Database Notes by Rakib

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Database Notes by Me

Database Part

Show Databases

-> show database;

Create Database:

-> create database "name";
-> create database seu;

Retrive Database:

-> USE 'DB_NAME';
// show all tables od the used DB
-> show tables;

Update Database:

-> CAN'T RENAME DATABASE

Delete Database:

-> drop database 'DB_NAME';

N:B: Tried to note with sequence of CRUD.
Where **CRUD** = **C**reate **R**etrive **U**pdate **D**elete.
CRUD operations are used in different applications.
Sometimes those application is called as CRUD application.

Database Table Part

Create Table:

-> create table "table name"("Attribute/Column name" variable type, Attribute name" variable type);
-> create table studentinfo(uid int(10) primary key, uname varchar(50), uaddress varchar(11), uphone int(10));

Retrive Table:

-> Desc 'Table_NAME';
// show all tables od the used DB
-> Desc studentinfo

Update Table:

-> ALTER TABLE `TableName`
RENAME TO `UpdatedTableName` ;
-> ALTER TABLE 'STUDENTINFO'
RENAME TO 'STD_INFO'

Delete Table:

-> drop table "tablename";

Database Table Column

Create Column(add column):

-> ALTER TABLE 'TABLE_NAME'
ADD 'COLUMN_NAME'   'COL_TYPE(X)';

-> ALTER TABLE std_info
ADD dept varchar(10);

Retrive Column(Retrive Data):

-> SELECT 'COLUMN_NAME' FROM 'TABLE_NAME';
-> SELECT * FROM STD_INFO;
-> SELECT DEPT, UNAME FROM STD_INFO;

Update Column(Rename/Modify Name):

// Modify Attribute Type
-> ALTER TABLE `TableName`
MODIFY 'std_no' char(8);

// Rename Column Name
ALTER TABLE `TableName`
Change Column 'std_no' 'std_no_updated' char(7);

Delete Column:

-> ALTER TABLE `TableName`
Drop Column 'ColumnName';
-> ALTER TABLE `std_info`
Drop Column 'std_no';

Database Table Row

Create Row(Insert Data):

// insert into table columns
-> insert into 'TableName' values(data, data, data, data);
-> insert into 'std_info' values(01, "Rakib", "Dhaka, Bangladesh", 019999);
-> insert into 'std_info'(uid, uname, phone) values(02, "Abdul", "Abc, Def");

Retrive Row(Retrive Data):

-> SELECT 'COLUMN_NAME' FROM 'TABLE_NAME' Where 'column_name' = 'rowData;
-> SELECT * FROM STD_INFO where uid = 01;
-> SELECT DEPT, UNAME FROM STD_INFO where uid = 01;

Update Row(Update Data):

// Modify Row Data
-> update 'Table_name' set 'Col_Name' = "Data" where 'Col_Name' = "Data";
-> update Std_Info set DEPT = "CSE" where uid = "01";
-> update Std_Info set DEPT = "CSE", uName = "Rakibul" where uid = "01";

Delete Row:

-> Delete from 'Table_name' where 'Col_Name' = "Data";
-> Delete from Std_Info where uid = "01";
-> Delete from Std_Info where uid >= "01" and uid <= "03";

Retrieval Queries(Select *)

Simple Select:

1) select * from STUDENT;
2) select STD_NO, NAME, CGPA from STUDENT;
3) select NAME, CGPA*200+200 as MARKS from STUDENT;
4) select STD_NO, NAME, upper(DEPT) from STUDENT;

Conditional Select:

11) select NAME, DEPT, CGPA from student where CGPA > 3.95;
12) select NAME, DEPT, CGPA from student where CGPA >= 3.50 && CGPA <= 3.90;
or,
select NAME, DEPT, CGPA from student where CGPA Between 3.50 and 3.90;
13) select NAME from STUDENT where DEPT = "CSE" || DEPT = "EEE";

Order By Select:

7) select DEPT from STUDENT order by dept asc;
8) select NAME from STUDENT order by GRAD_DATE asc;
select NAME from STUDENT order by NAME DESC;
9) select STD_NO, NAME, CGPA from STUDENT order by CGPA desc;
select STD_NO, NAME, CGPA from STUDENT order by NAME asc;
0) select STD_NO, NAME, CGPA from STUDENT order by CGPA desc, NAME asc;

