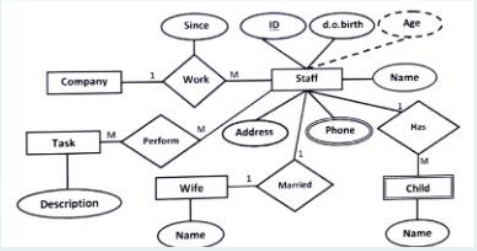
3



For the ER diagram given, which of the following observations is/are true

- All are strong entities
- There are four strong entities ✓
- There are ternary relationships
- There are no multivalued attributes

4

Which of the following combines cartesian product and certain selection into one operation

- Set-Union
- Natural Join ✓
- Division
- Assignment

5

Equivalent SQL query for the relational algebra expression given in figure is:

Schema: R = (A, B, C) S = (D, E, F), **Relational algebra expression**: $\Pi_{A,F}\,(\sigma_{C=D}\,(r \times s))$

- select A, F from r natural join s where C=D
- select A, F from r cartesian product s where C=D
- select A, F from r,s where C=D ✓
- select A, F from r join s where r.C=s.D

6

Which of the following statement is correct to display all the cities with the condition, temperature, and humidity whose humidity is in the range of 60 to 75 from the 'weather' table? [Schema: weather(city, condition, temperature, humidity)]

A.) SELECT * FROM weather WHERE humidity IN (60 to 75)

B.) SELECT * FROM weather WHERE humidity BETWEEN 60 AND 75

C.) SELECT * FROM weather WHERE humidity >60 AND humidity<75

D.) SELECT * FROM weather WHERE humidity >=60 AND humidity<=75

- A, B and D
- B and C
- B and D ✓
- A, B and C

7

Consider the table **STUDENT**

Roll	*SName*	*City*	*Marks*
1	Rajaneesh	Chennai	90
2	Sanidhya	Mumbai	90
3	Omkar	Chennai	95
4	Latha	Delhi	91
5	John	Chennai	98

Which of the Query is used to Select all the Students from City Chennai.

- Select * from STUDENT where city == "Chennai ";
- Select * from STUDENT where city="Chennai "; ✓
- Select * from STUDENT where city is "Chennai ";
- Select * from STUDENT where city like "Chennai_";

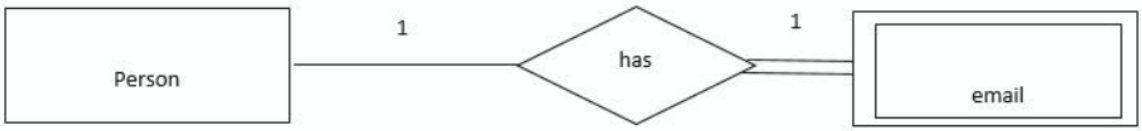
8

Known facts that can be recorded and have implicit meaning is:

- Data ✓
- Knowledge
- Information

9

For the ER diagram given, which of the following observations is/are true



- Each e-mail address belongs at least to one person
- Each email address belongs to at the most one person
- Each email address belongs to many persons
- Each e-mail address belongs to exactly one person ✓

10

Consider the table **STUDENT**

Roll	*SName*	*City*	*Marks*
1	Rajaneesh	Chennai	90
2	Sanidhya	Mumbai	90
3	Omkar	Chennai	95
4	Latha	Delhi	91
5	John	Chennai	98

SELECT SName, City FROM Customers WHERE Marks=92; will return how many rows?

- 1
- 2
- 3
- 0 ✓

11

The natural join is defined by

- Selection
- Cartesian product
- Projection
- All of the mentioned ✓

12

like 'profit\%-loss%' in where clause matches which of the following:

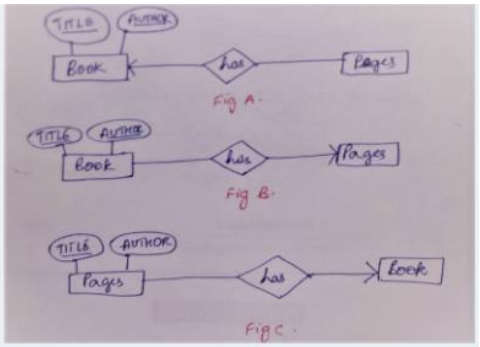
- profit-loss
- profit\%-loss%
- protit%-loss ✓
- profit/-loss

13

Employee = (Employee_id:int, fname:String, lname: String dept_name:String, salary: float) is an example of

