BLANCHARD Charles (chabl044)
RUAUX Justin (jusru942)
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Group C3

Database technology
TDDD37

Lab 3 : Normalization

Question 1

Considering **R(A,B,C,D,E,F)** with the following FDs:

FD1: **A→BC**
FD2: **C→AD**
FD3: **DE→F**

Use the Armstrong rules to derive the following FD: **C→B**

FD4: **C→A**	*(decomposition of FD2)*
FD5: **A→B**	*(decomposition of FD1)*
FD6: **C→B**	*(transitivity of FD4 and FD5)*

Use the Armstrong rules to derive the following FD: **AE→F**

FD4: **A→C**	*(decomposition of FD1)*
FD5: **C→D**	*(decomposition of FD2)*
FD6: **A→D**	*(transitivity of FD4 and FD5)*
FD7: **AE→DE**	*(augmentation of FD6 with E)*
FD7: **AE→F**	*(transitivity of FD7 and FD3)*

Question 2

Considering **R(A,B,C,D,E,F)** with the following FDs:

FD1: **A→BC**
FD2: **C→AD**
FD3: **DE→F**

Compute the attribute closure of X = **{A}**

Initially	X^+ = {A}
By using FD1:	X^+ = {A,B,C}
By using FD2:	X^+ = **{A,B,C,D}**

Compute the attribute closure of X = **{C,E}**

Initially	X^+ = {C,E}
By using FD2:	X^+ = {A,C,D,E}
By using FD1:	X^+ = {A,B,C,D,E}
By using FD3:	X^+ = **{A,B,C,D,E,F}**

Question 3

Considering **R(A,B,C,D,E,F)** with the following FDs:

FD1: **AB→CDEF**
FD2: **E→F**
FD3: **D→B**

Candidate keys for R are **{A,B}** and **{A,D}**.

FD2 and FD3 violate the BCNF condition.

Let's decompose R based on FD2:

Relation	FDs	Candidate key(s)
R1(E,F)	FD2	**{E}**
R2(A,B,C,D,E)	FD3 and FD4: **AB→CDE**	**{AB},{AD}**

R1 is in BCNF but R2 isn't. Let's decompose R2 based on FD3:

Relation	FDs	Candidate key(s)
R3(D,B)	FD3	**{D}**
R4(A,C,E)	FD5: **A→CE**	**{A}**

R3 and R4 are in BCNF.

The decomposition of R into a set of BCNF relations is: **{R1, R3, R4}**.

Question 4

Considering **R(A,B,C,D,E)** with the following FDs:

FD1: **ABC→DE**
FD2: **BCD→AE**
FD3: **C→D**

The candidate key for R is **{B,C}**.

FD3 violate the BCNF condition.

Let's decompose R based on FD3:

Relation	FDs	Candidate key(s)
R1(C,D)	FD3	**{C}**
R2(A,B,C,E)	FD4: **ABC→E** FD5: **BC→AE**	**{BC}**

R1 and R2 are in BCNF.

The decomposition of R into a set of BCNF relations is: **{R1, R2}**.