Distinct Select:

6) select distinct DEPT from STUDENT;

Distinct == Group By Select:

6) select distinct DEPT from STUDENT;
or,
6) select DEPT from STUDENT GROUP BY DEPT;

Date Select:

14) select NAME from STUDENT where year(GRAD_DATE) = "2008" && CGPA > 3.70;
15) select * from STUDENT where year(GRAD_DATE) != "2008" && year(GRAD_DATE) != "2007";

Like Varchar Select:

16) select * from STUDENT where name like "s%"; //starts with s
-> select * from STUDENT where name like "s%a";//starts with s, ends with a
17) select * from STUDENT where NAME like "%a%a%"; // at least two 'a' in string

LIKE 'a%'	Finds any values that start with "a"
LIKE '%a'	Finds any values that end with "a"
LIKE '%abc%'	Finds any values that have "abc" in any position
LIKE '_r%'	Finds any values that have "r" in the second position
LIKE 'a_%'	Finds any values that start with "a" and are at least 2 characters in length
LIKE 'a__%'	Finds any values that start with "a" and are at least 3 characters in length
LIKE 's%a'	Finds any values that start with "s" and ends with "a"

Aggregation

Count:

c) select count(std_no) from student;
or
select count(*) from student;

Min:

a)select min(cgpa) from student;

Max:

b)select max(grad_date) from student;
i) select max(cgpa) from student where year(grad_date) >= 2004;
0) select name, dept, cgpa from student where dept = "CSE" && cgpa >
(select max(cgpa) from student where dept = "EEE");

Group By:

d)select max(cgpa), min(cgpa), dept from student group by dept;
e)select max(grad_date), min(grad_date), dept from student group by dept;
f)select dept, count(std_no) from student group by dept;
g)select dept, max(cgpa), min(cgpa) from student group by dept having count(std_no) >= 3;
h) select dept, max(cgpa), min(cgpa), grad_date from student where year(grad_date) >= 2004 group by dept;

Having:

//Having is used to check info of any aggregation operation and specially after group by
-> select max(cgpa), min(cgpa), dept from student group by dept having count(*) >= 2;

Proper SQL Query: SFWGH

Select * **F**rom student **W**here id = xx and name in(select name from student where dept = xx) **G**roup by dept **H**aving count(id) >= 1;

Subquery:

a) select name from student where cgpa= (select max(cgpa) from student);

IN:

b) select name, dept, cgpa from student where (dept, cgpa) **in**(select dept, min(cgpa) from student group by dept);

ANY:

select name, dept, cgpa from student where dept = "CSE" && cgpa > **any**(select cgpa from student where dept = "EEE");

ALL:

select name, dept, cgpa from student where dept = "CSE" && cgpa > **all**(select cgpa from student where dept = "EEE");

Join Operation:

Inner Join: joins common

- select * from customerinfo c, checkinoutinfo cio where c.NID = cio.NID;
- select * from customerinfo c inner join checkinoutinfo cio on where c.NID = cio.NID;
- SELECT NAME AS COURSE_NAME, GRADE AS STUDENT_GRADE FROM GRADE G, COURSE C WHERE G.ID = C.ID AND G.STUDENT_ID = 234;
- SELECT C.NAME AS COURSE_NAME, ROW_NUMBER() OVER (ORDER BY C.NAME) AS CourseTally FROM TEACHER T, COURSE C WHERE T.ID = C.TEACHER_ID AND T.ID = 3578;

Left Join: O><O => O>

- select * from customerinfo c left join checkinoutinfo cio on c.NID = cio.NID;

Right Join: O><O => <O

- select * from customerinfo c Right join checkinoutinfo cio on c.NID = cio.NID;

Full Outer Join: joins all content of tables

- select * from customerinfo c FULL OUTER JOIN checkinoutinfo cio on c.NID = cio.NID;

Quiz 2

For questions involving the formula **r = (n%x)+1**, you should be aware of the following:

- **x** will be a given number, which will typically be the **total number of rows** in a table
- **n** is the **last two digits of your ID**
- **r** is the **row number** of the table that you should use
- **%** sign denotes **modulus** operation

