SQL Language

Exercises on JOIN, GROUP BY clauses

1. **Given the following relational schema (primary keys are underlined, optional attributes are indicated by "*")**

   STUDENT (StudID, SName, City)

   COURSE(CourseID, CName, TeacherID)

   TEACHER (TeacherID, TName)

   EXAM(CourseID, StudID, Date, Grade)

a) Find the student ID and the maximum, minimum and average exam grade for each student
b) Find the student ID, the name, and the maximum, minimum and average exam grade for each student
c) For each student with an average grade higher than 28, find the studentID, name, and the maximum, minimum and average exam grade for each student
d) For each student with an average grade higher than 28 and who has had exams in at least 10 different dates, find the student ID, the name and the maximum, minimum and average exam grade for each student

2. **Given the following relational schema (primary keys are underlined, optional attributes are indicated by "*")**

   PERSON (TaxID, Name, BirthDate)

   PRIVATE_LESSON (TaxID, Date, Hour, InstID)

   INSTRUCTOR (InstID, NameI)

a) For each person view the tax code and the number of lessons attended
b) For each person view the tax code, the name and the number of lessons attended
c) For each person view the tax code, the name, the number of lessons attended and the number of (different) instructors with whom he or she has done lessons
d) For each person born after 1970 who has attended at least 5 lessons, view the tax code, the name, the number of lessons attended and the number of (different) instructors with whom he has taken lessons

3. Given the following relational schema (primary keys are underlined, optional attributes are indicated by "*")

   COURSE (<u>CourseID</u>, CourseName, Year, Semester)
   COURSE_SCHEDULE (<u>CourseID</u>, <u>WeekDay</u>, <u>StartTime</u>, EndTime, Room)

a) Find course code, course name and total number of lessons per week for third-year courses for which the total number of lessons per week is greater than 10 and lessons are on more than three different days of the week.

4. Given the following relational schema (primary keys are underlined, optional attributes are indicated by "*")

   ACCOMMODATION (<u>CodeA</u>, Address, City, Area)

   LEASE (<u>CodC</u>, StartDate, EndDate*, PersonName, CodeA, MonthlyRent)

   Note: Area expressed in square meters. For current contracts, EndDate is NULL.

a) Find the name of people who have entered into more than two rental contracts for the same apartment (at different times).
b) Find, for cities where at least 100 contracts have been signed, the city, the maximum monthly cost of rents, the average monthly cost of rents, the maximum duration of contracts, the average duration of contracts and the total number of contracts concluded.

Nested queries (in, not in, exits, not exists)

5. Given the following relational schema (primary keys are underlined, optional attributes are indicated by "*")

ORCHESTRA (CodeO, NameO, DirectorName, NoElements)

CONCERT(CodeC, Date, CodeO, CodeH, TicketPrice)

HALL (CodeH, Name, City, Capacity)

a) Find the code and name of the orchestraswith more than 30 elements that have given concerts both in Turin and in Milan and have never held concerts in Bologna.

6. Given the following relational schema (primary keys are underlined, optional attributes are indicated by "*")

COURSE (CourseID, CourseName, Year, Semester)
COURSE_SCHEDULE (CourseID, WeekDay, StartTime, EndTime, Room)

a) Find classrooms where first-year classes were never held.

7. Given the following relational schema (primary keys are underlined, optional attributes are indicated by "*")

ACCOMMODATION (CodeA, Address, City, Area)

LEASE (CodC, StartDate, EndDate*, PersonName, CodeA, MonthlyRent)

Note: Area expressed in square meters. For current contracts, EndDate is NULL.

a) Find the name of people who have never rented accommodation with an area of more than 80 square meters.
b) Find the code and address of the apartments in Turin where the monthly fee has always been higher than 500 euros and for which at most 5 rental contracts have been stipulated.

Correlated queries

1. **Sia dato il seguente schema relazionale (le chiavi primarie sono sottolineate, gli attributi opzionali sono indicati con "*")**

ACCOMMODATION (CodeA, Address, City, Area)

LEASE (CodC, StartDate, EndDate*, PersonName, CodeA, MonthlyRent)

Note: Area expressed in square meters. For current contracts, EndDate is NULL.

a) Find the code, address and city of the accommodations that have an area greater than the average area of the accommodations of the cities in which they are located.

