

In-class Exercises: BCNF

1. FD recap.

- (a) Create an instance of relation $R(A, B, C, D, E)$ that violates this functional dependency: $ABC \rightarrow DE$.

- (b) Suppose we have a relation $R(A, B, C, D, E)$. Does the instance below violate the functional dependency $DB \rightarrow A$?

A	B	C	D	E
5	3	2	1	6
5	3	3	1	2
5	8	4	1	5

2. Is a relation in BCNF?

- (a) Suppose we have a relation $\text{Students}(\text{SID}, \text{email}, \text{course}, \text{term}, \text{prof})$, and that these FDs hold:
 $\{ \text{SID} \rightarrow \text{email}; \quad \text{course}, \text{term} \rightarrow \text{prof}; \quad \text{SID}, \text{course} \rightarrow \text{grade}. \}$. Is this relation in BCNF?
- (b) Suppose we have a relation $\text{Customers}(\text{name}, \text{DOB}, \text{address}, \text{favouriteCar}, \text{manufacturer})$ and these FDs hold:
 $\{ \text{name} \rightarrow \text{DOB}, \text{favouriteCar}; \quad \text{favouriteCar} \rightarrow \text{manufacturer} \}$. Is this relation in BCNF?
- (c) Suppose we have a relation $\text{Parts}(\text{part}, \text{manufacturer}, \text{seller}, \text{price})$ and these FDs hold:
 $\{ \text{part} \rightarrow \text{manufacturer}; \quad \text{part}, \text{seller} \rightarrow \text{price} \}$. Is this relation in BCNF?
- (d) Suppose we have a relation $R(A, B, C, D, E)$ and these FDs hold:
 $\{ B \rightarrow AC; \quad CB \rightarrow E; \quad A \rightarrow D \}$. Is this relation in BCNF?

3. **How does BCNF help?** Consider again the relation relation Parts(part, manufacturer, seller, price) with these FDs:
 $\{ \text{part} \rightarrow \text{manufacturer}; \quad \text{part, seller} \rightarrow \text{price} \}$.
- (a) Keeping in mind the FDs, make an instance of this relation that has redundant information.
- (b) If we applied the decomposition step from BCNF decomposition, what attributes would each of the new relations have?
- (c) Project the FDs onto each of the new relations
- (d) Put the same data as in part (a) into your new schema. Is there any redundancy?
- (e) Is it *possible* to create redundancy with this new schema?