Last Name, Organization Id, Street, City, State, Zip-Code)

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Doctor ID  (Primary Key) | First Name  (Not Null) | Last Name  (Not Null) | Organization Id  (Foreign Key) | Street  (Not Null) | City  (Not Null) | State  (Not Null) | Zip-Code  (Not Null) |
|  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |

1. **Doctor Phone Number**(Doctor ID, Phone Number)

|  |  |
| --- | --- |
| Doctor ID  (Foreign Key) | Phone Number  (Not Null) |
|  |  |
|  |  |

**Tables and Their Functional Dependencies:**

1. **User**(User ID, First Name, Last Name, Date of birth, Medical Insurance, Medical History, Street, City, State, Zip-code)

**FD**= {User ID →First Name, Last Name, Date of birth, Medical Insurance, Medical History, Street, City, State, Zip-code }

1. **User Phone** **Number**(User ID, Phone Number)

**FD**= {User ID -> Phone Number}

{User ID} is foreign key constraint

1. **Patient**(Patient ID, Reason Of Procurement ,Organ Required, Doctor ID ,User ID)

**FD**= {Patient ID, Reason of Procurement -> Organ Required, Doctor ID, User ID}

{User ID, Doctor ID} are foreign key constraints

1. **Donor**(Donor ID, Organ Donated, Reason Of Donation, Organization ID, User ID)

**FD**= {Donor ID-> Reason of Donation, Organization ID, Organ Donated, User ID}

{User ID, Organization ID} are foreign key constraints

1. **Transaction**(Patient ID, Organ ID, Donor ID, Date of transaction, Bill)

**FD**= {Patient ID, Organ ID -> Donor ID, Date of transaction, Bill}

{Patient ID, Donor ID} are foreign key constraints

1. **Organ Available**(Organ ID, Organ Name, Donor ID)

**FD**= {Organ ID -> Organ Name, Donor ID}

{Donor ID} is foreign key constraint

1. **Organization**(Organization ID, Organization Name, Street, City, State, Zip-code, Government Approved)

**FD**= {Organization ID -> Organization Name, Street, City, State, Zip-code, Government Approved}

1. **Organization Phone Number**(Organization ID, Phone Number)

**FD**= {Organization ID -> Phone Number}

{Organization ID} is foreign key constraints

1. **Doctor**(Doctor ID, First Name, Last Name, Organization Id, Street, City, Address, Zip-Code)

**FD**= {Doctor ID -> First Name, Last Name, Organization Id, Street, City, Address, Zip-Code}

{Organization ID} is foreign key constraint

1. **Doctor Phone Number**(Doctor ID, Phone Number)

**FD**= {Doctor ID -> Phone Number}

{Doctor ID} is foreign key constraint

**Normalization:**

1. **Table Name: User**

**First Normal Form**

**User**(User ID, First Name, Last Name, Date of birth, Medical Insurance, Medical History, Street, City, State, Zip-code)

**FD**= {User ID →First Name, Last Name, Date of birth, Medical Insurance, Medical History, Street, City, State, Zip-code }

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| User ID | First Name | Last Name | Date of birth | Medical Insurance | Medical History | Street | City | State | Zip-code |
|  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |

**Second Normal Form**

**User**(User ID, First Name, Last Name, Date of birth, Medical Insurance, Medical History, Street, City, State, Zip-code)

**FD**= {User ID →First Name, Last Name, Date of birth, Medical Insurance, Medical History, Street, City, State, Zip-code }

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| User ID | First Name | Last Name | Date of birth | Medical Insurance | Medical History | Street | City | State | Zip-code |
|  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |

**Third Normal Form**

**User**(User ID, First Name, Last Name, Date of birth, Medical Insurance, Medical History, Zip-code)

**FD**= {User ID →First Name, Last Name, Date of birth, Medical Insurance, Medical History, Zip-code }

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| User ID | First Name | Last Name | Date of birth | Medical Insurance | Medical History | Zip-code |
|  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |

**User Zip-code** (Zip-code, Street, City, State)

**FD**= {Zip-code->Street, City, State}

|  |  |  |  |
| --- | --- | --- | --- |
| Zip-code | Street | City | State |
|  |  |  |  |
|  |  |  |  |

1. **Table Name: User Phone Number**

**First Normal Form**

**User Phone** **Number** (User ID, Phone Number)

**FD**= {User ID -> Phone Number}

|  |  |
| --- | --- |
| User ID | Phone Number |
|  |  |
|  |  |

**Second Normal Form**

**User Phone** **Number** (User ID, Phone Number)

**FD**= {User ID -> Phone Number}

|  |  |
| --- | --- |
| User ID | Phone Number |
|  |  |
|  |  |

**Third Normal Form**

**User Phone** **Number** (User ID, Phone Number)

**FD**= {User ID -> Phone Number}

|  |  |
| --- | --- |
| User ID | Phone Number |
|  |  |
|  |  |

1. **Table Name: Patient**

**First Normal Form**

**Patient** (Patient ID, Reason Of Procurement, Organ Required, Doctor ID, User ID)

**FD**= {Patient ID, Reason of Procurement -> Organ Required, Doctor ID, User ID}

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Patient ID | Reason Of Procurement | Organ Required | Doctor ID | User ID |
|  |  |  |  |  |
|  |  |  |  |  |

