Lab 6 Report

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Program : SWE

Department : CSE

Course : CSE 4308

Information Given

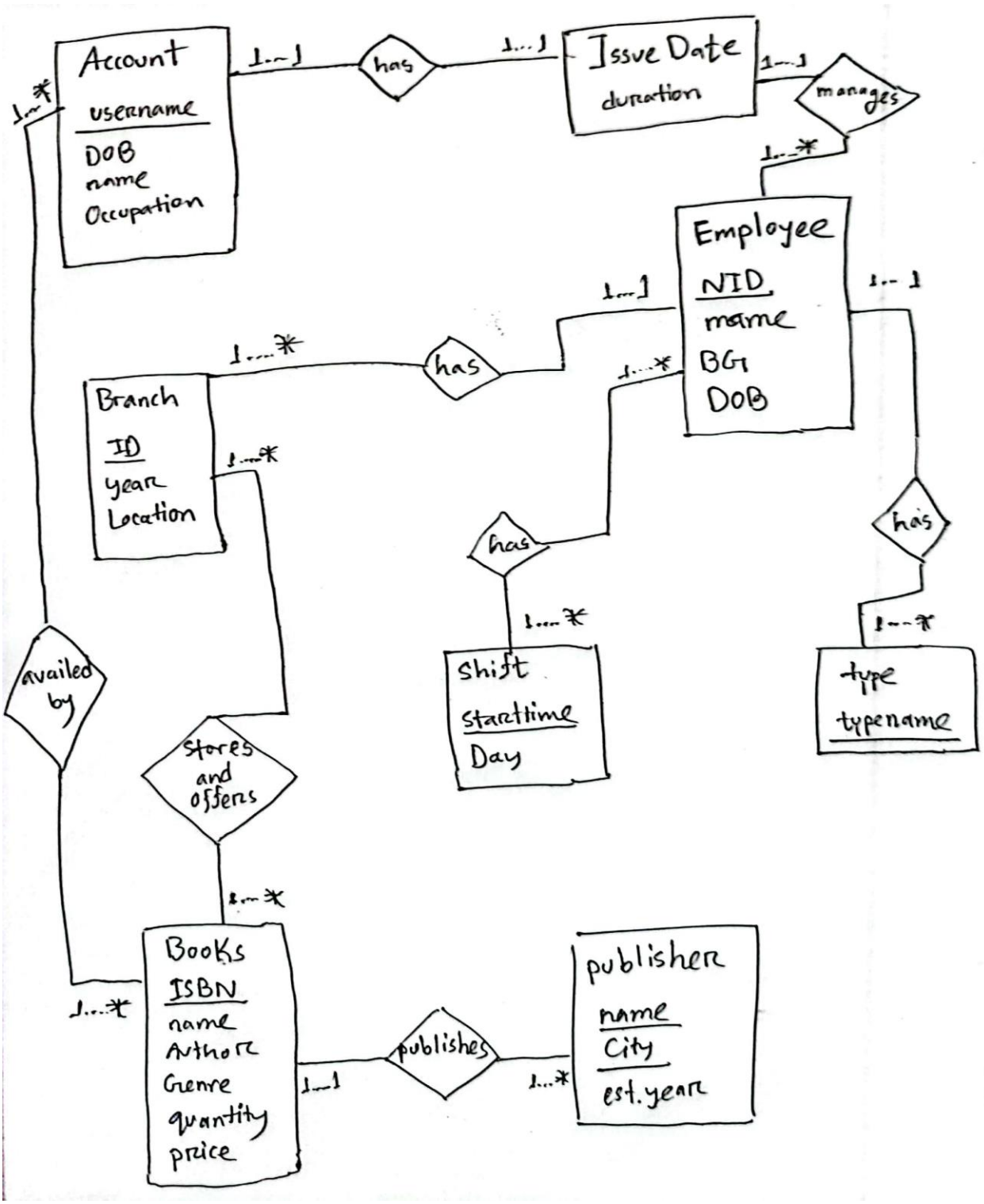
We are Booked (WB) is the legal depository of all new books and other printed materials in Bangladesh. Previously they stored all their information on paper. Recently they have decided to use a database. They have come up with the following requirements:

- There are many branches of WB in different locations in the country. Each branch has its unique branch ID, location, and year of establishment.
- Every branch is maintained by some employees. During the recruitment process, the National ID (NID), name, blood group, and birth date are stored. WB has three types of employees, namely Admin, Librarian, and Maintenance. Each has a separate base salary and 40% housing allowance based on the base salary.
- The employees work in different shifts in different branches. Each shift starts at a certain time on a specific day of the week. It also has a fixed duration.
- Of course the branches house many books. Each book can be identified by a 13-digit ISBN number. The name, author, genre, and price of the books are also stored. The number of copies of a book for each branch should be also tracked efficiently.
- Each book comes from different publishers. The publishers have their name, city, and establishment year. Note that, the same city will not have more than one publisher with the same name.
- To issue a book from any branch, a user has to create an account, providing their unique username. In addition to that, the user's name, date of birth, hometown, and occupation are also stored.
- When a book is issued by a user, the employee sets the issue date and number of days the user can keep the book. It might happen that sometimes the employee forgets to put the duration. In that case, the book should be returned within 15 days. Additionally, information about the user, book, and employee involved needs to be tracked for future purposes.

