

Relation 1: Student(ID, Name, Major, Year, Email)

Functional Dependencies:

$ID \rightarrow \text{Name, Major, Year, Email}$ (ID is PK)

$\text{Email} \rightarrow \text{ID, Name, Major, Year}$ (Email is unique)

All functional dependencies have a candidate key as LHS, **Student is in BCNF**

Relation 2: Professor(ID, Name, Email, DeptID)

Functional Dependencies:

$ID \rightarrow \text{Name, Email, DeptID}$ (ID is PK)

$\text{Email} \rightarrow \text{ID, Name, DeptID}$ (Email is unique)

All functional dependencies have a candidate key as LHS, **Professor is in BCNF**

Relation 3: Class(ID, Name, Semester, Year, ProfessorID)

Functional Dependencies:

$ID \rightarrow \text{Name, Semester, Year, ProfessorID}$ (ID is PK)

All functional dependencies have a candidate key as LHS, **Class is in BCNF**

Relation 4: Group(ID, Name, ClassID)

Functional Dependencies:

$ID \rightarrow \text{Name, ClassID}$ (ID is PK)

All functional dependencies have a candidate key as LHS, **Group is in BCNF**

Relation 5: Enrollment(StudentID, ClassID)

PK is (StudentID, ClassID), **Enrollment is in BCNF**

Relation 6: TeamMember(StudentID, GroupID, ClassID)

Functional Dependencies:

GroupID \rightarrow ClassID (because each group belongs to one class)

PK is (StudentID, GroupID, ClassID), GroupID (the LHS of GroupID \rightarrow ClassID) is not a superkey, so **TeamMember is not in BCNF**

Democomposition:

TeamMember(StudentID, GroupID) - (StudentID, GroupID) is the PK
and

Group(GroupID, ClassID) - already exists

TeamMember(StudentID, GroupID, ClassID) **becomes** TeamMember(StudentID, GroupID)