2. **Sia dato il seguente schema relazionale (le chiavi primarie sono sottolineate, gli attributi opzionali sono indicati con "*")**

AIRCRAFT (SerialNumber, Model, Capacity)

SCHEDULE (Code, Departure, Destination, DepartureTime, ArrivalTime)

FLIGHTS (Code, SerialNumber, Date, NoReservations)

a) Find the routes (city of departure, city of arrival) that have never been made with a Boing-747 aircraft.

SQL Language: Exercise

1. **Given the following relational schema (primary keys are underlined, optional attributes are indicated by "*")**

ATHLETE (<u>ACode</u>, AName, ASurname, Nationality, BirthDate)
ATTENDANCE (<u>CCode</u>, <u>ACode</u>, Position, Time)
COMPETITION (<u>CCode,</u> Place, Date, CType)

a) Show the code and the name of the athletes who never attended any Super G competitions (CType = 'Super G').

b) Find the countries for which at least 5 athletes born before 1980 compete, each of whom has participated in at least 10 cross-country skiing competitions.

2. **Given the following relational schema (primary keys are underlined, optional attributes are indicated by "*")**

PUBLISHER(<u>PCode</u>, EditorName, Address, City)
BOOK(<u>BCode</u>, Title, AuthorName, PCode)
BOOKSTORE(<u>BSCode</u>, BookshopName, Address, City)
SALE(<u>BCode</u>, <u>BSCode</u>, <u>Date</u>, NoCopies)

   a) Find the name of the bookstores where no books from publishers based in Turin have been sold.
   b) Find the name of the publishers for which at least 10 publications were sold in 2002 in bookstores in Rome in more than 2,000 copies.

3. **Given the following relational schema (primary keys are underlined, optional attributes are indicated by "*")**

MC_TEST(<u>TestID</u>, Topic, Score)
STUDENT (<u>StudentID</u>, Name, Address, CityA)
TEST-RESULT (<u>StudentID</u>, <u>TestID</u>, isCorrectAnswer)

   a) Find the names of students who did not correctly answer any math multiple choice test.
   b) Find the names of the students in Turin who achieved the maximum possible score in the math multiple choice test.

4. **Given the following relational schema (primary keys are underlined, optional attributes are indicated by "*")**

   AIRCRAFT (<u>SerialNumber</u>, Model, Capacity)
   SCHEDULE (<u>Code</u>, Departure, Destination, DepartureTime, ArrivalTime)
   FLIGHTS (<u>Code, SerialNumber, Date</u>, NoReservations)

a)   Find out the code and departure time of flights departing from Milan to Naples on 1 October 1993, which still have free seats and whose duration (difference between the time of arrival and the time of departure) is less than the average duration of flights from Milan to Naples.

5. **Given the following relational schema (primary keys are underlined, optional attributes are indicated by "*")**

   MECHANIC(<u>ID</u>, Name)
   CAN-REPAIR (<u>ID</u>, <u>FaultType</u>)
   HAS-DONE-REPAIR (<u>RCode</u>, ID, LicensePlate, Date, Duration, FaultType)

a) Find the name of the mechanics who have carried out at least one repair of a fault that they did not know how to repair.
b) For cars that required repairs carried out by at least 3 different mechanics on the same day, display the car's license plate, the date of repairs and the types of faults that occurred, sorting the result in ascending order of license plate and descending order of date.

6. **Given the following relational schema (primary keys are underlined, optional attributes are indicated by "*")**

   MEETING_ROOM(<u>RCode</u>, NumberSeats, Projector)
   BOOKING(<u>RCode, Date, StartTime</u>, EndTime, ECode)
   EMPLOYEE(<u>ECode</u>, Name, Surname, BirthDate, City)

   a) View the code and maximum number of seats in projector-equipped rooms that have been booked at least 15 times for meetings starting before 3:00 p.m., but have never been booked for meetings starting after 8:00 p.m.
   b) View for each room the room code, the maximum number of seats and the number of reservations considering only the last date on which the room was booked

7. **Given the following relational schema (primary keys are underlined, optional attributes are indicated by "*")**

GUIDE (<u>GCode</u>, Name, Surname, Nationality)
TOUR_TYPE (<u>TourTypeCode</u>, Monument, Duration, City)
GROUP (<u>GRCode</u>, NumberParticipants, Language)
GUIDED_TOUR (<u>GRCode</u>, <u>Date</u>, <u>StartTime</u>, TourTypeCode, GCode)

a)   Among the monuments for which at least 10 guided tours have been made, view the monument that has been visited by the largest number of people overall.
b)   For each tour guide who has never guided a type of tour for French-speaking groups, show name and surname and, for each date, the total number of type of tours guided and their total duration.