- Relation extension
- Relation Intension ✓
- Relation instance
- Relation tuple

14



Identify the ER diagram that best describes the following : A book which is identified by its author and title is made up of multiple pages

- (•) A ✓
- ( ) B
- ( ) C

15

Which of the following relation algebra queries will fetch the highest account balance in the bank

Consider the schema:

Branch = (branch-name, branch-city, assets)
Customer= (customer-name, customer-street, customer-city)
Loan = (loan-number, branch-name, amount)
Borrower = (customer-name, loan-number)
Account = (account-number, branch-name, balance)
Depositor = (customer-name, account-number)

A. $\Pi_{balance}$ (account) $\cap$ $\Pi_{account.balance}$ ($\sigma_{account.balance < d.balance}$ (account $\times$ ρ_d(account)))
B. $\Pi_{balance}$ (account) $\cap$ $\Pi_{account.balance}$ ($\sigma_{account.balance > d.balance}$ (account $\times$ ρ_d(account)))
C. $\Pi_{balance}$ (account) $-$ $\Pi_{account.balance}$ ($\sigma_{account.balance < d.balance}$ (account $\times$ ρ_d(account)))
D. $\Pi_{balance}$ (account) $-$ $\Pi_{account.balance}$ ($\sigma_{account.balance > d.balance}$ (account $\times$ ρ_d(account)))

- ( ) A
- ( ) B
- (•) C ✓
- ( ) D

16

What is the expected output of the query shown in the figure

Consider the schema:

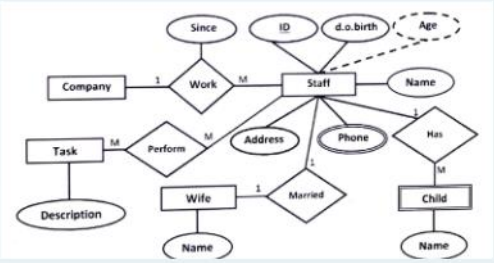
employee (person-name, street, city)
works (person-name, company-name, salary)
company (company-name, city)
manages (person-name, manager-name)

Relational Algebra Query:

$$\Pi_{\text{person-name, city}} (\text{employee} \bowtie (\sigma_{\text{company-name} = \text{“First Bank Corporation”}} (\text{works})))$$

- Selects person name and city from cartesian product of employee and works tables
- Selects person name and city from natural join of employee and works tables
- Selects names and cities of residence of all employees who work for First Bank Corporation ✓
- Selects data of all employees who work for First Bank Corporation

17



For the ER diagram given, which of the following observations is/are false

- Age is derived
- Child entity uses the attribute of staff to identify itself
- A task is given to at most one staff ✓
- A staff can have multiple phone numbers

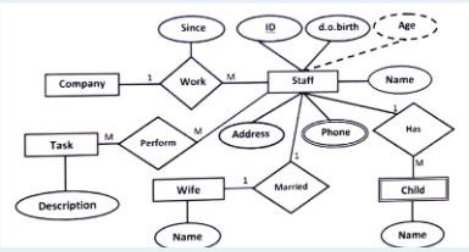
18

Which of the following is a binary operation which operates sets of same schema

A.) $\cup$ B.) σ C.) ρ D.) π

- (●) A ✓
- ( ) B
- ( ) C
- ( ) D

19



For the ER diagram given, which of the following observations is/are true

- (●) Since is the attribute of a relation ✓
- ( ) Since is the attribute of company
- ( ) Since is the attribute of staff
- ( ) Since is a relation

20

Constraint : "No two instances (tuples) can have the same combination of values for all their attributes" is a

- Model-based constraint
- Schema-based constraint ✓
- Application-based
- Semantic constraints

21

What is the type of architecture if : collection of multiple databases are interconnected, spread physically across various locations and communicate via a computer network

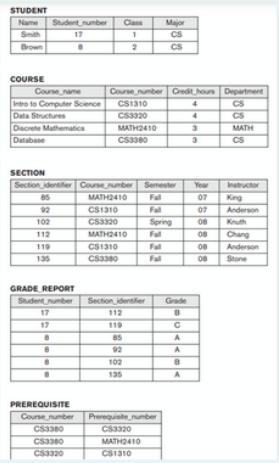
- Centralized
- Client Server
- Parallel
- Distributed ✓

