Department of Computer Science and Engineering

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UCS1412 - Database Laboratory

Assignment 9: Database Design

Part A: Database Design using Normal Forms

8) TO PROVE DEPENDENCY PRESERVATION PROPERTY:
PERFORM UNION OF ALL FDS IN 3NF RELATIONS AND PROVE IT'S EQUIVALENT TO 1NF LIST OF FDS.

Initially we have the following functional dependencies with the 1NF relation **company**,
fd1 : $empid \rightarrow \{name, address, bdate, sex, salary, dno\}$
fd2 : $dno \rightarrow \{dname, mgr_id\}$
fd3 : $pno \rightarrow \{pname, pdno\}$
fd4 : $empid, pno \rightarrow \{hrs\}$

Therefore, the initial list of fds are: $F = \{fd1, fd2, fd3, fd4\}$

Decomposing the above relation to 3NF, we get the following relations and functional dependencies:

1. company_employee

Here,
Closure of empid : $\{empid\}^+ = \{empid, name, address, bdate, sex, salary, dno\}$
Hence it preserves $empid \rightarrow \{name, address, bdate, sex, salary, dno\}$, i.e, fd1.
Therefore, $F1 = \{fd1\}$

2.company_department

Here,
Closure of dno : $\{dno\}^+ = \{dno, dname, mgr_id\}$
Hence it preserves $dno \rightarrow \{dname, mgr_id\}$, i.e, fd2.
Therefore, $F2 = \{fd2\}$

3.company_project

Here,
Closure of pno : $\{pno\}^+ = \{pno, pname, pdno\}$
Hence it preserves $pno \rightarrow \{pname, pdno\}$, i.e, fd3.
Therefore, $F3 = \{fd3\}$

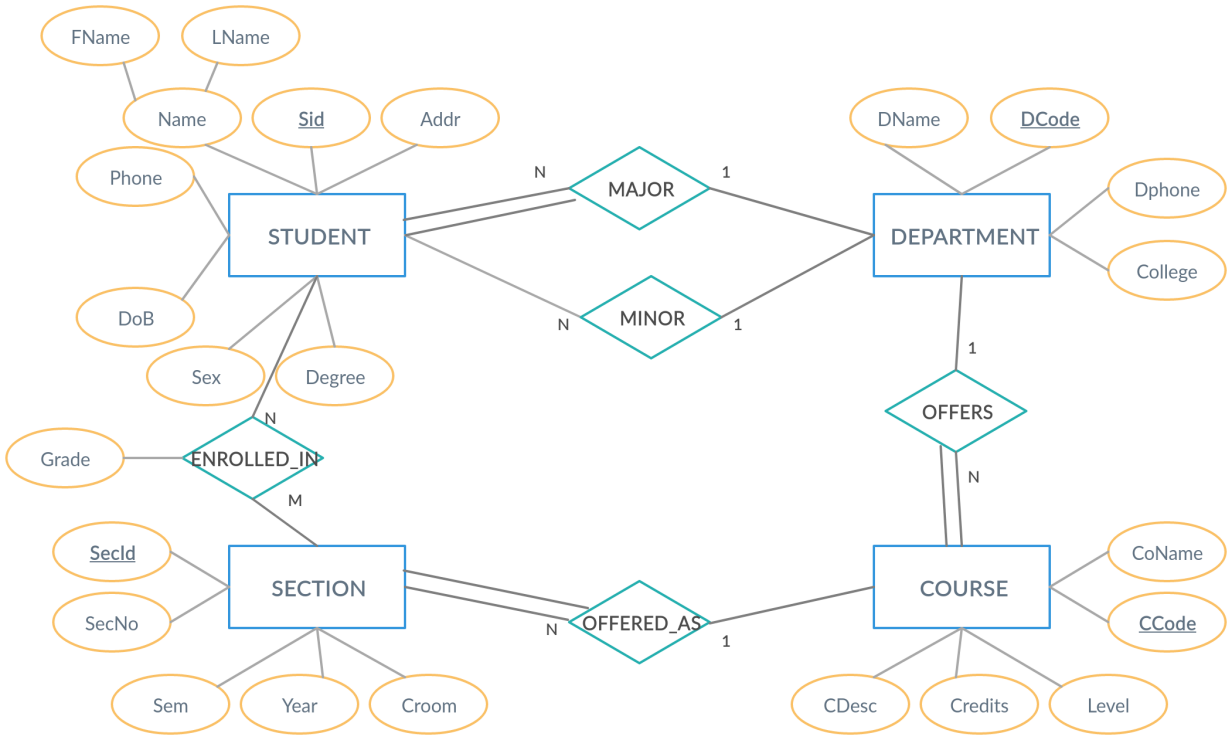
4.company_work

Here,
Closure of $\{empid, pno\}^+ : \{empid, pno\}^+ = \{empid, pno, hrs\}$
Hence it preserves $empid, pno \rightarrow \{hrs\}$, i.e, fd4.
Therefore, $F4 = \{fd4\}$

Now,$F1 \cup F2 \cup F3 \cup F4 = \{fd1, fd2, fd3, fd4\} = F$
Hence, the functional dependencies are preserved through the decomposition of the 1NF table. Thus, proved.

Part B: Database Design using ER diagram

1) Draw ER diagram for the above requirements. Mention the constraints in the diagram.



2) Convert the ER into the corresponding relations using ER-Relational Mapping.