

CREATING TABLES

```
CREATE TABLE Zips(  
    Zip varchar(6) NOT NULL PRIMARY KEY,  
    City varchar(255),  
    City_State varchar(255)  
);
```

```
CREATE TABLE Addresses(  
    Address varchar(255) NOT NULL PRIMARY KEY,  
    Zip varchar(6),  
    FOREIGN KEY (Zip) REFERENCES Zips(Zip)  
);
```

```
CREATE TABLE Person(  
    Person_ID int NOT NULL PRIMARY KEY,  
    Person_Name varchar(255) NOT NULL,  
    Email varchar(255),  
    Phone varchar(8),  
    Address varchar(255),  
    FOREIGN KEY (Address) REFERENCES Addresses(Address),  
    Schools varchar(255)  
);
```

```
CREATE TABLE Stakeholder (  
    Person_ID int NOT NULL PRIMARY KEY,  
    Stakeholder_Domain varchar(255) NOT NULL,  
    FOREIGN KEY (Person_ID) REFERENCES Person(Person_ID)  
    --ON DELETE CASCADE  
);
```

```
CREATE TABLE Professor (  
    Person_ID int NOT NULL,  
    Field_of_Expertise varchar(255) NOT NULL,  
    CONSTRAINT Professor_Field_Key PRIMARY KEY (Person_ID, Field_of_Expertise),  
    FOREIGN KEY (Person_ID) REFERENCES Person(Person_ID)  
    --ON DELETE CASCADE  
);
```

```
CREATE TABLE Student (  
    Person_ID int NOT NULL,  
    Student_ID int NOT NULL,  
    Admission_Date date,
```

```

        Major_Minor varchar(255) NOT NULL, --DEFAULT 'NONE',
        FOREIGN KEY (Person_ID) REFERENCES Person(Person_ID),
        PRIMARY KEY (Student_ID)
        --ON DELETE CASCADE
    );

CREATE TABLE Staff (
    Person_ID int NOT NULL,
    Staff_ID int NOT NULL,
    Date_Hired date,
    Staff_Position varchar(255) NOT NULL,
    FOREIGN KEY (Person_ID) REFERENCES Person(Person_ID),
    PRIMARY KEY (Staff_ID)
    --ON DELETE CASCADE,

);

CREATE TABLE Comment(
    Stakeholder_Person_ID int,
    Topic varchar(255),
    Date_Time datetime NOT NULL,
    FOREIGN KEY (Stakeholder_Person_ID) REFERENCES Person(Person_ID),
    CONSTRAINT Person_Topic_Key PRIMARY KEY (Stakeholder_Person_ID, Topic)
);

CREATE TABLE Course(
    Course_ID int NOT NULL PRIMARY KEY,
    Course_Name varchar(255) NOT NULL Unique
);

CREATE TABLE Teach(
    Professor_ID int,
    Course_ID int,
    Lesson_Time time,
    CONSTRAINT Professor_Course_Key PRIMARY KEY(Professor_ID, Course_ID),
    FOREIGN KEY (Professor_ID) REFERENCES Professor(Professor_Field_Key),
    FOREIGN KEY (Course_ID) REFERENCES Course(Course_ID)
);

CREATE TABLE Enroll(
    Student_ID int,

```

```

        Course_ID int,
        Enrolment_Date date NOT NULL,
        CONSTRAINT Student_Course_Key PRIMARY KEY (Student_ID, Course_ID),
        FOREIGN KEY (Student_ID) REFERENCES Student(Student_ID),
        FOREIGN KEY (Course_ID) REFERENCES Course(Course_ID)
    );

CREATE TABLE Graduate(
    Student_ID int NOT NULL,
    Thesis_Paper varchar(255),
    Professor_ID int NOT NULL,
    CONSTRAINT Graduate_Prof_Key PRIMARY KEY (Student_ID, Professor_ID),
    FOREIGN KEY (Student_ID) REFERENCES Student(Student_ID),
    FOREIGN KEY (Professor_ID) REFERENCES Professor(Professor_Field_Key)
);

CREATE TABLE Undergraduate(
    Student_ID int PRIMARY KEY,
    GPA float,
    FOREIGN KEY (Student_ID) REFERENCES Student(Student_ID)
);

CREATE TABLE Administrative_Staff(
    Staff_ID int NOT NULL PRIMARY KEY,
    Office_School varchar(255),
    Office_Name varchar(255)
);

CREATE TABLE Technical_Staff(
    Staff_ID int NOT NULL PRIMARY KEY,
    Lab_School varchar(255),
    Lab_Name varchar(255)
);

CREATE TABLE Office(
    Office_School varchar(255) NOT NULL,
    Office_Name varchar(255) NOT NULL,
    Lab_School varchar(255),
    Lab_Name varchar(255),
    CONSTRAINT Office_PK PRIMARY KEY(Office_School, Office_Name)
);