22

Which of the following is not part of data dictionary generated by DDL compiler

- Database instance ✓
- Database schema
- Integrity constraints
- Authorization

2



STUDENT

Name	Student_number	Class	Major
Smith	17	1	CS
Brown	8	2	CS

COURSE

Course_name	Course_number	Credit_hours	Department
Intro to Computer Science	CS1310	4	CS
Data Structures	CS3320	4	CS
Discrete Mathematics	MATH2410	3	MATH
Database	CS3380	3	CS

SECTION

Section_identifier	Course_number	Semester	Year	Instructor
85	MATH2410	Fall	07	King
92	CS1310	Fall	07	Anderson
102	CS3320	Spring	08	Knuth
112	MATH2410	Fall	08	Chang
119	CS1310	Fall	08	Anderson
135	CS3380	Fall	08	Stone

GRADE_REPORT

Student_number	Section_identifier	Grade
17	112	B
17	119	C
8	85	A
8	92	A
8	102	B
8	135	A

PREREQUISITE

Course_number	Prerequisite_number
CS3380	CS3320
CS3380	MATH2410
CS3320	CS1310

Consider the database given in the Figure, Choose the query which fetches the student names and major departments of all students who do not obtained any grade E in any of their courses.

- SELECT Name, Major FROM STUDENT S WHERE NOT EXISTS (SELECT * FROM GRADE_REPORT WHERE StudentNumber= S.StudentNumber AND NOT(Grade='E'))
- SELECT Name, Major FROM STUDENT SWHERE EXISTS (SELECT * FROM GRADE_REPORT WHERE StudentNumber= S.StudentNumber AND Grade='E')
- SELECT Name, Major FROM STUDENT S WHERE EXISTS (SELECT * FROM GRADE_REPORT WHERE StudentNumber= S.StudentNumber AND NOT(Grade='E'))
- SELECT Name, Major FROM STUDENT S WHERE NOT EXISTS (SELECT * FROM GRADE_REPORT WHERE StudentNumber= S.StudentNumber AND Grade='E') ✓

3

Choose the equivalent query for: SELECT E.Fname, E.Lname FROM EMPLOYEE AS A WHERE E.Ssn IN (SELECT D.Essn FROM DEPENDENT AS D WHERE E.Fname = D.Dependent_name AND E.Sex= D.Sex);

- SELECT E.Fname, E.Lname FROM EMPLOYEE AS A, DEPENDENT AS B WHERE A.Ssn = B.Essn AND A.Sex = B.Sex AND A.Fname = B.Dependent_name; ✓
- SELECT E.Fname, E.Lname FROM EMPLOYEE AS A WHERE E.Ssn EXISTS (SELECT D.Essn FROM DEPENDENT AS B WHERE A.Fname = B.Dependent_name AND A.Sex = B.Sex);
- SELECT E.Fname, E.Lname FROM EMPLOYEE AS A WHERE E.Ssn = SOME (SELECT D.Essn FROM DEPENDENT AS I WHERE A.Fname = B.Dependent_name AND A.Sex = B.Sex);
- SELECT E.Fname, E.Lname FROM EMPLOYEE AS E WHERE E.Ssn ALL (SELECT D.Essn FROM DEPENDENT AS D WHERE E.Fname = D.Dependent_name AND E.Sex = D.Sex);

2

What is the output of the PL-SQL code given

```
Schema used: Customers(ID, NAME,AGE,ADDRESS,SALARY)

CREATE OR REPLACE FUNCTION totalCustomers
RETURN number IS
   total number(2) := 0;
BEGIN
   SELECT count(*)total FROM Customers;
   RETURN total;
END;
/

declare a number;
begin
a := totalCustomers;
dbms_output.put_line(a);
end;
/
```

- Error missing keyword ✓
- Prints the total salary
- Prints total number of customers
- Error in function declaration

3

What is the output of the PL-SQL code given

```
Schema used: Customers(ID, NAME,AGE,ADDRESS,SALARY)

CREATE OR REPLACE PROCEDURE MaxSal(Age IN Number)
IS
   max number(6) := 0;
BEGIN
   SELECT max(salary) into max FROM Customers;
END;
/

Declare a number;
Begin
a:=24;
Maxsal(a);
End;
/
```

- ○ PL/SQL procedure successfully completed with the maximum salary output
- ○ PL/SQL procedure successfully completed without any output ✓
- ◉ Procedure created with compilation errors.
- ○ None of the mentioned

2. A cursor is used when defining the SQL statement that returns a result set *

- ○ For defining the SQL statement that returns a result set
- ◉ For working with each row of the result set returned by SQL statement ✓
- ○ For defining user defined functions/procedures
- ○ For defining triggers

