Julia Velson Assignment 5 (CS442) Dec 9, 2020

"I pledge my honor that I have abided by the Stevens Honor System"

① $R(A,B,C,D,E)$ with $FD = \{AB \to C, CD \to E, C \to A, C \to D, D \to B\}$

List candidate keys, NOT superkeys

Attributes → C, E, A, D, B

$A^+ = \{A\}$ $B^+ = \{B\}$ $D^+ = \{D\}$

$C^+ =$ $C \to A$, $C \to D$, $C \to C$, $C \to D \ldots D \to B$, $C \to D \ldots CD \to E$

$C^+ = ABCDE$

C^+ is candidate key. There then...

Now look at combinations with C as attr.

$AB^+ =$ AB given, $AB \to C$, $AB \to C \to D$, $AB \to CD \to E$ → $AB^+ = ABCDE$

$AD^+ =$ AD given, $D \to B$, $AB \to C$, $CD \to E$ → $AD^+ = ABCDE$

$AE^+ =$ AE given → $AE^+ = AE$

$BD^+ =$ BD given → $BD^+ = BD$

$BE^+ =$ BE given → $BE^+ = BE$

$DE^+ =$ DE given, $D \to B$ → $DE^+ = BDE$

CANIDATE KEYS = C, AB, AD

② $R(A,B,C,D,E,F)$ with $FD = \{AB \to C, AD \to B, C \to B, F \to AD, F \to E\}$

use Armstrong Axioms to prove F is superkey of R.

$F \to B$ from $F \to AD$ and $AD \to B$: transitivity

$F \to A$ and $F \to D$ from $F \to AD$: Decomposition

$F \to AB$ from $F \to A$ and $F \to B$: Union

$F \to C$ from $F \to AB$ and $AB \to C$: Transitive

$F \to E$ from functional dependencies FD : given

$F^+ = \{ABCDEF\}$

and is the superkey of R

(3) StudentInfo (StudNo, StudName, Major, Advisor, CourseNo, CTitle, InstrucName, InstrucLocn, Grade)

FD = {
StudNo → StudName
CourseNo → CTitle, InstrucName
InstrucName → InstrucLocn
StudNo, CourseNo, Major → Grade
StudNo, Major → Advisor
Advisor → Major }

Student (StudNo, StudName)
StudMajor (StudNo, Major, Advisor)
StudCourse (StudNo, Major, CourseNo, CTitle, Instrucname, InstrucLocn, Grade)

Satisfy BCNF?

[redacted] StudNo → StudName FD1

StudNo⁺ = StudNo, StudName ✓

∴ StudNo = Super key

Student Relation satisfies

StudentMajor (StudNo, Major, Advisor)

StudNo, Major → Advisor

Advisor → Major

StudNo⁺ = {StudNo, StudName}

Major⁺ = {Major}

Advisor⁺ = {Advisor, Major}

[redacted] StudNo, Major⁺ = {StudNo, ~~StudName~~, Advisor, Major}

Satisfy BCNF?

No [redacted] Advisor → Major messed up

need to separate more