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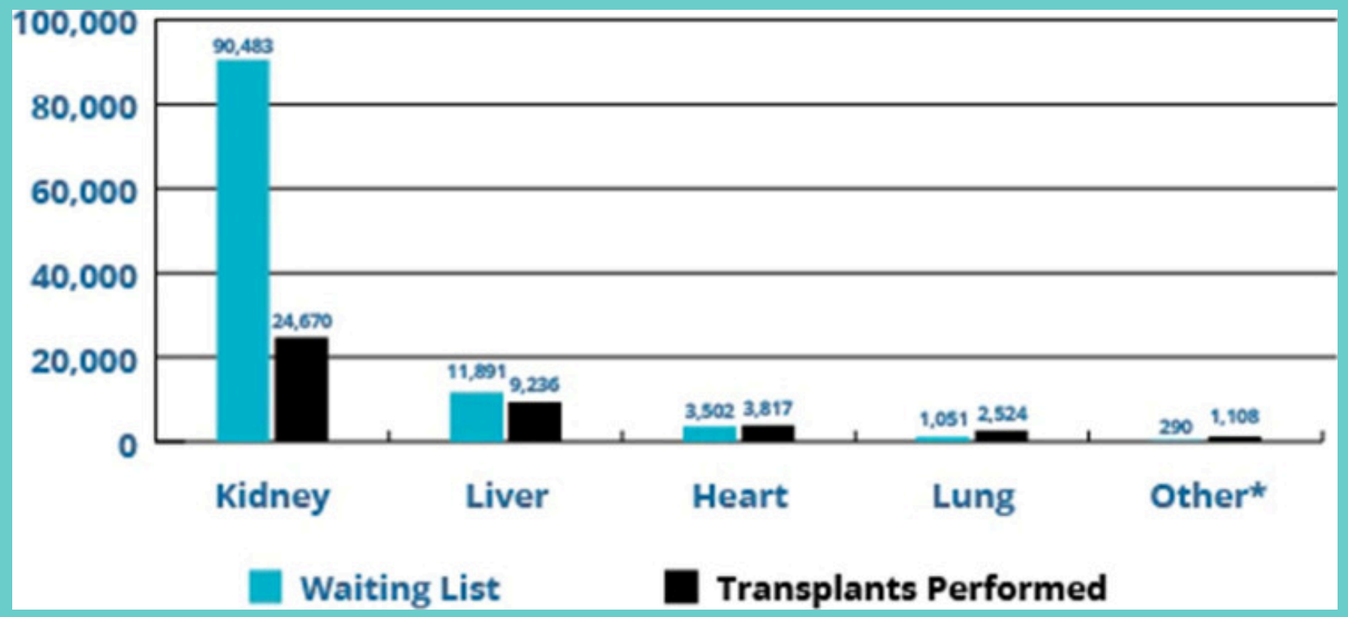
INTRODUCTION

This project involves designing and implementing a database for an organ transplantation network using MySQL. The database will handle information about patients, donors, organs, hospitals, and transplant procedures. CRUD operations (Create, Read, Update, Delete) and triggers will be employed to manage and automate the database operations.

Why OTN?

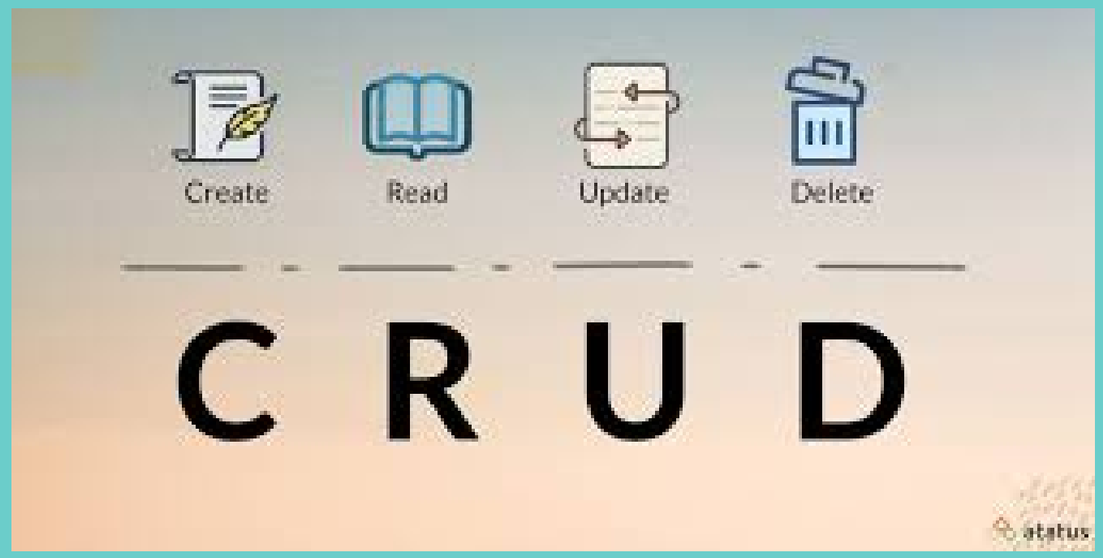
IT OFFERS A SECOND CHANCE AT LIFE TO PEOPLE OF ALL AGES WHO HAVE LIFE-THREATENING DISEASES OR INJURIES TO THEIR VITAL ORGANS.

