Group No. 16

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Online Learning Platform Management System

❖ Tables/Relations :-

1) Educator

➢ Functional Dependencies :

- EID → First Name
- EID → Last Name
- EID → Email ID
- EID → Experience
- EID → Company Name
- EID → Rating
- Email ID → Last Name
- Email ID → First Name
- Email ID → EID
- Email ID → Experience
- Email ID → Company Name
- Email ID → Rating

➢ This relation is in BCNF because the left side of all the FDs are either EID or Email ID which are candidate keys.

2) Domain

➢ There are only 2 attributes of this relation which are DID and Name. Both of these attributes can determine each other so both of them are candidate keys and hence this relation is also in BCNF.

3) **Edu_qualification**
    - ➢ There are only 2 attributes of this relation which are EID and qualification and candidate key for this relation is a combination of them. So, This relation is also in BCNF.
4) **Company**
    - ➢ There is only one attribute of this relation which is company name so it's also in BCNF.
5) **Course**
    - ➢ Functional Dependencies :
        - CID → Name
        - CID → No_of_lessons
        - CID → EID
        - CID → DID
        - CID → Company Name
        - CID → Rating
        - CID → Type_of_course
        - EID → Company Name
    - ➢ This relation is in 2NF because the last FD is violating conditions for 3NF and BCNF.
6) **Course_provide**
    - ➢ There are only 2 attributes of this relation which are CID and provide_skill and candidate key for this relation is a combination of them. So, This relation is in BCNF.
7) **Course_prerequisite**
    - ➢ There are only 2 attributes of this relation which are CID and prerequisite_skill and candidate key for this relation is a combination of them. So, This relation is also in BCNF.
8) **Record_course**
    - ➢ There are only 2 attributes of this relation which are Record_ID and Estimated time where Record_ID can determine Estimated time and hence this relation is also in BCNF.

9) Learn

➢ There are only 2 attributes of this relation which are CID and SID and the candidate key for this relation is a combination of them. So, This relation is in BCNF.

10) Feedback

➢ Functional Dependencies :

- {CID,SID} → Comments
- {CID,SID} → Ratings for course
- {CID,SID} → Ratings for educator

➢ This relation is in BCNF because the left side of all the FDs is {CID,SID} which is a candidate key.

11) Exam

➢ Functional Dependencies

- Exam ID → Total Marks
- Exam ID → Passing Marks
- Exam ID → starting time
- Exam ID → ending time
- Exam ID → live ID
- Exam ID → Exam date
- live ID → Total Marks
- live ID → Passing Marks
- live ID → starting time
- live ID → ending time
- live ID → Exam ID
- live ID → Exam date

➢ This relation is in BCNF because the left side of all the FDs are either Exam ID or live ID which are candidate keys.

12) Take

➢ Functional Dependencies

- {CID,SID} → PID
- PID → CID
- PID → SID

➢ This relation is in BCNF because the left side of all the FDs are either PID or {CID,SID} which are candidate keys.

13) Give

➢ There are only 2 attributes of this relation which are Exam ID and SID and the candidate key for this relation is a combination of them. So, This relation is in BCNF.

14) Result

➢ Functional Dependencies :

- {Exam ID,SID} → Status
- {Exam ID,SID} → Certificate ID

➢ This relation is in BCNF because the left side of all the FDs is {Exam ID,SID} which is a candidate key.

15) Payment

➢ Functional Dependencies :

- PID → Payment Date
- PID → Amount
- PID → Time

➢ This relation is in BCNF because the left side of all the FDs is PID which is a candidate key for this relation.

16) Student Contact

➢ There are only 2 attributes of this relation which are SID and contact number and candidate key for this relation is a combination of them. So, This relation is also in BCNF.

17) Student

➢ Functional Dependencies :

- SID → FirstName
- SID → Last Name
- SID → Email ID
- SID → Gender
- SID → City
- SID → Password
- Email ID → First Name
- Email ID → Last Name

- Email ID → Gender
- Email ID → City
- Email ID → Password
- Email ID → SID

➢ This relation is in BCNF because the left side of all the FDs are either SID or Email ID which are candidate keys.

18) Week days

➢ There are only 2 attributes of this relation which are Live ID and week day and candidate key for this relation is a combination of them. So, This relation is in BCNF.

19) Time Table

➢ Functional Dependencies :

- Live ID → Starting Time
- Live ID → Ending Time

➢ This relation is in BCNF because the left side of all the FDs is LiveID which is the candidate key.

20) Live course

➢ Functional Dependencies :

- Live ID → Fees
- Live ID → Start Date
- Live ID → End Date

➢ This relation is in BCNF because the left side of all the FDs is LiveID which is the candidate key.

❖ Insert anomalies :-

➢ Suppose there are 2 educators E1 and E2 working in companies C1 and C2 respectively. E1 is teaching course R1 and E2 is teaching course R2 on this platform. Since course relation is in 2NF, when we try to insert company name for course R1, it can accept C1 as well as C2 but this must not be true because R1 is taught by E1 which is working in C1 and not in C2.

❖ Logic of how we have arrived at BCNF design :-

- ➢ All the relations in our schema are in BCNF except Course relation which is in 2NF. When we have used BCNF decomposition algorithm for that relation, we have found out that we need to make another relation which contains EID and company name as their attributes and remove company name attribute from Course relation.
- ➢ But, there already exists a relation called Educator which contains both EID and company name and some more attributes.
- ➢ So, we just have to remove an attribute called company name from Course relation and after that all the FDs which have company name would also be removed from the relation.
- ➢ After that, when we check all the remaining FDs, we can see that the left side of all of them is only CID which is the candidate key and hence that relation is also in BCNF.
- ➢ So, all the relations are in BCNF now and hence our schema is in BCNF too.