```

```

CREATE TABLE Laboratory(
    Lab_School varchar(255) NOT NULL,
    Lab_Name varchar(255) NOT NULL,
    Lab_Location varchar(255) NOT NULL,
    CONSTRAINT Lab_PK PRIMARY KEY(Lab_School,Lab_Name),
    UNIQUE(Lab_School),
    UNIQUE(Lab_Name)
);

```

```

CREATE TABLE Teaching_Lab(
    Lab_School varchar(255) NOT NULL,
    Lab_Name varchar(255) NOT NULL,
    Subject varchar(255),
    CONSTRAINT TeachLab_PK PRIMARY KEY(Lab_School,Lab_Name),
    FOREIGN KEY (Lab_School, Lab_Name) REFERENCES Laboratory(Lab_School,
Lab_Name)
);

```

```

CREATE TABLE Research_Lab(
    Lab_School varchar(255) NOT NULL,
    Lab_Name varchar(255) NOT NULL,
    Specialization varchar(255),
    CONSTRAINT ResearchLab_PK PRIMARY KEY(Lab_School,Lab_Name),
    FOREIGN KEY (Lab_School, Lab_Name) REFERENCES Laboratory(Lab_School,
Lab_Name)
);

```

```

CREATE TABLE Research(
    Research_Topic varchar(255) NOT NULL,
    Lab_School varchar(255) NOT NULL,
    Lab_Name varchar(255) NOT NULL,
    Student_ID int NOT NULL,
    CONSTRAINT Research_PK PRIMARY KEY (Research_Topic, Student_ID),
    FOREIGN KEY (Lab_School, Lab_Name) REFERENCES Research_Lab(Lab_School,
Lab_Name),
    FOREIGN KEY (Student_ID) REFERENCES Graduate(Graduate_Prof_Key)
);

```

```

CREATE TABLE Experiment(
    Lab_School varchar(255) NOT NULL,
    Lab_Name varchar(255) NOT NULL,

```

```

        Student_ID int NOT NULL,
        Experiment_Date date,
        Topic varchar(255),
        CONSTRAINT Experiment_PK PRIMARY KEY (Lab_School, Lab_Name, Student_ID,
Experiment_Date),
        FOREIGN KEY (Lab_School, Lab_Name) REFERENCES Teaching_Lab(Lab_School,
Lab_Name),
        FOREIGN KEY (Student_ID) REFERENCES Undergraduate(Student_ID)
);

```

```

CREATE TABLE Timetable(
        --(weak entity set)
        Course_ID int NOT NULL PRIMARY KEY REFERENCES Course(Course_ID),
        Person_ID int NOT NULL,
        Student_ID int NOT NULL,
        Date_Time datetime,
        If_Clash bit,
        FOREIGN KEY (Student_ID) REFERENCES Student(Student_ID),
        FOREIGN KEY (Person_ID) REFERENCES Professor(Professor_Field_Key)
        --ON DELETE CASCADE
);

```

```

CREATE TABLE Equipment (
        Lab_School varchar(255) NOT NULL,
        Lab_Name varchar(255) NOT NULL,
        Equipment_ID int NOT NULL,
        Date_Purchased date NOT NULL,
        Model_No int NOT NULL,
        PRIMARY KEY (Equipment_ID),
        FOREIGN KEY (Lab_School) REFERENCES Laboratory(Lab_School),
        FOREIGN KEY (Lab_Name) REFERENCES Laboratory(Lab_Name)
        --ON DELETE CASCADE
);

```

```

CREATE TABLE Models (
        Model_No int NOT NULL ,
        Equipment_Name varchar(255) NOT NULL,
        PRIMARY KEY (Model_No)
);