Instructions:

- Insert your name and ID at the top
- Rename your file with only your ID
- **You cannot attempt this exam using pen and paper**
- Do not modify this file in any way other than where it is explicitly stated that you should replace a line
- Final file must be converted to PDF
- The **last 15 minutes** must be reserved solely for file **submission**

Given below is the partial database state of an educational institution.

r = 1

STUDENT

ID	Name	Email	Password
121	Istiaq	121@seu.edu.bd	Fsa7f6
234	Ahmed	234@seu.edu.bd	Sf6saf
……..			

r = 2

GRADE

ID	Student_ID	Grade
CSE383	121	A+
CSE384	121	A+
CSE384	234	B-
……..		

r = 3

COURSE

ID	Name	Teacher_ID
CSE383	Database Design	3578
CSE384	Database Design Lab	7651
……..		

4	TEACHER ID | Name 3578 | Iqbal 7651 | Hossain ……..

Additionally, the following information is given regarding the relations:

- STUDENT: ID (PK)
- GRADE: ID and Student_ID (PK), Student_ID (FK references STUDENT's ID)
- Teacher: ID (PK)
- Course: ID (PK), Teacher_ID (FK references TEACHER's ID)

1. For RELATION, r = (n%3)+1, write down the following:
   a) SQL statements for **creating** the relation. Ensure that you use sensible data types for the attributes. [3]
   b) SQL statements needed to **insert** two new rows of your own, using relevant data from your own imagination. [2]
   c) Insert a single **screenshot** showing SQL statements from both a) and b) after they have been executed in a DBMS. If you see an error, **explain** the reasoning behind it. If you do not see an error, explain what could've caused one even if there were no syntax errors. [2]

Note that your marks for answers a) and b) are dependent upon you uploading an appropriate screenshot in c).

