MARMARA UNIVERSITY

FACULTY OF ENGINEERING
COMPUTER SCIENCE & ENGINEERING DEPARTMENT

CSE3055
DATABASE SYSTEMS
Homework #8

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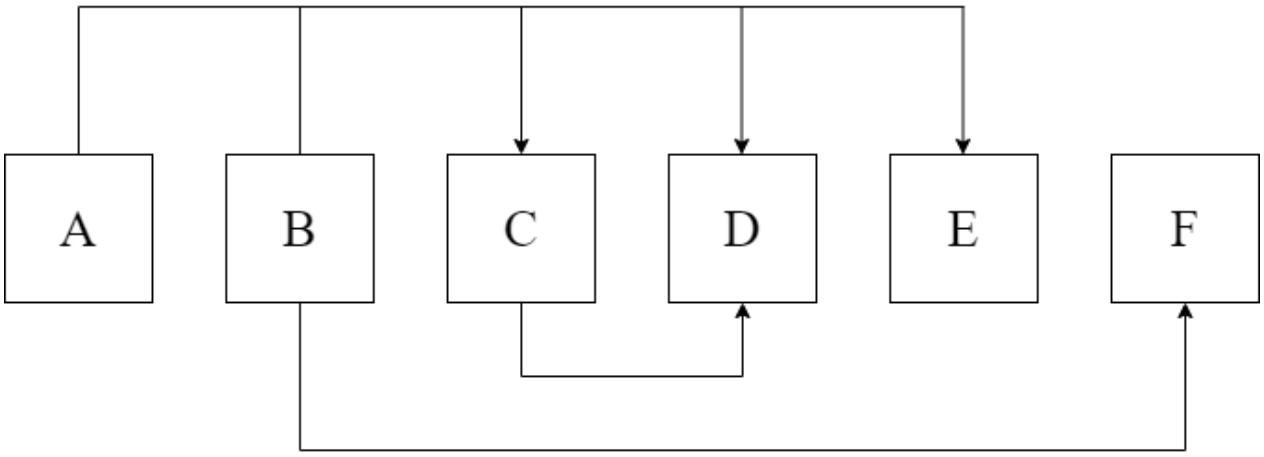
1)

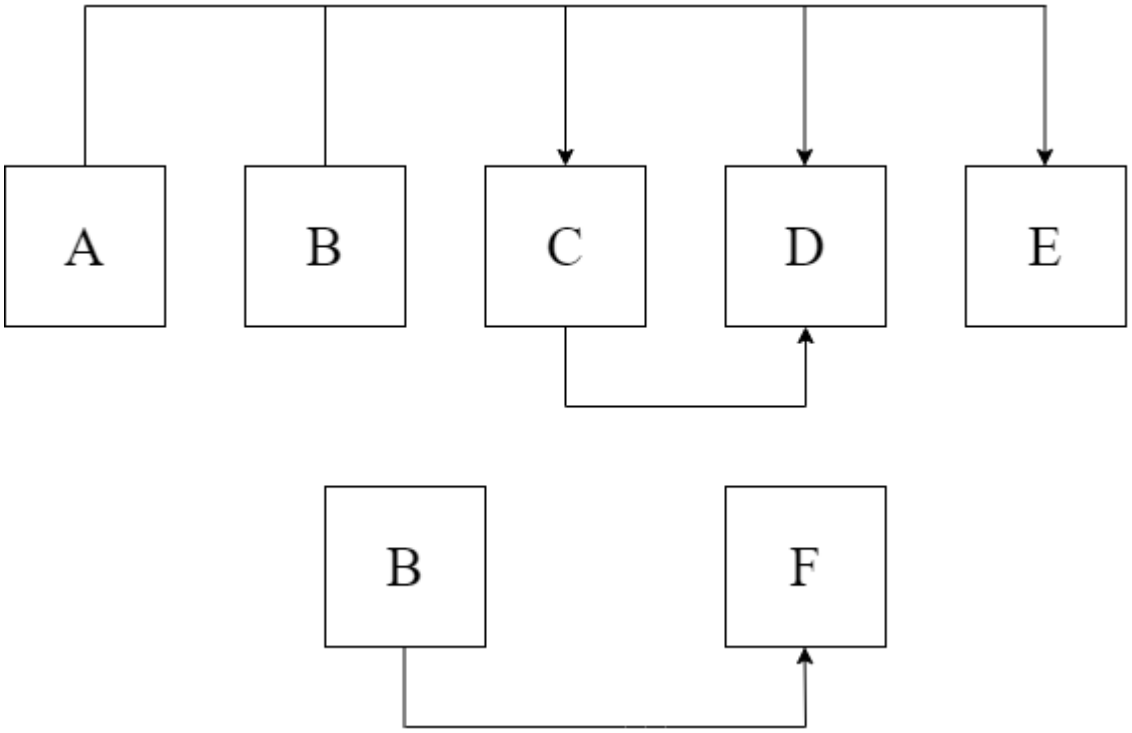


a. What is the key(s) for the relation?
As seen above, A and B are the primary keys of the diagram.