**Second Normal Form**

**Patient** (Patient ID, Reason of Procurement, Doctor ID, User ID)

**FD**= {Patient ID-> Doctor ID, User ID, Reason of Procurement}

|  |  |  |  |
| --- | --- | --- | --- |
| Patient ID | Doctor ID | User ID | Reason of Procurement |
|  |  |  |  |
|  |  |  |  |

**Reason of Procurement Organ Required** (Reason of Procurement, Organ Required)

**FD**= {Reason of Procurement->Organ Required}

|  |  |
| --- | --- |
| Reason of Procurement | Organ Required |
|  |  |
|  |  |

**Third Normal Form**

**Patient** (Patient ID, Reason of Procurement, Doctor ID, User ID)

**FD**= {Patient ID-> Doctor ID, User ID, Reason of Procurement}

|  |  |  |  |
| --- | --- | --- | --- |
| Patient ID | Doctor ID | User ID | Reason of Procurement |
|  |  |  |  |
|  |  |  |  |

**Reason of Procurement Organ Required** (Reason of Procurement, Organ Required)

**FD**= {Reason of Procurement->Organ Required}

|  |  |
| --- | --- |
| Reason of Procurement | Organ Required |
|  |  |
|  |  |

1. **Table Name: Donor**

**First Normal Form**

**Donor** (Donor ID, Organ Donated, Reason of Donation, Organization ID, User ID)

**FD**= {Donor ID-> Reason of Donation, Organization ID, Organ Donated, User ID}

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Donor ID | Organ Donated | Reason Of Donation | Organization ID | User ID |
|  |  |  |  |  |
|  |  |  |  |  |

**Second Normal Form**

**Donor** (Donor ID, Organ Donated, Reason of Donation, Organization ID, User ID)

**FD**= {Donor ID-> Reason of Donation, Organization ID, Organ Donated, User ID}

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Donor ID | Organ Donated | Reason Of Donation | Organization ID | User ID |
|  |  |  |  |  |
|  |  |  |  |  |

**Third Normal Form**

**Donor** (Donor ID, Organ Donated, Reason of Donation, Organization ID, User ID)

**FD**= {Donor ID-> Reason of Donation, Organization ID, Organ Donated, User ID}

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Donor ID | Organ Donated | Reason Of Donation | Organization ID | User ID |
|  |  |  |  |  |
|  |  |  |  |  |

1. **Table Name: Transaction**

**First Normal Form**

**Transaction** (Patient ID, Organ ID, Donor ID, Date of transaction, Bill)

**FD**= {Patient ID, Organ ID -> Donor ID, Date of transaction, Bill}

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Patient ID | Organ ID | Donor ID | Date of transaction | Bill |
|  |  |  |  |  |
|  |  |  |  |  |

**Second Normal Form**

**Transaction** (Patient ID, Organ ID, Date of transaction, Bill)

**FD**= {Patient ID -> Date of transaction, Bill, Organ ID}

|  |  |  |  |
| --- | --- | --- | --- |
| Patient ID | Date of transaction | Bill | Organ ID |
|  |  |  |  |
|  |  |  |  |

**Organ Donor** (Organ ID, Donor ID)

**FD**= {Organ ID -> Donor ID}

|  |  |
| --- | --- |
| Organ ID | Donor ID |
|  |  |
|  |  |

**Third Normal Form**

**Transaction** (Patient ID, Organ ID, Date of transaction, Bill)

**FD**= {Patient ID -> Date of transaction, Bill, Organ ID}

|  |  |  |  |
| --- | --- | --- | --- |
| Patient ID | Date of transaction | Bill | Organ ID |
|  |  |  |  |
|  |  |  |  |

**Organ Donor** (Organ ID, Donor ID)

**FD**= {Organ ID -> Donor ID}

|  |  |
| --- | --- |
| Organ ID | Donor ID |
|  |  |
|  |  |

1. **Table Name: Organ Available**

**First Normal Form**

**Organ Available** (Organ ID, Organ Name, Donor ID)

**FD**= {Organ ID -> Organ Name, Donor ID}

|  |  |  |
| --- | --- | --- |
| Organ ID | Organ Name | Donor ID |
|  |  |  |
|  |  |  |

