**Computer Science 204: Database Programming**

**A.CREATE THE TABLES w constraints**

**CREATE TABLE `libraries`.`author` (**

**`AuthorId` INT NOT NULL,**

**`AuthorFirstName` VARCHAR(45) NULL,**

**`AuthorLastName` VARCHAR(45) NULL,**

**`AuthorNationality` VARCHAR(45) NULL,**

**PRIMARY KEY (`AuthorId`));**

**CREATE TABLE `libraries`.`book` (**

**`BookID` INT NOT NULL,**

**`BookTitle` VARCHAR(50) NOT NULL,**

**`BookAuthor` INT NOT NULL,**

**`Genre` VARCHAR(20),**

**PRIMARY KEY (`BookID`));**

**CREATE TABLE `libraries`.`Borrower` (**

**`BorrowId` INT NOT NULL,**

**`ClientId` INT NOT NULL,**

**`BookId` INT NOT NULL,**

**`BorrowDate` date,**

**PRIMARY KEY (`BorrowId`));**

**CREATE TABLE `libraries`.`Client` (**

**`ClientId` INT NOT NULL,**

**`ClientFirstName` VARCHAR(50),**

**`ClientLastName` VARCHAR(50),**

**`ClientDoB` INT,**

**PRIMARY KEY (`ClientId`));**

**#add occupation column for client table**

**ALTER TABLE `libraries`.`client`**

**ADD COLUMN `Occupation` VARCHAR(45) NULL AFTER `ClientDoB`;**

**#foreign key Book author ID to authorID**

**ALTER TABLE `libraries`.`book`**

**ADD INDEX `BookAuthor\_idx` (`BookAuthor` ASC) VISIBLE;**

**;**

**ALTER TABLE `libraries`.`book`**

**ADD CONSTRAINT `BookAuthor`**

**FOREIGN KEY (`BookAuthor`)**

**REFERENCES `libraries`.`author` (`AuthorId`)**

**ON DELETE NO ACTION**

**ON UPDATE NO ACTION;**

**#foreign key Borrower.BookID to Book.BookID**

**ALTER TABLE `libraries`.`borrower`**

**ADD INDEX `BookId\_idx` (`BookId` ASC) VISIBLE;**

**;**

**ALTER TABLE `libraries`.`borrower`**

**ADD CONSTRAINT `BookId`**

**FOREIGN KEY (`BookId`)**

**REFERENCES `libraries`.`book` (`BookID`)**

**ON DELETE NO ACTION**

**ON UPDATE NO ACTION;**

**#foreign key Borrower.ClientID to Client.ClientID**

**ALTER TABLE `libraries`.`borrower`**

**ADD INDEX `ClientId\_idx` (`ClientId` ASC) VISIBLE;**

**;**

**ALTER TABLE `libraries`.`borrower`**

**ADD CONSTRAINT `ClientId`**

**FOREIGN KEY (`ClientId`)**

**REFERENCES `libraries`.`client` (`ClientId`)**

**ON DELETE NO ACTION**

**ON UPDATE NO ACTION;**

**B. Populate database with sample set**

**Used mysql workbench GUI to populate data from CSV file.**

**C. Write following queries**

**1. #display all contents of client**

**Select \* from `libraries`.`Client`**

**2. #display client firstname,lastname, Occupation**

**Select ClientFirstName,ClientLastName,Occupation from `libraries`.`Client`;**

**3. #displays First and last names of clients that borrowed books in March 2018**

**Select ClientFirstName,ClientLastName from `libraries`.`Client` where ClientId in (Select ClientId from `libraries`.`borrower`where Year(BorrowDate)=2018 and Month(BorrowDate)=03);**

**4. #displays First and last names of the top 5 authors clients borrowed in 2017**

**Select `libraries`.`author`.AuthorFirstName,`libraries`.`author`.AuthorLastName from `libraries`.`borrower`,`libraries`.`book`,`libraries`.`author` where `libraries`.`borrower`.BookId=`libraries`.`book`.BookId and `libraries`.`book`.BookAuthor=`libraries`.`author`.AuthorId and Year(`libraries`.`borrower`.BorrowDate)=2017 group by `libraries`.`borrower`.BookId order by count(\*) Desc Limit 5;**

**5. #displays Nationalities of the least 5 authors that clients borrowed during the years 2015-2017**

**Select `libraries`.`author`.AuthorNationality from `libraries`.`borrower`,`libraries`.`book`,`libraries`.`author` where `libraries`.`borrower`.BookId=`libraries`.`book`.BookId and `libraries`.`book`.BookAuthor=`libraries`.`author`.AuthorId and Year(`libraries`.`borrower`.BorrowDate) in (2015,2017) group by `libraries`.`borrower`.BookId order by count(\*) Limit 5;**

**6. #displays the book that was most borrowed during the years 2015 to 2017**

**Select `libraries`.`book`.BookTitle from `libraries`.`borrower`,`libraries`.`book` where `libraries`.`borrower`.BookId=`libraries`.`book`.BookId and Year(BorrowDate) In (2015,2017) group by `libraries`.`borrower`.BookId order by count(\*) Desc Limit 1;**

**7. #Displays Top borrowed genres for client born in years 1970-1980**

**Select `libraries`.`book`.Genre from `libraries`.`borrower`,`libraries`.`book`, `libraries`.`client` where `libraries`.`borrower`.BookId=`libraries`.`book`.BookId and `libraries`.`client`.ClientId = `libraries`.`borrower`.ClientId and `libraries`.`client`.ClientDoB in (1970,1980) group by `libraries`.`book`.genre order by count(\*) Desc;**

**8. #Displays Top 5 occupations that borrowed the most in 2016**

**Select `libraries`.`client`.Occupation from `libraries`.`borrower`,`libraries`.`client` where `libraries`.`borrower`.ClientId = `libraries`.`client`.ClientId group by `libraries`.`borrower`.ClientId order by count(\*) Desc Limit 5;**

**9. #Display Average number of borrowed books by job title**

**Select `libraries`.`client`.Occupation, count(\*) as NumberBooks from `libraries`.`borrower` Natural inner join `libraries`.`client` group by `libraries`.`client`.Occupation;**

**10. #Creats a VIEW and display the titles that were borrowed by at least 20% of clients**

**Create VIEW DISPLAYER Select `libraries`.`book`.BookTitle, count(\*) as count from `libraries`.`borrower`,`libraries`.`book` where `libraries`.`borrower`.BookId=`libraries`.`book`.BookId group by `libraries`.`borrower`.BookId Having count(\*) > 16 order by count(\*) Desc;**

**11. #displays The top month of borrows in 2017**

**Select MONTHNAME(`libraries`.`borrower`.BorrowDate) as Month, Count(\*) As count from `libraries`.`borrower` where Year(`libraries`.`borrower`.BorrowDate) = 2017 Group By MONTHNAME(`libraries`.`borrower`.BorrowDate) Order By count Desc Limit 3;**

**12. #displays average number by age**

**Select `libraries`.`book`.BookTitle, count(\*) as count from `libraries`.`borrower`,`libraries`.`book` where `libraries`.`borrower`.BookId=`libraries`.`book`.BookId group by `libraries`.`borrower`.BookId Having count(\*) > 16 order by count(\*) Desc;**