SLIIT UNI
THE KNOWLEDGE UNIVERSITY

IT2140 - Database Design and Development

Department of Information Technology, Faculty of Computing

Year 2 semester 1 (2025)

Tutorial 07

Learning outcomes:

- Identify candidate keys using functional dependencies.
- Analyze the normal form of a relation.
- Detect violations and normalize relational schemas.

1. Consider the following functional dependencies for a relation R: (A, B, C, D, E, F)
   F= {A→C, C→D, D→B, E→F}

   (a) Find all keys of R.

2. Consider the following functional dependencies for a relation: R (A, B, C, D, E, F)
   F = {AB→C, DC→AE, E→F}

   (a) Find all the keys of R.

3. Consider a relation R= (A, B, C, D) with the following functional dependencies:
   F= {CE→D, D→B, C→A}

   (a) Find all candidate keys in R

   (b) Which normal for is R in? c. If the relation is not in BCNF, convert it to a set of relations in BCNF through decomposition.

4. Consider a relation R (A, B, C, D, E), with the following set of functional dependencies over R: F = {A→BC, BC→E, E→DA}

   (a) Find all the keys in R.

   (b) Is R in BCNF? If R is not in BCNF, convert it to a set of BCNF relations.

5. Consider the following functional dependencies for a relation R(A, B, C, D, E)

   F = {AB→C, AB→D, D→A, BC→D, BC→E}

   (a) Find all the keys of R.

   (b) Is R in BCNF? Give reasons for your conclusion. If R is not in BCNF, convert it to a set of BCNF relations.

6. Consider a relation R=(A, B, C, D, E) with the following functional dependencies:
   F= {BC→ADE, D→B}

   (a) Find all candidate keys in R

   (b) Which normal for is R in?

   (c) If the relation is not in BCNF, convert it to a set of relations in BCNF through decomposition