



**Islamic University of Technology**  
**Lab Task 04**  
**CSE 4308 - DBMS Lab**

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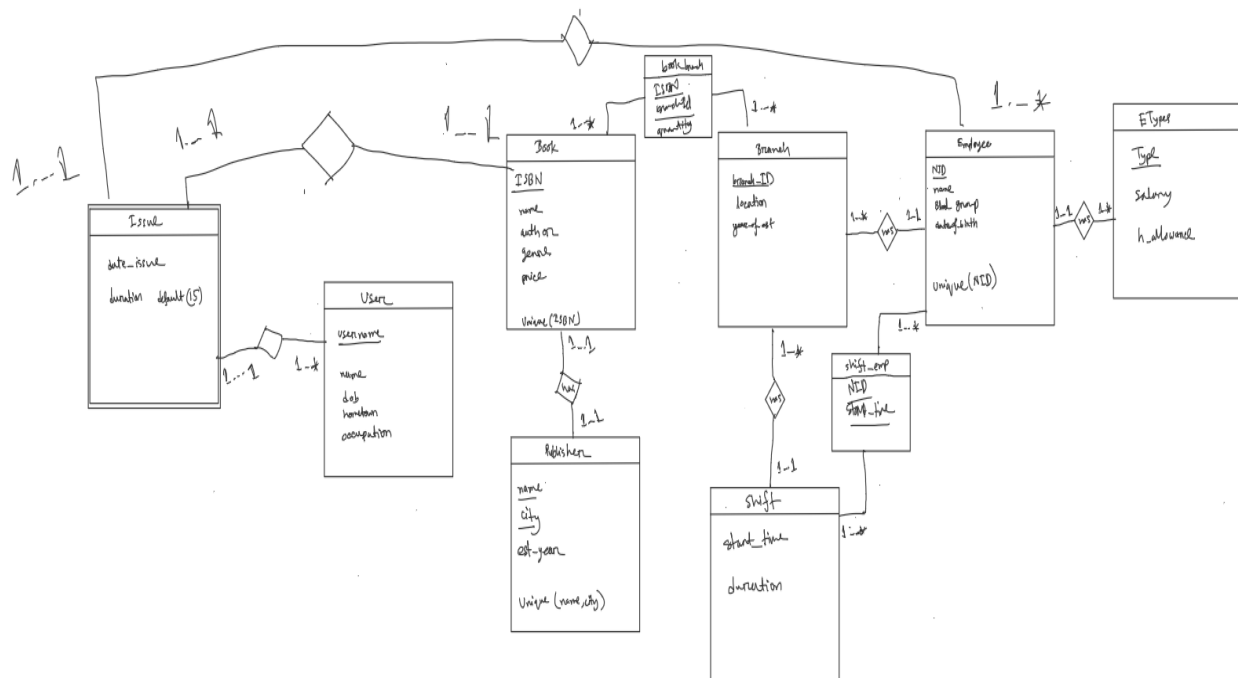
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## Task :

## Report :

**Analysis :** In this task, we need to draw an ER diagram with appropriate cardinality and negating data redundancy. Afterwards, the ER diagram has to be converted into DDL using standard SQL denoting the appropriate constraints.

## ER Diagram :



## Working code :

```
create table branch(  
    branch_id varchar2(10),  
    location varchar2(30),  
    year_est DATE,  
    nid varchar2(17)  
  
    constraint pk_branch primary key (branch_id)
```

```

        constraint fk_nid FOREIGN KEY (nid) references employee(nid)
    )

create table employee(
    nid varchar2(17),
    name varchar2(30),
    blood_group varchar2(3),
    dob DATE,
    type varchar2(10)

    Constraint pk_employee primary key (nid)
    CONSTRAINT uc_nid unique(nid)
    CONSTRAINT fk_etypes FOREIGN KEY (type) REFERENCES etypes(type)
)

create table etypes(
    type VARCHAR2(10),
    base_salary NUMBER,
    h_allowance NUMBER
    constraint pk_type primary key (type)
)

create table book_branch(
    branch_id varchar2(10),
    ISBN varchar2(20)
    constraint pk_branch_id_ISBN primary key (branch_id, ISBN)
    constraint fk_branch_id FOREIGN KEY (branch_id) REFERENCES
branch(BRANCH_ID)
    constraint fk_ISBN FOREIGN KEY (ISBN) REFERENCES book(ISBN)
)

create table book(
    ISBN VARCHAR2(13),
    name varchar2(20),
    author varchar2(20),
    genre varchar2(20),
    price NUMBER

