Example – BCNF Decomposition

- FDs F = { C $\rightarrow$ CSJDPQV, JP $\rightarrow$ C, SD $\rightarrow$ P, J $\rightarrow$ S }

- From JP $\rightarrow$ C, C $\rightarrow$ CSJDPQV and transitivity, we have JP $\rightarrow$ CSJDPQV

- SD $\rightarrow$ P violates BCNF since SD is not a key, decompose CSJDPQV into CSJDQV and SDP

- From J $\rightarrow$ S, decompose CSJDQV into JS and CJDQV

- Decomposition is lossless

- Decomposition does not preserve FD JP $\rightarrow$ C
  - Need to join the two relations to check that the FD is not violated.
  - Can add a relation CJP to the decomposition if CJP is in BCNF

Example – 3NF Synthesis

❖ FDs F = { C → CSJDPQV, JP → C, SD → P, J → S }

❖ F is not a minimal cover.

- Replace C → CSJDPQV with { C → S, C → J, C → D, C → P, C → Q, C → V }

- Remove C → P from F since it is implied by C → S, C → D and SD → P

- Remove C → S from F since it is implied by C → J and J → S

❖ Minimal cover F′ = {C → J, C → D, C → Q, C → V, JP → C, SD → P, J → S }

Example – 3NF Synthesis

❖ Minimal cover F′ = {C → J, C → D, C → Q, C → V,

$\quad$ JP → C, SD → P, J → S }

❖ Combine FDs with same LHS F′ = {C→ JDQV,

$\quad$ JP → C, SD → P, J → S }

❖ Create relations CJDQV, CJP, SDP, JS

❖ Remark: You can combine relations with C as key

▪ e.g., CJDQV and CJP to CJDQVP