---

a) CREATE TABLE course (

ID VARCHAR(7) NOT NULL PRIMARY KEY,

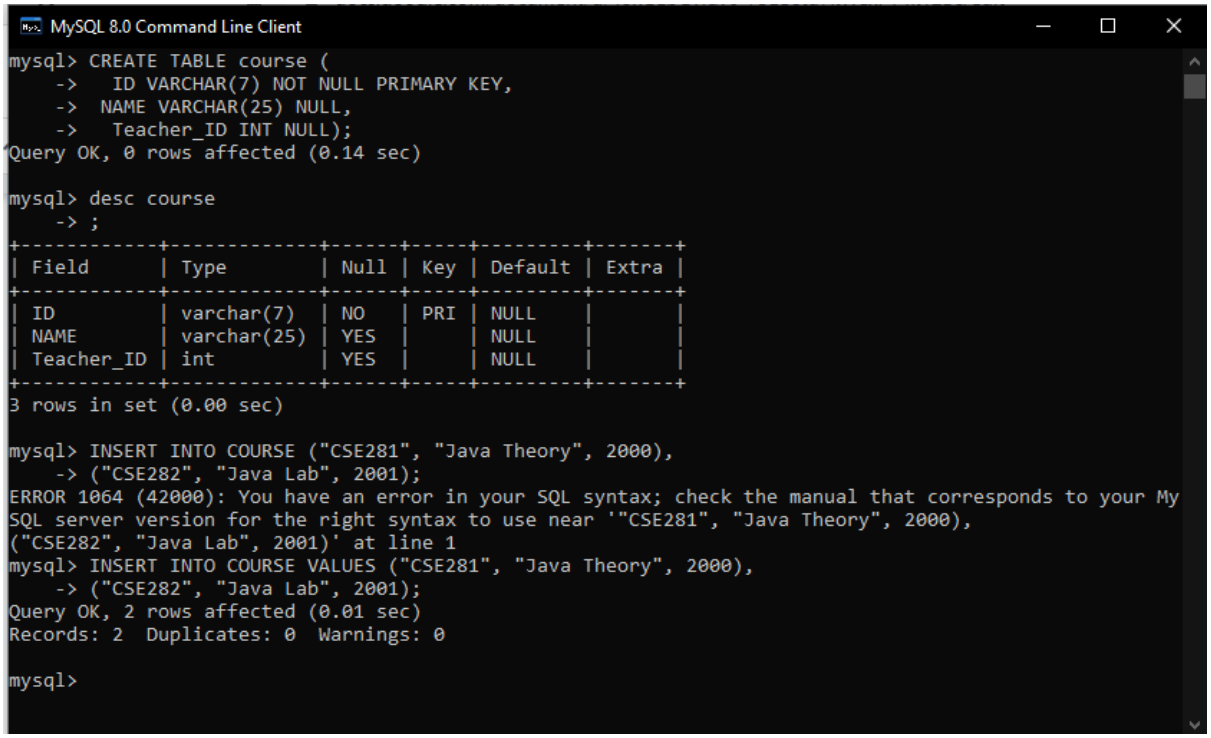
NAME VARCHAR(25) NULL,

Teacher_ID INT NULL);

b) INSERT INTO COURSE VALUES ("CSE281", "Java Theory", 2000),

("CSE282", "Java Lab", 2001);

c) There is an error because I didn't use the "VALUES" SQL keyword during inserting corresponding columns data.



For questions 2 and 3 below, you have to **write SQL statements** to satisfy the given requirements and **explain** them (the statements) in your own words. Correct statements without valid explanations will not be eligible for any marks.

2. Retrieve the course names and course grades obtained by the student with the ID 234.

SELECT NAME AS COURSE_NAME, GRADE AS STUDENT_GRADE FROM GRADE G, COURSE C WHERE G.ID = C.ID AND G.STUDENT_ID = 234;

3. Retrieve the number of courses taught by the teacher whose ID is 3578. Your table should have a single column named CourseTally containing the number of courses.

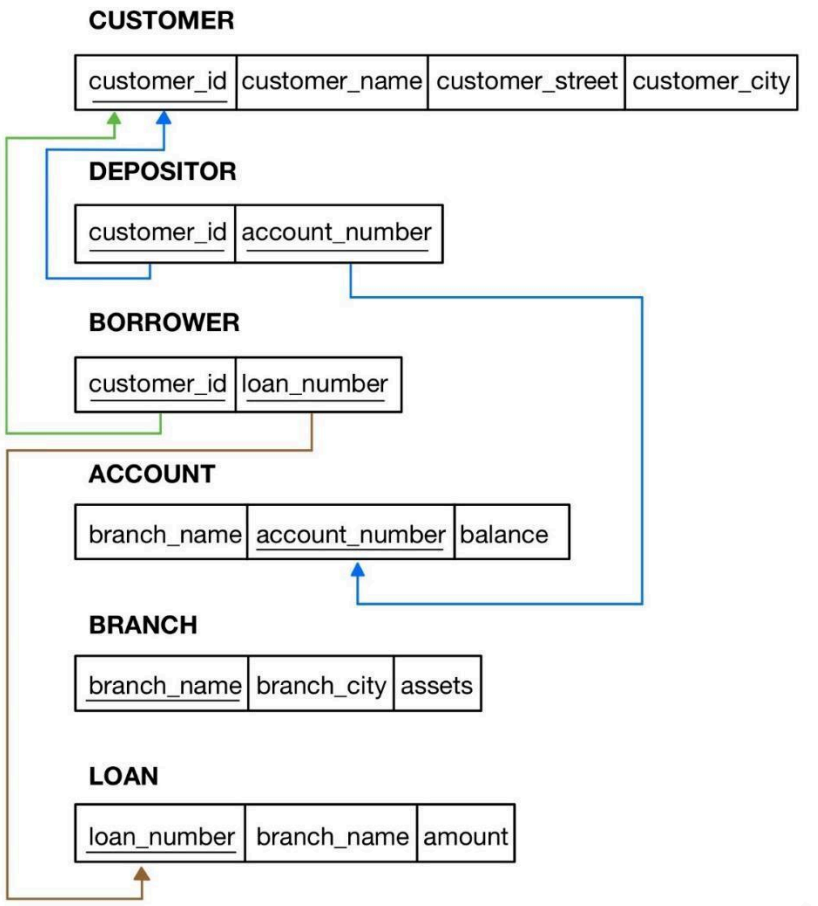
SELECT C.NAME AS COURSE_NAME, ROW_NUMBER() OVER (ORDER BY C.NAME) AS CourseTally FROM TEACHER T, COURSE C WHERE T.ID = C.TEACHER_ID AND T.ID = 3578;

Worksheet 4

CSE384/CSE3012: Database Design Lab
Worksheet 4: Constraints, Joins

Given below is the schema diagram of a bank database. Apart from the primary key and foreign key constraints, it the following two constraints:

- Assets must always be greater than or equal to zero in the BRANCH table
- Balance must always be greater than or equal to zero in the ACCOUNT table



The aforementioned database is populated with the data given below.

