Started on	Monday, 28 September 2020, 9:21 AM
State	Finished
Completed on	Monday, 28 September 2020, 10:27 AM
Time taken	1 hour 5 mins
Feedback	https://www.lnmiit.ac.in/

Question **1**

Not answered

Marked out of 3.00

Consider the following relation state for a relation schema S with attributes X Y Z:

S

t#	X	Y	Z
1	m	20	T
2	m	10	F
3	o	30	T
4	n	30	T
5	o	20	T

Check all the dependencies that are *violated* by the relation-state S2.

t# that violate the FD

- [ ] i. XY -> Z is violated —
- [x] ii. XZ -> Y is violated 3 & 5
- [x] iii. YZ -> X is violated 1 & 5
- [x] iv. Z -> X is violated 1, 3, 4, 5
- [x] v. X ->Y is violated 1, 2, 3, 5

Question **2**

Not answered

Marked out of 5.00

Which of the following is an irreducible set (minimum cover) of the given set of FDs?

Q → U
U → V
PQ → WST
SU → TR
V T → RW
R → W

1 Q → U
2 U → V
3 PQ → W
4 PQ → S
5 PQ → T
6 SU → T
7 SU → R
8 VT → R
9 VT → W
10 R → W

Step 1

Step 2

$(PQ)^+ = \{P, Q, R, S, T, U, V, W\}$

$(P)^+ = P$, $(Q)^+ = \{Q, U, V\}$

$(SU)^+ = \{S, U, T, R, W, V\}$

$(S)^+ = (S)$, $(U)^+ = \{U, V\}$

$(VT)^+ = \{V, T, R, W\}$

$(V)^+ = V$, $(T)^+ = \{T\}$

∴ ALL Left irreducible

- i. {Q → U, U → V, PQ → S, SU → T, SU → R, V T → R, PQ → T, R → W}
- ii. {Q → U, U → V, PQ → S, SU → T, PQ → W, V T → R, PQ → T, R → W}
- iii. {Q → U, U → V, PQ → S, SU → T, V T → R, R → W}
- iv. {Q → U, U → V, PQ → S, SU → T, SU → R, V T → R, V T → W, R → W}

Step1: Check RHS has one attribute

Step2: Check for left irreducible

Step3: Check each FD for irreducibility.

Step 3 ↓

Compute closure with & without FD.

(I) with Q → U $(Q)^+ = \{Q, U\}$ ⇒ There is change in closure

without Q → U $(Q)^+ = \{Q\}$ ∴ this FD cannot be removed.

(II) Consider for FD 3. PQ → W

with PQ → W $(PQ)^+ = \{P, Q, W, S, T, V, R, V\}$

without PQ → W $(PQ)^+ = \{P, Q, U, V, S, T, R, W\}$

∵ the closures remain same, this FD can be removed

& so on for each FD.

Question **3**

Not answered

Marked out of 2.00

Consider the relation E = {P,Q,R,S}.

Suppose that the following functional dependencies hold:

PQ → R

PQ → S

R → P

S → Q

List all the candidate key(s) for E.

{PQ}, {RS}, {QR}, {PS}

$(PQ)^+ = (RS)^+ = (QR)^+ = (PS)^+ = \{P, Q, R, S\}$

no subset of any of these sets give the same closure.

$\therefore P^+ = \{P\}$, $(Q)^+ = \{Q\}$, $(R)^+ = \{R, P\}$

$(S)^+ = \{S, Q\}$

Question **4**

Not answered

Marked out of 5.00

Consider the relation E = {P,Q,R,S}.

Suppose that the following functional dependencies hold:

PQ → R ----------(1)

PQ → S ----------(2)

R → P ----------(3)

S → Q ----------(4)

Step 1: Calculate CKs
(PQ), (QR), (RS), (PS)
(i) ∴ all are key/prime attributes
→ there are no non key ∴.
A relation is all attributes prime is in 3NF
(ii) It is not in BCNF as LHS of FD(3) & (4) is not CK.

What is the highest form of relation E?

- BCNF
- None of BCNF and 3NF
- Both BCNF and 3NF
- ✓ 3NF

.

From the list below, select all applicable choices to justify whether E is (or is not) in BCNF.

- FD (2) violates the BCNF requirement
- FD (1) violates the BCNF requirement
- ✓ FD (3) violates the BCNF requirement
- ✓ FD (4) violates the BCNF requirement
- All FDs satisfy the BCNF requirement

.

From the list below, select all applicable choices to justify whether E is (or is not) in 3NF.

- FD (4) violates the 3NF requirement
- FD (1) violates the 3NF requirement
- FD (3) violates the 3NF requirement
- ✓ All FDs satisfy the 3NF requirement
- FD (2) violates the 3NF requirement

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Give a 3NF decomposition of E that is lossless, dependency preserving, and has as few tables as possible. Name each decomposition as E1, E2 and so on. **No other relation schema name will be accepted**.

E1(P,Q,R,S)

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Question **5**

Not answered

Marked out of 3.00

Consider the following relational schema. The primary keys are underlined.

Students (rollno: *integer*, sname: *string*)

Courses (courseno: *integer*, cname: *string*)

Registration (rollno: *integer*, courseno: *integer*, percent: *float*)

Which of the following are relational algebra expressions for the following query:

Find the distinct name of all students who score more than 90% in the course numbered 107

i. π_{sname} (Students * $\sigma_{\text{courseno = 107 and percent > 90}}$ (Registration))

ii. π_{sname} (Students * π_{rollno} ($\sigma_{\text{courseno = 107}}$ ($\sigma_{\text{percent > 90}}$ (Registration))))

iii. π_{sname} ($\sigma_{\text{courseno = 107 and percent > 90}}$ (Registration * Students))

iv. π_{sname} (Students) * $\sigma_{\text{courseno = 107 and percent > 90}}$ (Registration)

contains only one attribute Sname

*

contains attributes rollno, courseno, percent

join can be performed only on an attribute that has same name in both tables. None exist

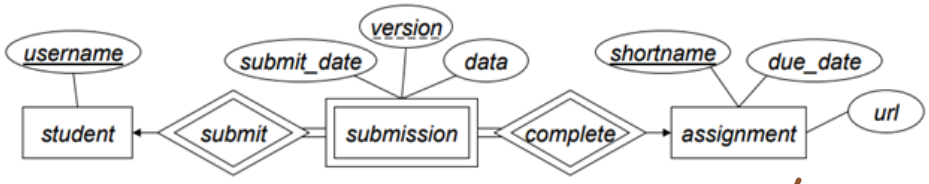
Question **6**

Not answered

Marked out of 3.00

Map the following conceptual model into relational model: (In the diagram, arrow head indicates the cardinality of 1, and no arrow means a cardinality of N).

Please use the same names as used in the diagram. Marks will be deducted for use of alternative names.



(0.5) student (username) Primary key must be mentioned

(0.5) assignment (shortname, due_date, url) →

(2) submission (username, shortname, version, submit_date, data)

FK_2 references assignment (shortname)

FK_1 references student (username)

Both PK & FKs must be specified.

Question **7**

Not answered

Marked out of 4.00

List four significant differences between a file-processing system and a DBMS. Explain them with the help of examples?

Question **8**

Not answered

Marked out of 5.00

Explain the importance of physical data independence and logical data independence in the database systems. What possible problems could have been encountered if these concepts were not implemented? Explain with the help of examples.