Student (ssn, name, address, major)
Course (code, title)
Registered (ssn, code)
Use relational algebra to answer the following :
a. List the codes of courses in which at least one student is registered (registered courses).
b. List the title of registered courses.
c. List the codes of courses for which no student is registered.
d. The titles of courses for which no student is registered.
e. Name of students and the titles of courses they registered to.
f. SSNs of students who are registered for both database systems and analysis of algorithms.
g. SSNs of students who are registered for both database systems and analysis of algorithms.
h. The name of students who are registered for both database systems and analysis of algorithms.

i. List of courses in which all students are registered.
j. List of courses in which all ‘ECMP’ major students are registered.

a. List the codes of courses in which at least one student is registered (registered courses).
$\pi_{code}(Registered)$

b. List the title of registered courses. $\pi_{title}(Course \bowtie Registered)$

c. List the codes of courses for which no student is registered.

Consider the following relations:

□□□□□(□□□□□□□)−□□□□□(□□□□□□□□□□□□)*π**code*(*Course*)−*π**code*(*Registered*)

d. The titles of courses for which no student is registered.
□□□□□□□(□□□□□□□−(□□□□□□□⋈□□□□□□□□□□□□))*π**title*
(*Course*−(*Course*⋈*Registered*))

e. Name of students and the titles of courses they registered to.
□□□□□,□□□□□(□□□□□□□□⋈□□□□□□□□□□□□⋈□□□□□□□)*π**name*,*title*
(*Student*⋈*Registered*⋈*Course*)

f. SSNs of students who are registered for both database systems and analysis of algorithms.
g. SSNs of students who are registered for either database systems or analysis of algorithms.
h. The name of students who are registered for both database systems and analysis of algorithms.
□□□□□(□□□□((□□□□□□□□⋈□□□□□□□□□□□□⋈(□□□□□□□⋈□□□□□□□=′□□
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=′□□□□□□□□□□□□□□□□□□□□*h*□□′□□□□□□□))⋈□□□□□□□□)*π**name*(*π**ssn*
((*Student*⋈*Registered*⋈(*Course*⋈*σtitle*=′*Database Systems*′
Course))∩(*Student*⋈*Registered*⋈*σtitle*=′*Analysis of Algorithms*′*Course*))⋈*Student*)

i. List of courses in which all students are registered.
□□□□□,□□□(□□□□□□□□□□□□)/□□□□(□□□□□□□□□)*π**code*,*ssn*(*Registered*)/*π**ssn*
(*Student*)

j. List of courses in which all ‘ECMP’ major students are registered.
□□□□□,□□□(□□□□□□□□□□□□)/□□□□(□□□□□□□=′□□□□′□□□□□□□□□)*π**code*,
ssn(*Registered*)/*π**ssn*(*σmajor*=′*ECMP*′*Student*)

Consider the following relations:

Explanation:

- π...: Projection operation (selecting specific columns)
- σ...: Selection operation (filtering rows based on a condition)
- ⋈⋈: Natural join operation (joining tables based on common columns)
- /A/B: Division operation (returning elements from A that match every element in B)

These expressions represent the operations needed to answer each question using relational algebra.

Related posts:

1. What is database management system (DBMS) ? What are the tasks performed by users in DBMS ?
2. What are the advantages and disadvantages of DBMS ?
3. What do you understand by database users ? Describe the different types of database users.
4. Who are data administrators ? What are the functions of database administrator ?OR Discuss the role of database adinistrator.
5. What is data abstraction ? Explain different levels ofabstraction.
6. Explain the differences between physical level,conceptual level and view level of data abstraction.
7. Explain the difference between database management system (DBMS) and file system.
8. Discuss the architecture of DBMS. What are the types of DBMS architecture ?
9. What are data models ? Briefly explain different types of data models.
10. Describe data schema and instances.
11. Describe data independence with its types
12. Describe the classification of database language. Which type of language is SQL ?

 Consider the following relations:

Consider the following relations:

13. Explain DBMS interfaces. What are the various DBMS interfaces ?
14. What is ER model ? What are the elements of ER model ? What are the notations of ER diagram ?
15. What do you understand by attributes and domain ?Explain various types of attributes used in conceptual data model.
16. Construct an ER diagram for University system.
17. Construct an ER diagram for the registrar’s office
18. Explain the primary key, super key, foreign key and candidate key with example. OR Define key. Explain various types of keys.
19. What do you mean by a key to the relation ? Explain the differences between super key, candidate key and primary key.
20. Explain generalization, specialization and aggregation. OR Compare generalization, specialization and aggregation with suitable examples.
21. What is Unified Modeling Language ? Explain different types of UML.
22. What is relational model ? Explain with example.
23. Explain constraints and its types.
24. What are the additional operations in relational algebra ?
25. Explain integrity constraints.
26. Explain the following constraints : i. Entity integrity constraint. ii. Referential integrity constraint. iii. Domain constraint.
27. Describe mapping constraints with its types.
28. Explain how a database is modified in SQL. OR Explain database modification.
29. Discuss join and types with suitable example. Define join. Explain different types of join.
30. Describe the SQL set operations

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