Lossless Decomposition

Designing Schemas

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Learning Objectives

By the end of this video, you will be able to:

- Define lossless decomposition, and explain why it is desired.
- Explain why BCNF decomposition is lossless.

A Decomposition Can Be Lossy

- Favorites(drinker, bar, beer)

drinker	bar	beer
Alex	John Bar	Sam Adams
Carissa	Green Bar	Bud Light
Alex	Purple Bar	Coors

Example Favorites relation

- Decomposition: $R_1 =$

drinker	bar
Alex	John Bar
Carissa	Green Bar
Alex	Purple Bar

R_2

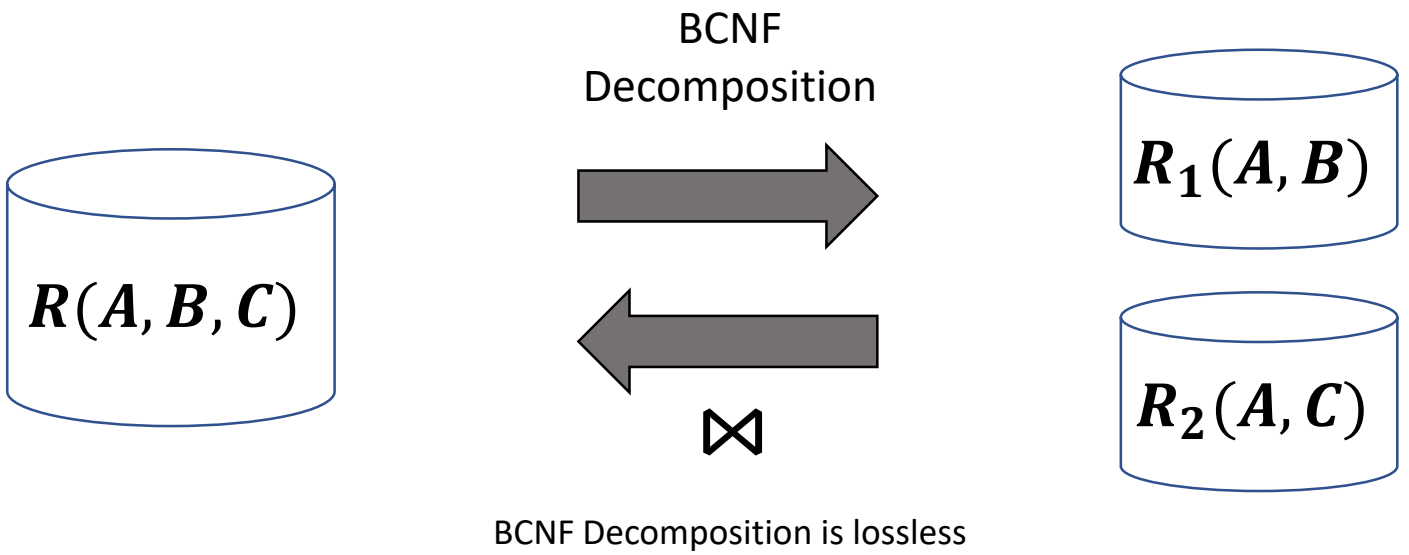
drinker	beer
Alex	Sam Adams
Carissa	Bud Light
Alex	Coors

Example decomposition of the Favorites relation

- Favorites $= R_1 \bowtie R_2$?
- No! We got extra tuples:
  - (Alex, John Bar, Coors)
  - (Alex, Purple Bar, Sam Adams)

BCNF: Lossless Decomposition

- That is, we reconstruct the original relation.
- If we decompose $R(A, B, C)$ into $R_1(A, B)$ and $R_2(A, C)$, due to $A \longrightarrow B$, then $R = R_1 \bowtie R_2$.



BCNF Decomposition Is Lossless

- Reconsider the lossy example: (drinker, bar, beer).
- Will BCNF decompose to (drinker, bar), (drinker, beer)?
  - Yes, but only when drinker → bar or drinker → beer.
- Suppose drinker → bar?
- Suppose drinker → beer?

- Favorites(drinker, bar, beer)

drinker	bar	beer
Alex	John Bar	Sam Adams
Carissa	Green Bar	Bud Light
Alex	Purple Bar	Coors

- Decomposition: $R_1 =$

drinker	bar
Alex	John Bar
Carissa	Green Bar
Alex	Purple Bar

$R_2 =$

drinker	beer
Alex	Sam Adams
Carissa	Bud Light
Alex	Coors

- Favorites $= R_1 \bowtie R_2$?
- No! We got extra tuples:
  - (Alex, John Bar, Coors)
  - (Alex, Purple Bar, Sam Adams)

Example decomposition of the Favorites relation