- NOWADAYS, TECHNOLOGICAL AND MEDICAL ADVANCES HAVE MADE ORGAN TRANSPLANTATION ONE OF THE MOST SUCCESSFUL AND POPULAR TREATMENT METHODS.
- TRANSPLANTATION SURGERY IS REGARDED TO BE THE ONLY TREATMENT FOR THE END-STAGE FAILURE OF ORGANS SUCH AS THE LIVER, LUNG, AND HEART, AND ALSO THE MOST LOW-COST WAY TO TREAT KIDNEY END-STAGE DISEASES
- BASED ON THE STATISTICS, OVER 40,000 TRANSPLANTS WERE PERFORMED IN 2021.
- HOWEVER, UNFORTUNATELY, 17 PEOPLE DIE EACH DAY WAITING FOR AN ORGAN TRANSPLANT.
- THE BELOW FIGURE SHOWS THE NUMBER OF PATIENTS ON THE WAITING LIST AND THE PERFORMED TRANSPLANTATIONS DIVIDED BY 4 MAJOR TRANSPLANTABLE AND OTHER ORGANS IN 2021 (HRSA 2022).



CRUD Operations

1. **CREATE:**
   - PATIENTS: INSERT NEW PATIENTS INTO THE PATIENTS TABLE.
   - DONORS: INSERT NEW DONORS INTO THE DONORS TABLE.
   - ORGANS: ADD NEW ORGANS TO THE ORGANS TABLE.
   - HOSPITALS: REGISTER NEW HOSPITALS.
   - TRANSPLANTS: RECORD A NEW TRANSPLANT PROCEDURE.
2. **READ:**
   - RETRIEVE PATIENT, DONOR, ORGAN, HOSPITAL, AND TRANSPLANT INFORMATION USING SELECT QUERIES.
   - EXAMPLE: SELECT * FROM PATIENTS WHERE BLOOD_TYPE = 'O+';
3. **UPDATE:**
   - UPDATE PATIENT AND DONOR DETAILS.
   - CHANGE THE AVAILABILITY STATUS OF ORGANS.
   - UPDATE HOSPITAL INFORMATION.
   - MODIFY TRANSPLANT RECORDS IF NEEDED.
4. **DELETE:**
   - REMOVE RECORDS OF PATIENTS, DONORS, ORGANS, HOSPITALS, AND TRANSPLANTS AS NECESSARY.



Triggers

```
CREATE TRIGGER UPDATEPRIORITYAFTERTRANSPLANT
AFTER INSERT ON TRANSPLANTS
FOR EACH ROW
BEGIN
UPDATE PATIENTS
SET PRIORITYLEVEL = 0
WHERE PATIENTID = NEW.PATIENTID;
END
```

CONCLUSION

1. **EFFICIENT DATA MANAGEMENT**: UTILIZING A DBMS LIKE MYSQL FOR AN OTN ALLOWS FOR EFFICIENT STORAGE, RETRIEVAL, AND MANIPULATION OF DATA RELATED TO PATIENTS, DONORS, ORGANS, HOSPITALS, AND TRANSPLANT PROCEDURES. THIS STRUCTURED APPROACH ENHANCES DATA ORGANIZATION AND ACCESSIBILITY.

2. **IMPROVED PATIENT CARE**: WITH A WELL-DESIGNED DATABASE, HEALTHCARE PROVIDERS CAN TRACK PATIENTS' MEDICAL HISTORY, ORGAN NEEDS, TRANSPLANT PROCEDURES, AND FOLLOW-UP CARE MORE EFFECTIVELY. THIS LEADS TO IMPROVED PATIENT CARE AND OUTCOMES.

3. **ENHANCED COORDINATION**: THE DATABASE FACILITATES SEAMLESS COORDINATION AMONG HEALTHCARE PROFESSIONALS, TRANSPLANT COORDINATORS, HOSPITALS, AND ORGAN PROCUREMENT ORGANIZATIONS (OPOS). REAL-TIME DATA UPDATES ENSURE EVERYONE HAS ACCESS TO THE LATEST INFORMATION, AIDING IN TIMELY DECISION-MAKING.

4. **DATA INTEGRITY AND SECURITY**: IMPLEMENTING PROPER DATABASE DESIGN PRINCIPLES, ACCESS CONTROLS, AND DATA VALIDATION MECHANISMS ENSURES DATA INTEGRITY AND SECURITY. PATIENT CONFIDENTIALITY AND REGULATORY COMPLIANCE (E.G., HIPAA) ARE MAINTAINED.

5. **AUTOMATION WITH TRIGGERS**: THE USE OF TRIGGERS AUTOMATES CERTAIN DATABASE ACTIONS, SUCH AS UPDATING PATIENT PRIORITY LEVELS AFTER TRANSPLANTS OR LOGGING AUDIT TRAILS. THIS REDUCES MANUAL INTERVENTION, MINIMIZES ERRORS, AND STREAMLINES PROCESSES.

IN CONCLUSION, LEVERAGING A DBMS IN AN ORGAN TRANSPLANTATION NETWORK BRINGS NUMEROUS BENEFITS RANGING FROM EFFICIENT DATA MANAGEMENT AND IMPROVED PATIENT CARE TO ENHANCED COORDINATION, DATA SECURITY, AUTOMATION, DECISION SUPPORT, SCALABILITY, AND FLEXIBILITY. IT PLAYS A VITAL ROLE IN MODERN HEALTHCARE SYSTEMS STRIVING TO OPTIMIZE ORGAN DONATION AND TRANSPLANTATION PROCESSES WHILE PRIORITIZING PATIENT WELL-BEING.

References:

1. HTTPS://OPTN.TRANSPLANT.HRSA.GOV/
2. HTTPS://WWW.NCBI.NLM.NIH.GOV/PMC/ARTICLES/PMC9930023/

Thank You