

10/22/09 - Week 9 /Day 18

Thursday, October 22, 2009
5:01 PM



102209 -
Week 9 Da...
Audio recording started: 5:01 PM Thursday, October 22, 2009

- Announcements
 - Will allow 3 person teams
 - specifications will be declared
 - possibility of readjusting grade range for midterm

- Normalization
 - Process of decomposing tables into smaller tables

I. Normal Form

- a. All attributes are atomic
 - i. Ex. SSN => 312-44-7809

Ex. Tel

| SSN | Tel |
|-------------|--------------|
| 312-44-7809 | 813-479-2211 |
| | 813-479-2203 |
| | |

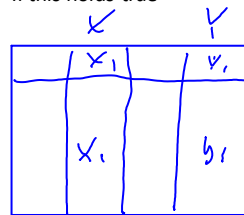
Define another table that carry over Tel# and ID

| SSN | Tel |
|-----|-----|
| s1 | T1 |
| s1 | T2 |

II. Functional dependency (FD)

FD: Table R (A)
 $X \subset A, Y \subset A$
 the values of X determines that of Y, Y is FD on X
 $X \twoheadrightarrow Y$

If this holds true



R (A, B, C)

F = {A \twoheadrightarrow B, B \twoheadrightarrow C}

Derivation of F.D.s

Need to use \twoheadrightarrow **Inference rules** (to derive)

i. Armstrong's Axioms

IR1: Reflexivity

$Y \subset X$, then $X \twoheadrightarrow Y$

IR2: Augmentatino

if $X \twoheadrightarrow Y$, then $XC \twoheadrightarrow YC$

IR3: Transitivity

if $X \twoheadrightarrow Y, Y \twoheadrightarrow Z$
then $X \twoheadrightarrow Z$

Extended set of Irs:

1. Decomposition:

if $X \twoheadrightarrow YZ$, then $X \twoheadrightarrow Y$
 $X \twoheadrightarrow Z$

2. Union

if $X \twoheadrightarrow Y$ and $X \twoheadrightarrow Z$.

AB \twoheadrightarrow

- then $X \rightarrow YZ$
 3. Pseudotransitivity:
 If $X \rightarrow Y$ and $WY \rightarrow Z$
 then $WX \rightarrow Z$

Ex1: $R(A, B, C, D)$

$F: \{AB \rightarrow C, C \rightarrow B, C \rightarrow D\}$

$AB \rightarrow D?$ (true due to **transitivity**)

$AB \rightarrow ABD?$ (true - $AB \rightarrow AB$)

$AB \rightarrow D \Rightarrow AB \rightarrow ABD$

Reverse

What will give results

_____ $\rightarrow ABC?$

| | | |
|---|-----|---|
| L | L+R | R |
|---|-----|---|

Ex2: $R(A, B, C, G, H, I)$

$F: \{A \rightarrow B, A \rightarrow C, CG \rightarrow H, CG \rightarrow I, B \rightarrow H\}$

$A \rightarrow H?$

(true)

$AG \rightarrow I?$

$CG \rightarrow I$ and $A \rightarrow C \Rightarrow AG \rightarrow I$ (**pseudotransitivity**)

$CG \rightarrow HI?$

$CG \rightarrow H$ and $CG \rightarrow I \Rightarrow CG \rightarrow HI$

$F: \{AB \rightarrow C, C \rightarrow B, C \rightarrow D\}$
 very clear is that

| | | |
|---|------|---|
| L | L+R | R |
| A | B, C | D |

Closure (can have 2 meanings)

1. Closure of $F : F^+$

----- of $A : A^+$

$A \rightarrow$ A

$A^+ : \{A\}$

$(AB)^+ : \{A, B, C, D\}$

$(AC)^+ : \{A, C, B, D\}$

Closure of $F : F^+ \{AB \rightarrow C,$

$C \rightarrow B$

$C \rightarrow D\}$

----- of $A : A^+ AB \rightarrow D,$

$AB \rightarrow ABD$

Using;

$R(A, B, C, G, H, I)$

$F: \{A \rightarrow B, A \rightarrow C, CG \rightarrow H, CG \rightarrow I, B \rightarrow H\}$

$A^+ : \{ABCH\}$

$G^+ : \{G\}$

$AG^+ : \{ABCHG I\}$

| | | |
|----|-----|----|
| L | L+R | R |
| AG | CB | HI |