CUSTOMER

customer_id	customer_name	customer_street	customer_city
C-101	Jones	Main	Harrison
C-201	Smith	North	Rye
C-211	Hayes	Main	Harrison
C-212	Curry	North	Rye
C-215	Lindsay	Park	Pittsfield
C-220	Turner	Putnam	Stamford
C-222	Williams	Nassau	Princeton
C-225	Adams	Spring	Pittsfield
C-226	Johnson	Alma	Palo Alto
C-233	Glenn	Sand Hill	Woodside
C-234	Brooks	Senator	Brooklyn
C-255	Green	Walnut	Stamford

DEPOSITOR

customer_id	account_number
C-101	A-217
C-201	A-215
C-211	A-102
C-215	A-222
C-220	A-305
C-226	A-101
C-226	A-201

BORROWER

customer_id	loan_number
C-101	L-17
C-201	L-11
C-201	L-23
C-211	L-15
C-212	L-93
C-222	L-17
C-225	L-16
C-226	L-14

ACCOUNT

branch_name	account_number	balance
Downtown	A-101	500
Perryridge	A-102	400
Brighton	A-201	900
Mianus	A-215	700
Brighton	A-217	750
Redwood	A-222	700
Round Hill	A-305	350

BRANCH

branch_name	branch_city	assets
Brighton	Brooklyn	7100000
Downtown	Brooklyn	9000000
Mianus	Horseneck	400000
North Town	Rye	3700000
Perryridge	Horseneck	1700000
Pownal	Bennington	300000
Redwood	Palo Alto	2100000
Round Hill	Horseneck	8000000

LOAN

loan_number	branch_name	amount
L-11	Round Hill	900
L-14	Downtown	1500
L-15	Perryridge	1500
L-16	Perryridge	1300
L-17	Downtown	1000
L-23	Redwood	2000
L-93	Mianus	500

Task 1

Create a bank database. Then, write SQL statements to create the relations in that database by referring to the schema. Ensure that you use sensible data types for the attributes by referring to both the database schema and state.

Task 2

Populate the database with the data given above.

Task 3

a) Find the names and cities of customers who have a loan at Perryridge branch

```
SELECT CUSTOMER_NAME, CUSTOMER_CITY FROM CUSTOMER C, BORROWER B, LOAN L
WHERE C.CUSTOMER_ID = B.CUSTOMER_ID
AND L.LOAN_NUMBER = B.LOAN_NUMBER
AND L.BRANCH_NAME = 'PERRYRIDGE';
```

b) Find which accounts have balances between 700 and 900.

```
select a.account_number, a.balance from depositor d, customer c, account a where d.customer_id = c.customer_id and
d.account_number = a.account_number and a.balance >= 700 && a.balance <= 900;
```

c) Find the names of customers on streets with names ending in "Hill".

```
SELECT C.CUSTOMER_STREET FROM CUSTOMER AS C WHERE CUSTOMER_STREET LIKE
'%HILL';
```

d) Find the names of customers with accounts at a branch where Johnson has an account.

```
SELECT CUSTOMER_NAME FROM CUSTOMER C, DEPOSITOR D, ACCOUNT A
WHERE C.CUSTOMER_ID = D.CUSTOMER_ID
AND D.ACCOUNT_NUMBER = A.ACCOUNT_NUMBER
AND BRANCH_NAME IN (SELECT BRANCH_NAME FROM CUSTOMER C, DEPOSITOR D,
ACCOUNT A
WHERE C.CUSTOMER_ID = D.CUSTOMER_ID
AND D.ACCOUNT_NUMBER = A.ACCOUNT_NUMBER
AND CUSTOMER_NAME = 'JOHNSON')
AND CUSTOMER_NAME != 'JOHNSON';
```

