

1. Every conversion into BCNF may not be dependency preserving

We only need to give a counter example: Consider the following schema;

abc and c→b

Clearly the above schema is in 3NF, because ab→c is a superkey dependency and, from c→b we can see that b-c=b, which is a subset of the primary key (such dependency is also allowed in 3NF).

But, the above schema is not in BCNF because c→b is neither super-key nor trivial dependency. So we decompose above schema, keeping it lossless.

Only possible lossless decomposition is: ac and cb. (because, their intersection c is primary key for the 2nd table).

But clearly the dependency ab→c is lost. Hence, proved.

Q.E.D

2.

UnitID	StudentID	TutorID	Book	Date	Grade
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TutorID	TutEmail
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UnitID	Topic	Room
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3.

ProjectName	Budget	TeamSize
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ProjectName	M_id
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M_id	ProjectManager	Position
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4.

Group	Speciality
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Speciality	Faculty
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5.

ProjectID	Department	Curator	TeamSize
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Id	T_Id	TeamSize
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T_ID	ProjectGroupNumber
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6. The three design goals are lossless-join decompositions, dependency preserving decompositions, and minimization of repetition of information. They are desirable so we can maintain an accurate database, check correctness of up- dates quickly, and use the smallest amount of space possible.