

1. Determine the highest normal form of this relation scheme.

The relation scheme student Performance (StudentName, CourseNo, EnrollmentNo, Grade) has the following functional dependencies:

StudentName, courseNo \rightarrow grade

RollNo, courseNo \rightarrow grade

StudentName \rightarrow EnrollmentNo

EnrollmentNo \rightarrow StudentName

2. Suppose you are given a relation $R = (A, B, C, D, E)$ with the following functional dependencies: $\{CE \rightarrow D, D \rightarrow B, C \rightarrow A\}$

a. Find all candidate keys.

b. Identify the best normal form that R satisfies (1NF, 2NF, 3NF, or BCNF).

c. If the relation is not in BCNF, decompose it until it becomes BCNF. At each step, identify a new relation, decompose and re-compute the keys and the normal forms they satisfy.

3. You are given the following set F of functional dependencies for relation $R(A, B, C, D, E, F)$:
 $F = \{ABC \rightarrow D, ABD \rightarrow E, CD \rightarrow F, CDF \rightarrow B, BF \rightarrow D\}$

a. Find all keys of R based on these functional dependencies.

b. Is this relation in Boyce-Codd Normal Form? Is it 3NF? Explain your answers.

4. Write the advantages and disadvantages of normalization.

5. Determine the decomposition.

Consider the schema $R = (S, T, U, V)$ and the dependencies $S \rightarrow T, T \rightarrow U, U \rightarrow V$, and $V \rightarrow S$. Let $R = (R_1 \text{ and } R_2)$ be a decomposition such that $R_1 \cap R_2 \neq \emptyset$.