3. Which prefixes are available to Oracle triggers which work with "on update" event? *

- ○ : new only
- ○ : old only
- ◉ Both :new and : old ✓
- ○ Neither :new nor : old

2

which of the following function dependency hold
(1/1 Point)

Incharge	experience
Roy	5
Bella	2
Roy	6
Rai	3
Roy	4

- [ ] only Incharge->experience
- [x] only experience->Incharge ✓
- [ ] both
- [ ] none

3

Given the following functional dependencies
G->A
C->G
AF->D, then we can infer
(1/1 Point)

- [x] CF->D ✓
- [ ] D->F
- [ ] AF->C
- [ ] F->CD

1. for the relation R(A,B,C,D,E), and functional dependencies AB->C, C->D, B->EA
(1/1 Point)

- AB is a candidate key
- A is a candidate key
- BA is a candidate key
- B is a candidate key ✓

2. For the relation R(A,B,C,D,E,F), and functional dependencies AB->C, C->DE, E->F, C->B
(0/1 Point)

- A is a non prime attribute
- B is a prime attribute ✓
- D is a prime attribute
- there is no non prime attribute

2. given R(A,B,C,D,E) and AC->DE, E->D, A->B. In the fd AC->DE
(0/1 Point)

- only D is extraneous ✓
- only E is extraneous
- D and E are both not extraneous
- D and E are both extraneous

3. Consider the two sets P and Q with their FDs as below :
   1. P : A → B, AB → C, D → ACE
   2. Q : A → BC, D → AE

   Is P⊆Q?

(1/1 Point)

- true ✓
- false

2. For R(P,B,D,A) and P->BDA; D->A, relation is
(1/1 Point)

- (●) upto 2NF ✓
- ( ) upto 3NF
- ( ) upto 1 NF

3. For R(P,Q,R,S) and P->Q; Q->R; R->S, its decomposition into D1(Q,R), D2(R,S), D3(P,Q) are in
(1/1 Point)

- ( ) 3NF and not dependency preserving
- ( ) not 3NF and dependency preserving
- (●) 3NF and dependency preserving ✓
- ( ) not 3NF and not dependency preserving

2

Given R(A,B,C,D,E,G) and fd1: A->->B and fd2: B->->{E,G}. Then the following fd can be inferred
(1/1 Point)

- ( ) A->->{E}
- (●) A->->{C,D,E,G} ✓
- ( ) B->->A

3

The example is the case of
(1/1 Point)

T1	T2
R(A)	
W(A)	
	W(A)
	COMMIT
COMMIT	

- (●) update of T1 is lost and incorrect summary ✓
- ( ) update of T1 is lost but no incorrect summary
- ( ) update of T2 is lost and incorrect summary

2. S: R4(X) R2(X) R3(X) W1(Y) W2(X) R3(Y) W2(Y)
number of conflict serializable schedules that can be possible are
(0/1 Point)

- (●) 0
- ( ) 1
- ( ) 8
- ( ) 3 ✓

3. S:R1(X)W1(X) R2(X) R1(Y) W2(X) W1(Y) R2(Y) W2(Y)
(1/1 Point)

- (●) CONFLICT SERIALIZABLE AS T1T2 ✓
- ( ) CONFLICT SERIALIZABLE AS T2T1
- ( ) CONFLICT SERIALIZABLE AS both T1T2 and also T2T1
- ( ) NOT CONFLICT SERIALIZABLE

2. suppose S:R1(X) W1(X) R2(X) W2(X)C2 R1(Y).

   If the transaction fails immediately after R1(Y). Which one of the following statement is correct in this scenario?
   (1/1 Point)

   - ○ Only T2 must be aborted and then re-started to ensure transaction atomicity.
   - ◉ Schedule S is non-recoverable and cannot ensure transaction atomicity. ✓
   - ○ Schedule S is recoverable and can ensure atomicity and nothing else needs to be done.

3. In two-phase locking protocol with lock conversion during the growing phase for the lock acquire/release, which of the following option is correct
   (1/1 Point)

   - ◉ can acquire a lock-S on item, can acquire a lock-X on item, can convert a lock-S to a lock-X ✓
   - ○ can release a lock-S on item, can release a lock-X on item, can convert a lock-X to a lock-S
   - ○ can acquire a lock-S on item, can release a lock-X on item, can convert a lock-X to a lock-S
   - ○ can release a lock-S on item. can acquire a lock-X on item, can convert a lock-S to a lock-X