e) Find the names of customers with an account but not a loan at Mianus branch.

```
SELECT C.CUSTOMER_NAME FROM ACCOUNT A, CUSTOMER C, DEPOSITOR D
WHERE A.ACCOUNT_NUMBER = D.ACCOUNT_NUMBER
AND C.CUSTOMER_ID = D.CUSTOMER_ID
AND A.BRANCH_NAME = 'MIANUS'
AND C.CUSTOMER_NAME NOT IN(SELECT C.CUSTOMER_NAME FROM LOAN L,
CUSTOMER C, BORROWER B
WHERE C.CUSTOMER_ID = B.CUSTOMER_ID
AND B.LOAN_NUMBER = L.LOAN_NUMBER
AND L.BRANCH_NAME = 'MIANUS');
```

f) Find the names of branches whose assets are greater than the assets of some branch in Brooklyn.

```
SELECT BRANCH_NAME, BRANCH_CITY FROM BRANCH B WHERE ASSESTS > any(SELECT
ASSESTS FROM BRANCH B WHERE B.BRANCH_CITY = 'BROOKLYN')
B.BRANCH_CITY != 'BROOKLYN';
```

or,

```
SELECT BRANCH_NAME, BRANCH_CITY FROM BRANCH B WHERE ASSETS > any(SELECT
ASSETS FROM BRANCH B
WHERE B.BRANCH_NAME IN (SELECT branch_name FROM   branch WHERE  branch_city
= "brooklyn"))
AND B.BRANCH_NAME NOT IN (SELECT branch_name FROM branch WHERE  branch_city
= "brooklyn");
```

g) Find the set of names of branches whose assets are greater than the assets of all branches in Horseneck.

```
SELECT BRANCH_NAME, BRANCH_CITY FROM BRANCH B
WHERE ASSETS > ALL(SELECT ASSETS FROM BRANCH B WHERE B.BRANCH_CITY = 'HORSENECK')
AND B.BRANCH_CITY != 'Horseneck';
```

or,

```
SELECT BRANCH_NAME, BRANCH_CITY FROM BRANCH B
WHERE ASSETS > (SELECT MAX(ASSETS) FROM BRANCH B WHERE B.BRANCH_CITY =
'HORSENECK')
AND B.BRANCH_CITY != 'Horseneck';
```

h) Find the set of names of customers at Brighton branch, in alphabetical order.

```
SELECT CUSTOMER_NAME FROM CUSTOMER C, DEPOSITOR D, ACCOUNT A
WHERE C.CUSTOMER_ID = D.CUSTOMER_ID
AND D.ACCOUNT_NUMBER = A.ACCOUNT_NUMBER
```

```
AND A.BRANCH_NAME = 'BRIGHTON' ORDER BY CUSTOMER_NAME ASC;
```

i) Show the loan data, ordered by decreasing amounts and increasing loan numbers.

```
SELECT * FROM LOAN ORDER BY AMOUNT DESC, LOAN_NUMBER ASC;
```

j) Find the names of each branch and the number of customers having at least one account at that branch.

```
SELECT A.BRANCH_NAME, COUNT(C.CUSTOMER_ID) FROM ACCOUNT A, CUSTOMER C, DEPOSITOR D
WHERE A.ACCOUNT_NUMBER = D.ACCOUNT_NUMBER
AND D.CUSTOMER_ID = C.CUSTOMER_ID
GROUP BY A.BRANCH_NAME
HAVING COUNT(C.CUSTOMER_ID) >= 1;
```

k) Find the average balance of all customers in ‘Palo Alto’ having at least 2 accounts.

```
SELECT A.ACCOUNT_NUMBER, C.CUSTOMER_CITY, C.CUSTOMER_ID,
AVG(A.BALANCE) FROM ACCOUNT A, CUSTOMER C, DEPOSITOR D
WHERE A.ACCOUNT_NUMBER = D.ACCOUNT_NUMBER
AND D.CUSTOMER_ID = C.CUSTOMER_ID
AND C.CUSTOMER_CITY = 'PaloAlto'
HAVING COUNT(A.ACCOUNT_NUMBER) >= 2;
```