**Second Normal Form**

**Organ Available** (Organ ID, Organ Name, Donor ID)

**FD**= {Organ ID -> Organ Name, Donor ID}

|  |  |  |
| --- | --- | --- |
| Organ ID | Organ Name | Donor ID |
|  |  |  |
|  |  |  |

**Third Normal Form**

**Organ Available** (Organ ID, Organ Name, Donor ID)

**FD**= {Organ ID -> Organ Name, Donor ID}

|  |  |  |
| --- | --- | --- |
| Organ ID | Organ Name | Donor ID |
|  |  |  |
|  |  |  |

1. **Table Name: Organization**

**First Normal Form**

**Organization** (Organization ID, Organization Name, Street, City, State, Zip-code, Government Approved)

**FD**= {Organization ID -> Organization Name, Street, City, State, Zip-code, Government Approved}

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Organization ID | Organization Name | Street | City | State | Zip-code | Government Approved |
|  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |

**Second Normal Form**

**Organization** (Organization ID, Organization Name, Street, City, State, Zip-code, Government Approved)

**FD**= {Organization ID -> Organization Name, Street, City, State, Zip-code, Government Approved}

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Organization ID | Organization Name | Street | City | State | Zip-code | Government Approved |
|  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |

**Third Normal Form**

**Organization** (Organization ID, Organization Name, Zip-code, Government Approved)

**FD**= {Organization ID -> Organization Name, Zip-code, Government Approved}

|  |  |  |  |
| --- | --- | --- | --- |
| Organization ID | Organization Name | Government Approved | Zip-code |
|  |  |  |  |
|  |  |  |  |

**Organization Zip-code** (Zip-code, Street, City, State)

**FD**= {Zip-code->Street, City, State}

|  |  |  |  |
| --- | --- | --- | --- |
| Zip-code | Street | City | State |
|  |  |  |  |
|  |  |  |  |

1. **Table Name: Organization Phone Number**

**First Normal Form**

**Organization Phone Number** (Organization ID, Phone Number)

**FD**= {Organization ID -> Phone Number}

|  |  |
| --- | --- |
| Organization ID | Phone Number |
|  |  |
|  |  |

**Second Normal Form**

**Organization Phone Number** (Organization ID, Phone Number)

**FD**= {Organization ID -> Phone Number}

|  |  |
| --- | --- |
| Organization ID | Phone Number |
|  |  |
|  |  |

**Third Normal Form**

**Organization Phone Number** (Organization ID, Phone Number)

**FD**= {Organization ID -> Phone Number}

|  |  |
| --- | --- |
| Organization ID | Phone Number |
|  |  |
|  |  |

1. **Table Name: Doctor**

**First Normal Form**

**Doctor** (Doctor ID, First Name, Last Name, Organization Id, Street, City, Address, Zip-Code)

**FD**= {Doctor ID -> First Name, Last Name, Organization Id, Street, City, Address, Zip-Code}

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Doctor ID | First Name | Last Name | Organization Id | Street | City | Address | Zip-Code |
|  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |

**Second Normal Form**

**Doctor** (Doctor ID, First Name, Last Name, Organization Id, Street, City, Address, Zip-Code)

**FD**= {Doctor ID -> First Name, Last Name, Organization Id, Street, City, Address, Zip-Code}

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Doctor ID | First Name | Last Name | Organization Id | Street | City | Address | Zip-Code |
|  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |

**Third Normal Form**

**Doctor** (Doctor ID, First Name, Last Name, Organization Id, Zip-Code)

**FD**= {Doctor ID -> First Name, Last Name, Organization Id, Zip-Code}

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Doctor ID | First Name | Last Name | Organization Id | Zip-Code |
|  |  |  |  |  |
|  |  |  |  |  |

**Doctor Zip-code** (Zip-code, Street, City, State)

**FD**= {Zip-code->Street, City, State}

|  |  |  |  |
| --- | --- | --- | --- |
| Zip-code | Street | City | State |
|  |  |  |  |
|  |  |  |  |

1. **Table Name: Doctor Phone Number**

**First Normal Form**

**Doctor Phone Number** (Doctor ID, Phone Number)

**FD**= {Doctor ID -> Phone Number}

|  |  |
| --- | --- |
| Doctor ID | Phone Number |
|  |  |
|  |  |

**Second Normal Form**

**Doctor Phone Number** (Doctor ID, Phone Number)

**FD**= {Doctor ID -> Phone Number}

|  |  |
| --- | --- |
| Doctor ID | Phone Number |
|  |  |
|  |  |

**Third Normal Form**

**Doctor Phone Number** (Doctor ID, Phone Number)

**FD**= {Doctor ID -> Phone Number}

|  |  |
| --- | --- |
| Doctor ID | Phone Number |
|  |  |
|  |  |