Tutorial 3 — Normalization, Functional Dependencies

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Exercise 3-1

What are the non-trivial functional dependencies in the following table?

Also, what are the superkeys in the table? What about candidate keys?

id	name	address
1	Alice	123 Park Place
2	Alice	85 Seagram Drive
3	Bob	161 University Avenue W
4	Bob	85 Seagram Drive

Exercise 3-2

What is the highest normal form that the following table fits?

PersonID	Name	FavouriteColourID	ColourName
1	Alice	1	Green
2	Bob	1	Green
3	Eve	2	Blue

Exercise 3-3

What is the highest normal form that the following relation `R=ABCD` fits?

F = {
$A \rightarrow B$
$A \rightarrow C$
$C \rightarrow D$
}

Exercise 3-4

What is the highest normal form that the following relation `R=ABCDE` fits?

F = {
A $\rightarrow$ BCDE
E $\rightarrow$ ABCD
C $\rightarrow$ D
}

Exercise 3-5

What is the highest normal form that the following relation `R=ABCDEG` fits?

$F = \{$
$AB \rightarrow CDEG$
$EG \rightarrow ABCD$
$C \rightarrow E$
$\}$

Exercise 3-6

What is a canonical cover for the following set of FDs?

$F = \{$
$A \rightarrow BC$
$CD \rightarrow E$
$B \rightarrow D$
$E \rightarrow A$
$\}$

Exercise 3-7

What is a canonical cover for the following set of FDs?

F = {
$A \rightarrow BC$
$A \rightarrow B$
$B \rightarrow C$
$AB \rightarrow C$
}

Exercise 3-8

Decompose the following relation `R=ABCDE` into BCNF.

F = {
$A \rightarrow BC$
$C \rightarrow DE$
}

Exercise 3-9

Decompose the following relation `R=ABCD` into BCNF.

$F = \{$
$AB \rightarrow C$
$B \rightarrow D$
$C \rightarrow A$
$\}$