Problem statement:

1. Draw an ER Diagram, without any data redundancy, specifying the cardinality explicitly. You may add additional attributes only if it is needed.

Since I drew the ER Diagram on my copy, here's the scanned picture of it:


Account
username
DOB
name
Occupation
has
Issue Date
duration
manages
Employee
NID
name
BG
DOB
Branch
ID
year
Location
has
has
has
Shift
starttime
Day
type
typename
availed by
stores and offers
Books
ISBN
name
Author
Genre
quantity
price
publishes
publisher
name
City
est. year
1...1
1...*

2. Convert the ER Diagram into DDL using standard SQL denoting the appropriate constraints.

These are the relations and necessary constraints according to my ER Diagram:

```
CREATE TABLE BOOKS
(
    ISBN varchar(13),
    name varchar(50),
    Author varchar(50),
    genre varchar(50),
    quality int,
    price numeric(10, 2),
    CONSTRAINT PK_BOOKS PRIMARY KEY (ISBN)
);


CREATE TABLE PUBLISHER
(
    publisher_name varchar(50),
    city varchar(50),
    publisher_est_year int,
    ISBN varchar(13),
    CONSTRAINT PK_PUBLISHER PRIMARY KEY (publisher_name, city),
    CONSTRAINT FK_BOOKS FOREIGN KEY (ISBN) REFERENCES BOOKS (ISBN)
);


CREATE TABLE BRANCH
(
    B_ID varchar(5),
    location varchar(20),
    branch_Est_year YEAR,
    ISBN varchar(13),
    CONSTRAINT PK_BRANCH_ID PRIMARY KEY (ID),
    CONSTRAINT FK_BOOKS FOREIGN KEY (ISBN) REFERENCES BOOKS (ISBN)
);


CREATE TABLE TYPE
(
    typename varchar(50),
    base_salary numeric(10, 2),
    CONSTRAINT PK_TYPENAME PRIMARY KEY (typename)
```

```
);


CREATE TABLE Issued_book
(
    ISBN varchar(13),
    duration int,
    issued_date date,
    CONSTRAINT FK_BOOKS FOREIGN KEY (ISBN) REFERENCES BOOKS (ISBN) ON DELETE
CASCADE
);


CREATE table SHIFT
(
    Working_Shift DATETIME
);


CREATE TABLE EMPLOYEE
(
    NID int,
    name varchar(30),
    Blood_Group varchar(3),
    DOB DATE,
    B_ID varchar(5),
    Working_Shift DATETIME,
    typename varchar(50),
    duration int,
    CONSTRAINT PK_EMPLOYEE_NID PRIMARY KEY (NID),
    CONSTRAINT FK_BRANCH_ID FOREIGN KEY (B_ID) REFERENCES BRANCH (B_ID),
    CONSTRAINT FK_SHIFT FOREIGN KEY (Working_Shift) REFERENCES SHIFT
(Working_Shift),
    CONSTRAINT FK_TYPE FOREIGN KEY (typename) REFERENCES TYPE (typename),
    CONSTRAINT FK_ISSUED_BOOK FOREIGN KEY (duration) REFERENCES Issued_book
(duration)
);
```

```
CREATE TABLE ACCOUNT
(
    USERNAME VARCHAR(50),
    USER_DOB DATE,
    NAME varchar(50),
    occupation VARCHAR(50),
    ISBN VARCHAR(13),
    duration INT,
    CONSTRAINT PK_ACCOUNT PRIMARY KEY (USERNAME),
    CONSTRAINT FK_BOOKS FOREIGN KEY (ISBN) REFERENCES BOOKS (ISBN),
    CONSTRAINT FK_ISSUED_BOOK FOREIGN KEY (duration) REFERENCES ISSUED_BOOK
(duration)
);
```

Explanations of the relationships:

- Many **employees** work in one **Branch** but one employee cannot work in many branches.
- **Account** has **Issue Date** which is maintained by **Employee**
- An **account** can avail **books**
- **Publisher** publishes **books**
- **Employee** can have many **shifts**
- There are only 3 **types** of **employees**
- **Branches** store and offer many **books**