```

```

        constraint pk_book primary key (ISBN)
        constraint uc_ISBM unique (ISBN)
    )

create table publisher(
    name varchar2(30),
    city varchar2(20),
    est_year varchar2(4),
    ISBN varchar2(13)
    constraint pk_publisher primary key (name, city)
    constraint fk_ISBN FOREIGN KEY (ISBN) REFERENCES book(ISBN)
)

create table user(
    username varchar2(20),
    name varchar2(30),
    dob date,
    hometown varchar2(20),
    occupation varchar2(20)

    constraint pk_user primary key (username)
    constraint uc_username unique (username)
)

create table issue(
    date_issue date,
    duration number default 15,
    username varchar2(20) references user(username),
    ISBN varchar2(13) references book(ISBN),
    nid varchar2(17) references employee(nid)

    constraint fk_user FOREIGN KEY (username) references user(username)
    constraint fk_ISBN FOREIGN KEY (ISBN) references book(ISBN)
    constraint fk_NID FOREIGN KEY (nid) references employee(nid)
)

```

```

create table shift(
    start_time time,
    duration number,
    branch_id varchar2(10)

    CONSTRAINT pk_start_time primary key (start_time)
    constraint fk_branch_id FOREIGN KEY (branch_id) REFERENCES
branch(BRANCH_ID)
)

create table shift_emp(
    NID varchar2(17) references employee(NID),
    start_time time references shift(start_time)

    constraint pk_NID_start_time primary key (NID, start_time)

    constraint fk_NID FOREIGN KEY (NID) REFERENCES employee(NID)
    constraint fk_start_time FOREIGN KEY (start_time) REFERENCES
shift(start_time)
)

```

**Explanation of solution :** The ER diagram contains the database schema of We are Booked (WB) legal depository. The diagram has 8 tables and 2 junction tables.

1. Branch table : branch\_id is the primary key of this table along with relevant attributes. This branch has a one to many relationship with the Employee table, one to many relationship with shift table and many to many relationship with the Book table. The table has a foreign key (nid) from the Employee table.
  - a. Primary key : branch\_id
  - b. Foreign key : nid from Employee table
  - c. Relationships :
    - i. One to one : none
    - ii. One to many : Employee and Shift table
    - iii. Many to many : Book table
2. Employee table :
  - a. Primary key : nid

- b. Foreign key : type from etypes table
  - c. Relationships :
    - i. One to one : None
    - ii. One to many : Branch, etypes, Issue tables
    - iii. Many to many : Shift table
3. Shift table :
- a. Primary key : start\_time
  - b. Foreign key : branch\_id from branch table
  - c. Relationships :
    - i. One to one : none
    - ii. One to many : Branch table
    - iii. Many to many : Employee table
4. Book table :
- a. Primary key : ISBN
  - b. Foreign key : None, has a unique constraint on ISBN
  - c. Relationships :
    - i. One to one : Issue table, Publisher table
    - ii. One to many : None
    - iii. Many to many : Branch table
5. Publisher table :
- a. Primary key : Name and City
  - b. Foreign key : ISBN from Book table
  - c. Relationships :
    - i. One to one : Book table
    - ii. One to many : None
    - iii. Many to many : None
6. User table :
- a. Primary key : username
  - b. Foreign key : None, has a unique constraint of username
  - c. Relationships :
    - i. One to one : None
    - ii. One to many : Issue table
    - iii. Many to many : None
7. Issue table :
- a. Primary key : None
  - b. Foreign key : username from User table, ISBN from Book table and nid from Employee table.

- c. Relationships :
  - i. One to one : Book table
  - ii. One to many : User table and Employee table
  - iii. Many to many : None
- 8. Etypes table :
  - a. Primary key : Type
  - b. Foreign key : None
  - c. Relationships :
    - i. One to one : None
    - ii. One to many : Employee table
    - iii. Many to many : None
- 9. Shift\_emp junction table :
  - a. Primary key : NID and start\_time
  - b. Foreign key : NID from Employee table and start\_time from Shift table
  - c. Relationships : Serves as a junction between Shift and Employee tables
- 10. Book\_branch junction table :
  - a. Primary key : ISBN and branch\_id
  - b. Foreign key : ISBN from book table and branch\_id from Branch table
  - c. Relationships : Serves as a junction between Book and Branch tables

**Findings :** Visualizing different relationships between entities is the key to making a successful ER diagram. Fundamental knowledge of cardinality and data redundancy is a must for this purpose. In case of implementation, knowing the correct syntax for DDL and appropriate constraints is also imperative.

**Problems :** Figuring out the schema of the database proved to be a challenge. While drawing the ER diagram, cardinality of certain tables were difficult to apprehend. Checking data redundancy was also a stone in the way. On a specific note, finding out the relationship between the shift table with the branch and the employee table was difficult to visualize and implement. So was with the issue table as it introduced a weak entity. Furthermore, it is difficult to verify the efficiency of this schema due to lack of examples and proof checking. All in all, the lab task was beneficial to my understanding of the ER diagram and its implementation.