```

TABLE RECORDS

Addresses records:

	Address	Zip
1	1 Kaki Bukit View	746253
2	103 Amoy Street	937283
3	103 Bukit Merah	748382
4	11 Keng Cheow Str...	946673
5	118 Rivervale Drive	923647
6	119 Aljunied Road	237564
7	12 Bugis Street	038948
8	14 Benoi Sector	847372
9	18 Boon Lay Way	982746
10	18 Cavendish Park	746312
11	23 Farrer Road	123456
12	3 Mount Elizabeth	273672
13	350 Orchard Road	874623
14	919 Hougang Road	875632
15	Yishun Ring Road	536127

Administrative Staff records:

	Staff_ID	Office_School	Office_Name
1	444555	WKW	WKWoffice
2	555666	SPMS	Staff Office

Comment records:

	Stakeholder_Person_I...	Topic	Date_Time
1	1	Courses	2022-08-08 00:00:00.0...
2	1	Facilities	2022-01-01 00:00:00.0...
3	1	Food	2022-06-06 00:00:00.0...
4	1	IT	2022-09-09 00:00:00.0...
5	1	Wellbeing	2022-07-07 00:00:00.0...
6	2	Food	2022-02-02 00:00:00.0...
7	3	Wellbeing	2022-03-03 00:00:00.0...
8	4	Courses	2022-04-04 00:00:00.0...
9	5	IT	2022-05-05 00:00:00.0...

Course records:

	Course_ID	Course_Name
1	3	Intro to Aerospace
2	4	Intro To Badminton
3	10	Intro To Business Finan...
4	1	Intro To Databases
5	9	Intro To English
6	5	Intro To Java
7	8	Intro To Korean Langua...
8	7	Intro To MDP
9	6	Intro To Modern Dance
10	2	Intro To Tennis

Course History records:

	Student_ID	Course_ID	Pass_Fail_Bit
1	12345	1	1
2	23456	2	0
3	34567	3	1
4	45678	4	1
5	56789	5	0

Enroll records:

	Student_ID	Course_ID	Enrolment_Date
1	12345	1	2020-01-01
2	23456	2	2020-02-02
3	34567	3	2020-03-03
4	45678	4	2020-04-04
5	56789	5	2020-05-05

Equipment records:

	Lab_School	Lab_Name	Equipment_ID	Date_Purchased	Model_No
1	SCSE	Software Lab 1	123	2022-10-28	123
2	SCBE	Bio Lab 1	456	2022-09-11	102
3	SPMS	Computer Lab...	789	2022-08-28	104

Experiment records:

	Lab_School	Lab_Name	Student_ID	Experiment_Da...	Topic
1	SCSE	Software Lab...	45678	2021-02-03	Python

Graduate records:

	Student_ID	Thesis_Paper	Professor_ID
1	12345	Artificial Intelligence	11
2	12345	Chemistry	14
3	23456	Business Finance	12
4	34567	Environmental Hea...	13

Laboratory records:

	Lab_School	Lab_Name	Lab_Location
1	EEE	Circuits Lab 1	N2-1-1
2	SBS	Hardward Lab...	SB-1-2
3	SCBE	Bio Lab 1	SC-1-1
4	SCSE	Software Lab 1	N4-1-1
5	SPMS	Computer Lab...	SP-1-1
6	WKW	Science Lab 2	WKW-3-1

Models records:

	Model_No	Equipment_Name
1	102	Ultrasound Sens...
2	104	IR Sensor
3	123	Computer
4	456	Mouse
5	465	STM Board
6	466	ASE
7	789	Charger
8	843	Weighing Scale
9	903	Chairs
10	974	Tablet

Office records:

	Office_School	Office_Name	Lab_School	Lab_Name
1	EEE	Wellbeing Office	EEE	Circuits Lab 1
2	SBS	Office for Studen...	SBS	Office for Stude...
3	SCBE	Office	SCBE	Bio Lab 1
4	SCSE	Admin Office	SCSE	Software Lab 1
5	SPMS	Staff Office	SPMS	Computer Lab 1
6	WKW	WKWoffice	WKW	Science Lab 2

Person records:

