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ADT23SOCB1509

Assignment-3

**Applying Integrity Constraints in Library Management System**

**1) NOT NULL Constraint**

Ensures that a column **cannot have NULL values**.  
Example: The Title column in the **Book** table should always have a value.

CREATE TABLE Book (

Book\_ID INT PRIMARY KEY,

Title VARCHAR(255) NOT NULL,

Author VARCHAR(255),

Publisher VARCHAR(255),

Year\_Published INT

);

* Here, Title **cannot be NULL** because of the **NOT NULL constraint**.

**2) CHECK Constraint**

Ensures that values in a column **meet a specific condition**.  
Example: The **Year\_Published** should always be greater than 1900.

ALTER TABLE Book ADD CONSTRAINT chk\_Year CHECK (Year\_Published > 1900);

* This ensures that **Year\_Published** cannot be **before 1900**.

Example: The **Membership\_Date** should not be in the future.

ALTER TABLE Member ADD CONSTRAINT chk\_Membership\_Date CHECK (Membership\_Date <= CURDATE());

* This ensures **membership dates** are not set in the **future**.

**3) PRIMARY KEY and UNIQUE Constraint**

* **Primary Key** ensures **uniqueness and NOT NULL** for a column.
* **Unique** ensures **no duplicate values** but allows NULL.

Example:

CREATE TABLE Member (

Member\_ID INT PRIMARY KEY,

Name VARCHAR(100) NOT NULL,

Membership\_Date DATE,

Address VARCHAR(255),

Email VARCHAR(100) UNIQUE

);

* **Member\_ID** is the **Primary Key** (ensures uniqueness and NOT NULL).
* **Email** is set as **Unique** (ensures no duplicate emails but allows NULL).

**4) FOREIGN KEY Constraint**

Ensures **referential integrity** between tables.  
Example: Transaction table references Book and Member.

CREATE TABLE Transaction (

Transaction\_ID INT PRIMARY KEY,

Member\_ID INT,

Book\_ID INT,

Issue\_Date DATE,

Return\_Date DATE,

CONSTRAINT fk\_Member FOREIGN KEY (Member\_ID) REFERENCES Member(Member\_ID),

CONSTRAINT fk\_Book FOREIGN KEY (Book\_ID) REFERENCES Book(Book\_ID)

);

* fk\_Member ensures **only existing members** can borrow books.
* fk\_Book ensures **only available books** can be borrowed.

**Final Database Schema with Constraints**

CREATE TABLE Book (

Book\_ID INT PRIMARY KEY,

Title VARCHAR(255) NOT NULL,

Author VARCHAR(255),

Publisher VARCHAR(255),

Year\_Published INT CHECK (Year\_Published > 1900)

);

CREATE TABLE Member (

Member\_ID INT PRIMARY KEY,

Name VARCHAR(100) NOT NULL,

Membership\_Date DATE CHECK (Membership\_Date <= CURDATE()),

Address VARCHAR(255),

Email VARCHAR(100) UNIQUE

);

CREATE TABLE Transaction (

Transaction\_ID INT PRIMARY KEY,

Member\_ID INT,

Book\_ID INT,

Issue\_Date DATE,

Return\_Date DATE,

CONSTRAINT fk\_Member FOREIGN KEY (Member\_ID) REFERENCES Member(Member\_ID),

CONSTRAINT fk\_Book FOREIGN KEY (Book\_ID) REFERENCES Book(Book\_ID)

);