8. Given the following relational schema (primary keys are underlined, optional attributes are indicated by "*")

TEENAGER(<u>TaxID</u>, Name, Surname, Birthdate, City)
ACTIVITY(<u>ACode</u>, ActivityName, Description, Category)
SUMMER_CAMP(<u>CCode</u>, CampName, City)
REGISTRATION-FOR-ACTIVITIES-IN-SUMMER-CAMP(<u>TaxID</u>, <u>ACode</u>, <u>CCode</u>, <u>RegistrationDate</u>)

a)   View the first and last name of the teenagers who participated in the largest number of summer camps for the activities in the "Tennis" category.

9. Given the following relational schema (primary keys are underlined, optional attributes are indicated by "*")

   CUSTOMER (<u>CustomerID</u>, Name)
   ACCOUNT(<u>AccountID</u>, Balance, Branch, Country)
   CUSTOMER_ACCOUNT (<u>CustomerID</u>, <u>AccountID</u>)

a)   Find all branches that have at least one client who are the only holder (without co-holders) of a single current account (that is, customers to whom no other current account is in the name).

10. Given the following relational schema (primary keys are underlined, optional attributes are indicated by "*")

   TAXPAYER(<u>TaxId</u>, Name, Street, City)
   TAX_RETURN(<u>ReturnID</u>, Type, Income)
   PRESENTS(<u>TaxId</u>, <u>ReturnID</u>, Date)

a) Display the tax ID, name, and average income reported from 1990 onwards by taxpayers whom maximum income reported since 1990 is higher than the average income calculated on all tax retruns in the database.

11. Given the following relational schema (primary keys are underlined, optional attributes are indicated by "*")

PERSON (<u>Name</u>, Sex, Age)

PARENT (<u>ParentName</u>, <u>ChildName</u>)

a) Find the name of each person younger than 10 years old who is an only child

SQL Language: Exercises

1. **Given the following relational schema (primary keys are underlined, optional attributes are indicated by "*")**

   WORKSHOP (<u>WSID</u>, Name, Address, City)
   VEHICLE (<u>LicensePlate</u>, Model, Brand, Category, Power, YearRegistration, TaxCode)
   CUSTOMER (<u>TaxCode</u>, Name, Surname, BirthDate, Address, City)
   SERVICE (<u>LicensePlate</u>, <u>WSID</u>, <u>Date</u>, Cost)

For workshops that have serviced at least 200 different vehicles registered to customers born between 1970 and 1980, display the name and address of the workshop that carried out the most services (including all services) among workshops located in the same city. Also view the total cost of services carried out and the number of different vehicle models serviced.

2. **Given the following relational schema (primary keys are underlined, optional attributes are indicated by "*")**

   TECHNICIAN (<u>ID</u>, Name, Surname, BirthDate, Gender, Type)
   INTERVENTION (<u>IntID</u>, Name, Description, HourlyCost)
   BUILDING (<u>BuildingID</u>, Address, City, Province, Region, Type)
   PERFORM_INTERVENTION (<u>ID, IntID, Date</u>, BuildingID, Duration)

Considering only the buildings located in the province of Turin, view the date in March 2022 in which the highest number of interventions was carried out in the buildings considered.

3. **Given the following relational schema (primary keys are underlined, optional attributes are indicated by "*")**

   LOCATION (<u>LocID</u>, Name, City, Region, CapacityMax)
   EVENT (<u>EvID</u>, Title, Type)
   EDITION (<u>EvID</u>, <u>Date</u>, LocID, NumberParticipants)

Among the events for which editions have been organized in at least 3 different cities, view the title of the event in which the largest number of people participated overall (considering all editions of the event).

4. **Given the following relational schema (primary keys are underlined, optional attributes are indicated by "*")**

FILM (<u>CodF</u>, Title, ReleaseDate, Genre, DurationMinutes)
CINEMA (<u>CodC</u>, Name, Address, City)
HALL(<u>CodC</u>, <u>HallNumber</u>, Capacity)
SCREENING (<u>CodC</u>, <u>HallNumber</u>, <u>Date</u>, <u>StartTime</u>, EndTime, CodF)

   a) View the title of each film that has a shorter duration than the average duration of films**,** and that has been screened a number of times greater than the average number of screenings of films.

b) View the title of each film that has a shorter duration than the average duration of films *in the same genre*, and that has been screened a number of times greater than the average number of screenings of films *in the same genre*.