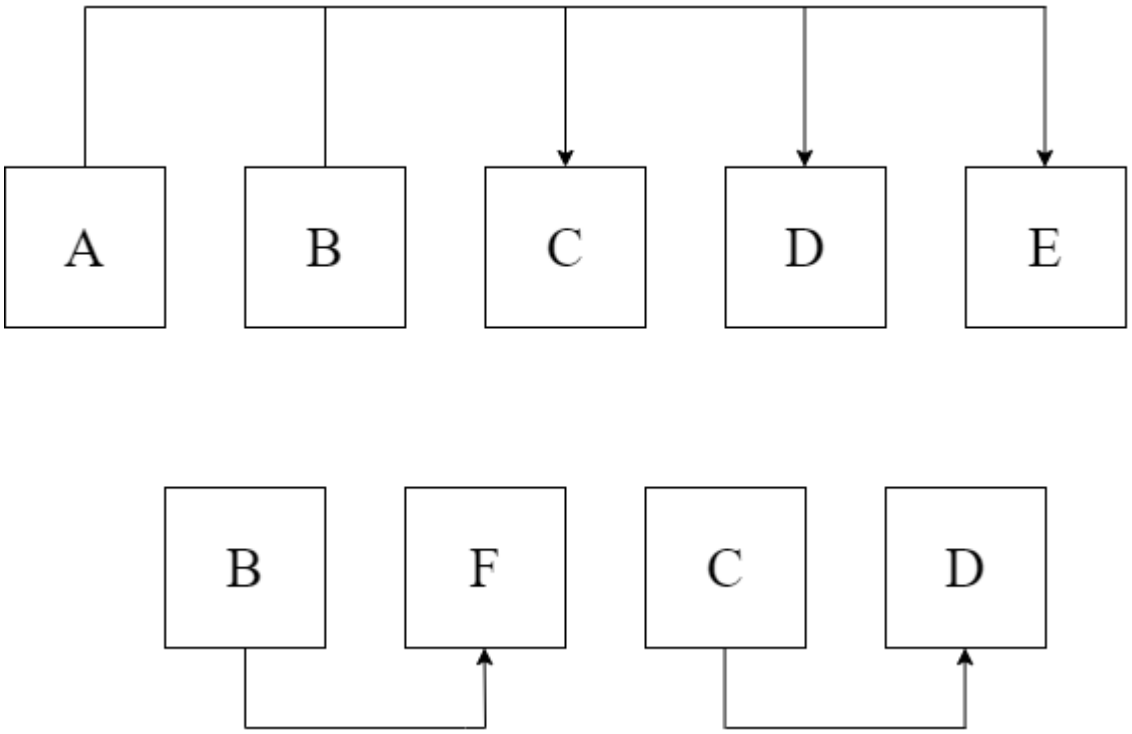
b. What is the normal form of this relation? Explain it.
1st Normal Form: Violation occurs if a relation contains composite or multi-valued attribute. Since there isn't any in our case, 1st Normal Form **is** satisfied.
2nd Normal Form: Violation does not occur if there is fully functional dependency among attributes. Since B -> F in our case, 2nd Normal Form **is not** satisfied.
3rd Normal Form: Violation occurs if there is a transitive dependency. In our case, C -> D, so 3rd Normal Form **is not** satisfied.

c. Decompose R into 3NF relations step by step if it is not in 3NF.
R is not in 3rd Normal Form, so the normalization steps will be like:

1st Normal Form to 2nd Normal Form:



2nd Normal Form to 3rd Normal Form:



2)

Since there is an associative entity between DEPARTMENT and SCHEDULE entities, we can apply denormalizing procedures. In addition, there is also an associative entity between SCHEDULE and EMPLOYEE, so this one is also appropriate for denormalizing.

3)

a)

We can define indexes on StudentName because of ordering; on GPA because it needs to scan whole database; on primary keys of both entities.

b)

CLUSTERED INDEXES:

- CREATE CLUSTERED INDEX idx_StudentID on STUDENT(StudentID);
- CREATE CLUSTERED INDEX idx_CourseID_StudentID on REGISTRATION(Student, CourseID);

NON-CLUSTERED INDEXES:

- CREATE NONCLUSTERED INDEX idx_StudentName on STUDENT(StudentName);
- CREATE NONCLUSTERED INDEX idx_gpa on STUDENT(GPA);

4)

a.

i) Accessed data pages: Page 150, Page 160, Page 110, Page 120, Page 170, Page 130, Page 140.

ii) Accessed data pages: Page 110, Page 120, Page 130, Page 140.

iii) Accessed data pages: Page 150, Page 170, Page 130.

b.

i) Accessed data pages: Page 100, Page 110, Page 120, Page 130

ii) Accessed data pages: Page 350, Page 360, Page 220, Page 230

iii) Accessed data pages: Page 350, Page 360, Page 230, Page 120