

CSCI 3287

Spring 2016 Database System

Assignment 2

Exercise 3.7.1: Use the chase test to tell whether each of the following dependencies hold in a relation $R(A, B, C, D, E)$ with the dependencies $A \twoheadrightarrow BC$, $B \rightarrow D$, and $C \twoheadrightarrow E$.

Initial Table:

A	B	C	D	E
a	b_1	c_1	d	e
a	b_1	c	d_1	e
a	b	c	d	e
a	b	c	d_1	e

$A \twoheadrightarrow BC$:

A	B	C	D	E
a	b	c	d	e
a	b	c_1	d_1	e
a	b_1	c	d	e
a	b_1	c_1	d_1	e

$B \rightarrow D$:

A	B	C	D	E
a	b	c	d	e
a	b	c_1	d	e
a	b_1	c	d_1	e
a	b_1	c_1	d_1	e

$C \twoheadrightarrow E$:

A	B	C	D	E
a	b	c	d	e
a	b	c_1	d	e
a	b_1	c	d_1	e_1
a	b_1	c_1	d_1	e_1

a) $A \rightarrow D$.

A	B	C	D	E
a	b	c	d	e
a	b	c ₁	d	e
a	b ₁	c	d	e ₁
a	b ₁	c ₁	d	e ₁

Holds.

All dependencies still apply to the table

b) $A \twoheadrightarrow D$.

A	B	C	D	E
a	b	c	d	e
a	b	c ₁	d	e
a	b ₁	c	d ₁	e ₁
a	b ₁	c ₁	d ₁	e ₁

Already **Holds**.

Value a in A already depends on d and d₁ values in D.

c) $A \rightarrow E$.

A	B	C	D	E
a	b	c	d	e
a	b	c ₁	d	e
a	b ₁	c	d ₁	e
a	b ₁	c ₁	d ₁	e

Doesn't Hold.

Dependency $A \rightarrow E$ conflicts with dependency $C \twoheadrightarrow E$.

d) $A \twoheadrightarrow E$.

A	B	C	D	E
a	b	c	d	e
a	b	c ₁	d	e
a	b ₁	c	d ₁	e ₁
a	b ₁	c ₁	d ₁	e ₁

Already **Holds**.

Value a in A already depends on e and e₁ values in E.

Exercise 4.10.1: Convert your ODL designs from the following exercises to relational database schemas.

a) Exercise 4.9.1.

```
Customers
(
    firstName: string,
    lastName: string,
    address: string,
    phone: string,
    ssn: string,
    accounts: list[integer]
)
Accounts
(
    acctNo: integer,
    acctType: string,
    balance: integer
)
```

c) Exercise 4.9.3.

```
Team
(
    teamName: string,
    players: list[string],
    teamCaptain: string,
    teamColors: list[string]
)
Player
(
    firstName: string,
    lastName: string
)
Fan
(
    firstName: string,
    lastName: string,
    favTeams: list[string],
    favPlayers: list[string],
    favColor: string
)
```

e) Exercise 4.9.5.

```
Person
(
    firstName: string,
    lastName: string,
    mother: string,
    father: string,
    children: list[name: string],
    education: list[string]
)
```