COSC265 Introduction to Databases

Tutorial 3: Normalization

1. A table R consists of four attributes (A, B, C, D) and the following set of functional dependencies is given: {A→B, A→C, A→D}

a) Is A a candidate key?

Yes, because all attributes appear in the closure of A, ie $\{A\}^+ = \{A, B, C, D\}$

b) Is R in 3NF?

Yes, because all FDs have the primary key on the left-hand side.

2. A table R with four attributes (A, B, C, D) has the following set of functional dependencies: {A→B, B→C, C→D}

a) Does A →D?

Yes. By using the transitivity rule, we can derive this FD.

b) Is A a candidate key?

Yes, because its closure contains all attributes of the table.

3. A table R with two attributes (A, B) has the following set of functional dependencies: {A→B, B→A}

a) Are both A and B candidate keys?

Yes.

b) Is R in BCNF?

Yes.

4. A table R with three attributes (A, B, C) has the following set of functional dependencies: {AB→C, AC→B, BC→A}

a) Is A a candidate key?

No

b) Is BC a candidate key?

Yes

c) Is R in 3NF?

Yes. It is also in BCNF, since the left-hand side of each FD contains a key.

5. A table (A, B, C) has the following set of functional dependencies: {BC →A}

a) Is R in 3NF?

Yes

b) Is BC a candidate key?

Yes

c) Is R in BCNF?

Yes

6. Find a minimal cover for F = {AB→C, A→B, AD→B}.

Using the algorithm given in lectures, the minimal cover for F is as follows:

G = {A→C, A→B}

7. Determine the minimal set of 3NF relations given the following set of FDs: F = {A→AC, B→ABC, D→ABC}.

Minimal cover G = {A→C, B→A, D→B}

3NF relations are:

A	C

B	A

D	B

8. Determine the minimal set of 3NF relations given the following set of FDs: F = {A→BC, BC→D}.

Minimal cover G = {A→B, A→C, BC→D}

Relations are:

A	B	C

B	C	D