ERD and Relational Schema

Team-1 Members

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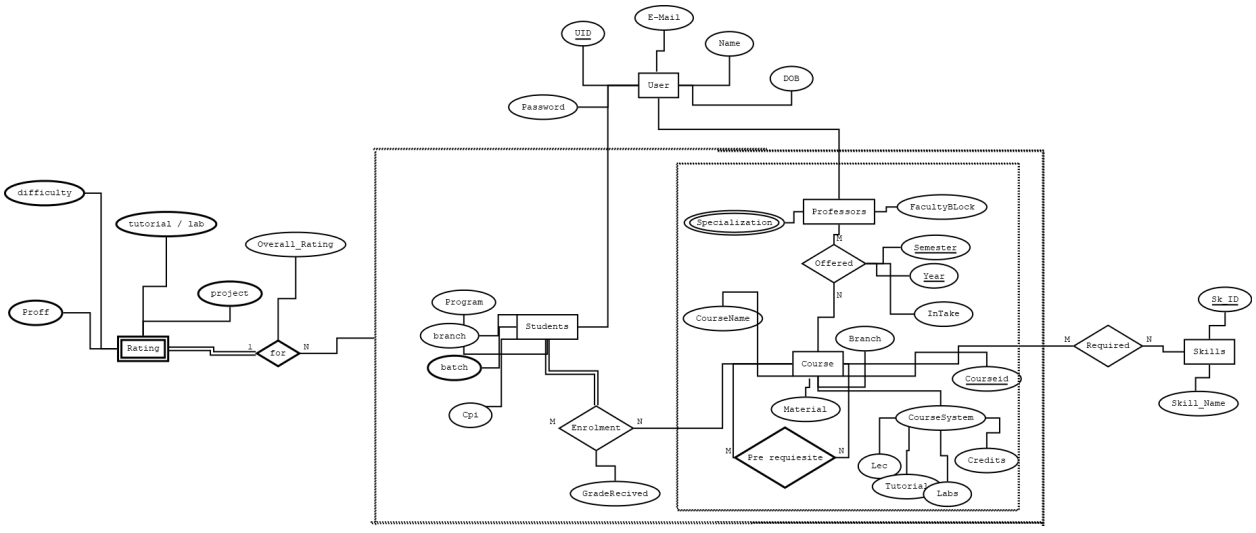
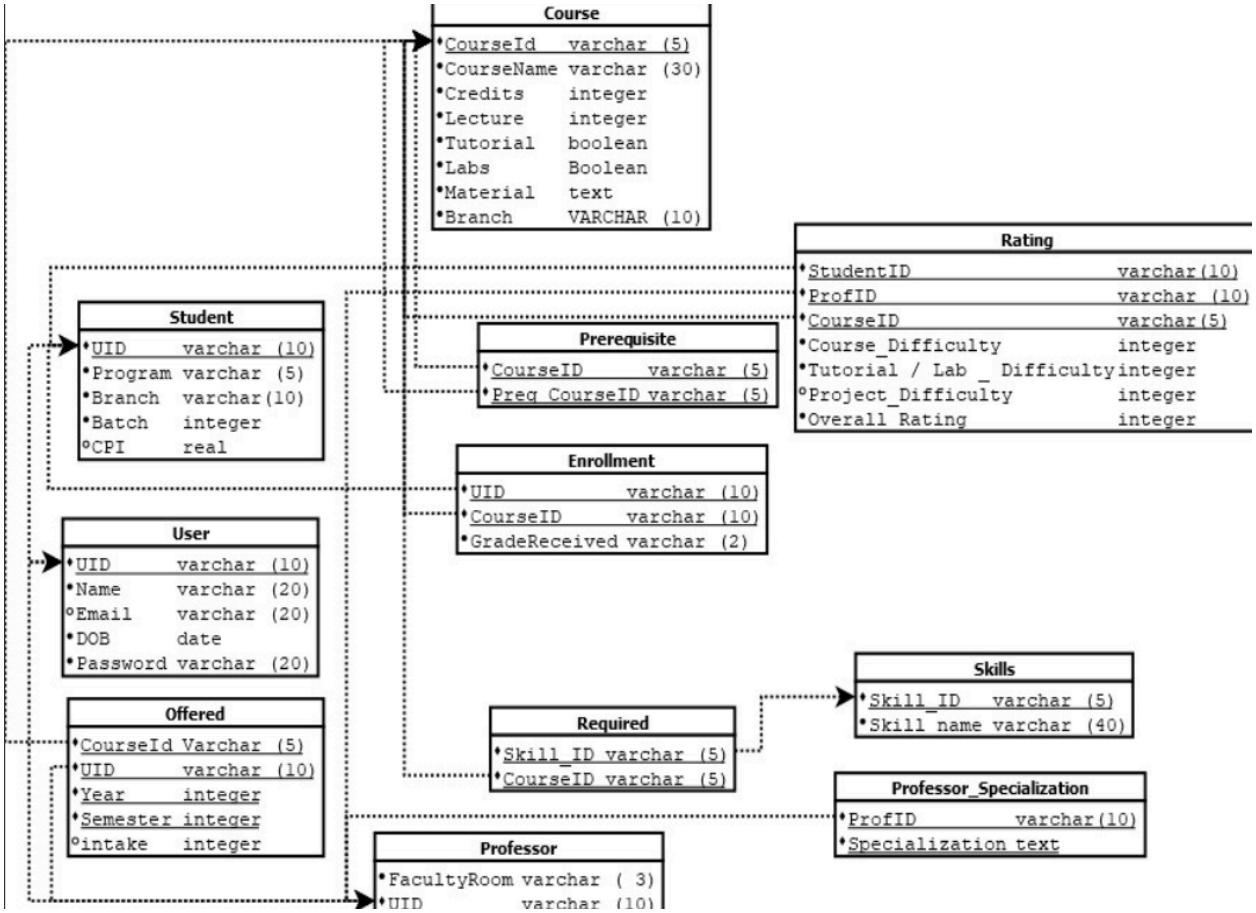
Entity Relationship Model:



Relational Schema :



Minimal FD set :

Functional Dependencies:

(uid,studid,profid are same just different names given for the ease of understanding)

UID -> {Name,Email,DOB,Password}
StudID -> {Program,Batch,CPI,Branch}
CourseId -> {CourseName,Credits,Lecture,Tutorial,Labs,Material,Branch}
CourseId ->> Preq_CourseID
ProfID -> {FacultyRoom}
{CourseID,UID,Year,Semester} -> {Intake}
{UID,CourseID} -> {GradeReceived}
{StudID,ProfID,CourseID}->{Course_Difficulty, Tutorial/Lab_Difficulty,Project_Difficulty,Overall_Rating}

Skill_ID -> {Skill_name}
ProfId ->> Specialization

Proof of BCNF :

BCNF Definition : A relation is in BCNF if for every non-trivial functional dependency X → Y, X is a superkey.

User (UID,Name,Email,DOB,Password):

UID -> Name
UID -> Email
UID -> DOB
UID -> Password

As UID is a super key and all attributes are only dependent on it User is in BCNF

Student (StudID,Program,Batch,CPI):

StudID-> Program
StudID-> Batch

StudID-> CPI

StudId-> Branch

As UID is a super key and all attributes are only dependent on it Student is in BCNF

Professor (ProfID,FacultyRoom):

ProfID-> FacultyRoom

As UID is a super key and all attributes are only dependent on it Professor is in BCNF

Course (CourseID,CourseName,Credits,Lecture,Tutorial,Labs,Material):

CourseId -> CourseName

CourseId -> Credits

CourseId -> Lecture

CourseId -> Tutorial

CourseId -> Labs

CourseId -> Material

CourseID ->Branch

As CourseID is a super key and all attributes are only dependent on it Course is in BCNF

Skills (Skill_ID,Skill_Name):

Skill_ID -> Skill_name

As Skill_ID is a super key and all attributes are only dependent on it Skills is in BCNF

Offered (CourseId,ProfId,Year,Semester):

{CourseId,ProfId,Year,Semester} -> intake

As this has a composite key which is a super key and intake is only dependent on them Offered is in BCNF

Enrollment(ProfID,CourseID) :

{ProfID,CourseID} -> GradeReceived

As this has a composite key which is a super key and GradeReceived is only dependent on them Enrollment is in BCNF

Prerequisite:

As Prerequisite has no additional attributes in it other than the keys, hence it will be in BCNF

Required :

As Prerequisite has no additional attributes in it other than the keys, hence it will be in BCNF

Rating:
(StudentID,ProfID,CourseID,Course_Difficulty,Tutorial/Lab_Difficulty,Project_Difficulty,Overall_Rating):

{StudentID,ProfID,CourseID} -> Course_Difficulty

{StudentID,ProfID,CourseID} -> Tutorial/Lab_Difficulty

{StudentID,ProfID,CourseID} -> Project_Difficulty

{StudentID,ProfID,CourseID} -> Overall_Rating

As this has a composite key which is a super key and all other attributes are only dependent on them Rating is in BCNF

Professor_Specialization (ProfID,Specialization):

ProfID ->> Specialization

As this relation has MVD(multi valued attribute) and candidate key is {ProfID,Specialization} and no other attribute is there hence this doesn't violate any rule of BCNF hence it follows BCNF.