	Person_ID	Person_Name	Email	Phone	Address	Schools
1	1	Matthew	matthew@gmail.c...	12345678	12 Bugis Street	NTU
2	2	Joe	joe@gmail.com	23456781	23 Farrer Road	NIE
3	3	Jim	jim@gmail.com	34567812	3 Mount Elizabeth	SMU
4	4	Mark	mark@gmail.com	45678123	103 Bukit Merah	NUS
5	5	John	john@gmail.com	56781234	119 Aljunied Road	SIM
6	6	May	may@gmail.com	67891234	Yishun Ring Road	NJC
7	7	Mary	mary@gmail.com	78912345	1 Kaki Bukit View	TJC
8	8	Kewei	kewei@gmail.com	09876432	11 Keng Cheow Str...	MJC
9	9	Ian	ian@gmail.com	98657653	12 Bugis Street	NJC
10	10	Kent	kent@gmail.com	43563466	919 Hougang Road	SUTD
11	11	Rayne	rayne@gmail.com	98677543	14 Benoi Sector	SIM
12	12	Jacob	jacob@gmail.com	31552543	3 Mount Elizabeth	NIE
13	13	Jade	jade@gmail.com	14232577	119 Aljunied Road	ASRJC
14	14	Sandy	sandy@gmail.com	32534676	1 Kaki Bukit View	NTU
15	15	Findy	findy@gmail.com	98765423	Yishun Ring Road	SUTD
16	16	Windy	windy@gmail.com	23436578	11 Keng Cheow Str...	NUS
17	17	Rab	rab@gmail.com	78965646	14 Benoi Sector	NJC
18	18	Hon	hon@gmail.com	75675436	3 Mount Elizabeth	SIM
19	19	Debbie	debbie@gmail.com	76853634	919 Hougang Road	NUS
20	20	Hao	hao@gmail.com	67874636	14 Benoi Sector	NIE

Professor records:

	Person_ID	Field_of_Expertise
1	11	Cyber Security
2	12	Artificial Intelligenien...
3	13	Finance
4	14	Chemistry
5	15	Communications

Research records:

	Research_Topic	Lab_School	Lab_Name	Student_ID
1	Circuits Analysis	EEE	Circuits Lab 1	12345
2	Covid Analysis	SCBE	Bio Lab 1	34567
3	FGPA Analysis	EEE	Circuits Lab 1	12345
4	Hardware Accelerati...	SBS	Hardward Lab...	23456

Research_Lab records:

	Lab_School	Lab_Name	Specialization
1	EEE	Circuits Lab 1	Embedded Softwa...
2	SBS	Hardward Lab...	FPGA
3	SCBE	Bio Lab 1	Covid Development

Staff records:

	Person_ID	Staff_ID	Date_Hired	Staff_Position
1	16	111222	2019-02-...	Healthcare
2	17	222333	2018-03-...	Secretary
3	18	333444	2015-08-...	Finance
4	19	444555	2022-01-...	Security
5	20	555666	2017-12-...	IT

Stakeholders records:

	Person_ID	Stakeholder_Domain
1	1	Government
2	2	Public
3	3	Food and Beverag...
4	4	Technology
5	5	Environment

Student records:

	Person_ID	Student_ID	Admission_Da...	Major_Minor
1	6	12345	2020-01-01	Computer Scien...
2	7	23456	2021-05-01	Music
3	8	34567	2022-04-02	Mathematics
4	9	45678	2022-05-01	Business
5	10	56789	2021-03-02	Sociology

Teach records:

	Professor_ID	Course_ID	Lesson_Time
1	11	1	12:00:00.00000...
2	11	7	08:30:00.00000...
3	12	2	14:00:00.00000...
4	14	6	14:30:00.00000...
5	15	8	09:00:00.00000...

Teaching_lab records:

	Lab_School	Lab_Name	Subject
1	SCSE	Software Lab 1	Software Engineeri...
2	SPMS	Computer Lab...	Number Theory
3	WKW	Science Lab 2	Current Affairs

Technical_Staff records:

	Staff_ID	Lab_School	Lab_Name
1	111222	EEE	Circuits Lab 1
2	222333	SBS	Hardward Lab...
3	333444	SCBE	Bio Lab 1

Timetable records:

	Course_ID	Person_ID	Student_ID	Date_Time	If_Clash
1	1	11	12345	2022-10-28 00:00:00.0...	0
2	2	12	23456	2021-09-09 00:00:00.0...	0
3	3	13	34567	2022-08-11 00:00:00.0...	1
4	4	14	45678	2022-10-19 00:00:00.0...	0
5	5	15	56789	2022-05-05 00:00:00.0...	0

Undergraduate records:

	Student_ID	GPA
1	45678	4
2	56789	3

Zips records:

	Zip	City	City_State
1	038948	Singapore	Singapore
2	123456	Singapore	Singapore
3	237564	Singapore	Singapore
4	273672	Singapore	Singapore
5	536127	Singapore	Singapore
6	746253	Singapore	Singapore
7	746312	Singapore	Singapore
8	748382	Singapore	Singapore
9	847372	Singapore	Singapore
10	874623	Singapore	Singapore
11	875632	Singapore	Singapore
12	923647	Singapore	Singapore
13	937283	Singapore	Singapore
14	946673	Singapore	Singapore
15	982746	Singapore	Singapore

QUERYING

1. Find all stakeholders who belong to the public domain.

```
SELECT X.Person_ID, Y.Person_Name
FROM Stakeholder as X, Person as Y
WHERE X.Person_ID = Y.Person_ID AND Stakeholder_Domain = 'Public';
```

2. Find all stakeholders who have provided at least five comments or suggestions.

```
SELECT X.Person_ID
FROM Stakeholder as X, Comment as Y
WHERE X.Person_ID = Y.Stakeholder_Person_ID
GROUP BY X.Person_ID
HAVING COUNT(X.Person_ID) >= 5
```

3. Find graduates who are supervised by more than one professors and assigned to more than one research laboratories.

```
SELECT X.Student_ID
FROM Graduate as X, Professor as Y, Research as Z
WHERE X.Professor_ID = Y.Person_ID
AND X.Student_ID = Z.Student_ID
GROUP BY X.Student_ID
HAVING COUNT(X.Student_ID) > 1 AND COUNT(Z.Lab_Name) > 1
```

4. Find all professors who teach more than one courses in the semester.

```
SELECT X.Person_ID
FROM Professor as X, Person as Y, Teach as Z
WHERE Z.Professor_ID = X.Person_ID
AND X.Person_ID = Y.Person_ID
GROUP BY X.Person_ID
HAVING COUNT(Z.Course_ID) > 1
```

5. List all the equipment belonging to a particular laboratory.

// if let's say it's Software Lab 1 in SCSE

```
SELECT *
FROM Equipment as X, Models as Y
WHERE X.Model_No = Y.Model_No
AND X.Lab_Name = 'Software Lab 1'
AND X.Lab_School = 'SCSE'
```

6. Find all undergraduates who have not attended at least one laboratory experiments.

```
SELECT Undergraduate.Student_ID
FROM Experiment, Undergraduate
WHERE NOT Undergraduate.Student_ID = Experiment.Student_ID;
```

7. List all graduates who are doing research and taking courses in the semester.

```
SELECT DISTINCT Graduate.Student_ID
FROM Graduate, Research, Enroll
WHERE Graduate.Student_ID = Research.Student_ID
AND Graduate.Student_ID = Enroll.Student_ID
AND Enroll.Course_ID IS NOT NULL
```

LIVE QUERY

Q1: For each student, find out how many other students took at least 3 identical courses as him/her? Find out what these courses are.

```

SELECT x.Student1, z.Same_Course,x.Student2
FROM (SELECT x.Student_ID as Student1, COUNT(x.Course_ID) as Same_Count,
y.Student_ID as Student2
      FROM Enroll as x, Enroll as y
      WHERE x.Course_ID = y.Course_ID
      AND x.Student_ID <> y.Student_ID
      GROUP BY x.Student_ID, y.Student_ID) as x,

      (SELECT x.Student_ID as Student1, x.Course_ID as Same_Course,
y.Student_ID as Student2
      FROM Enroll as x, Enroll as y
      WHERE x.Course_ID = y.Course_ID
      AND y.Student_ID <> x.Student_ID) as z

WHERE x.Same_Count >= 3
      AND x.Student1 = z.Student1 AND x.Student2 = z.Student2

```

Q2: Find out students who have failed courses at least once.

```

SELECT *
FROM Course_History
WHERE Course_History.Pass_Fail_Bit = 0

```