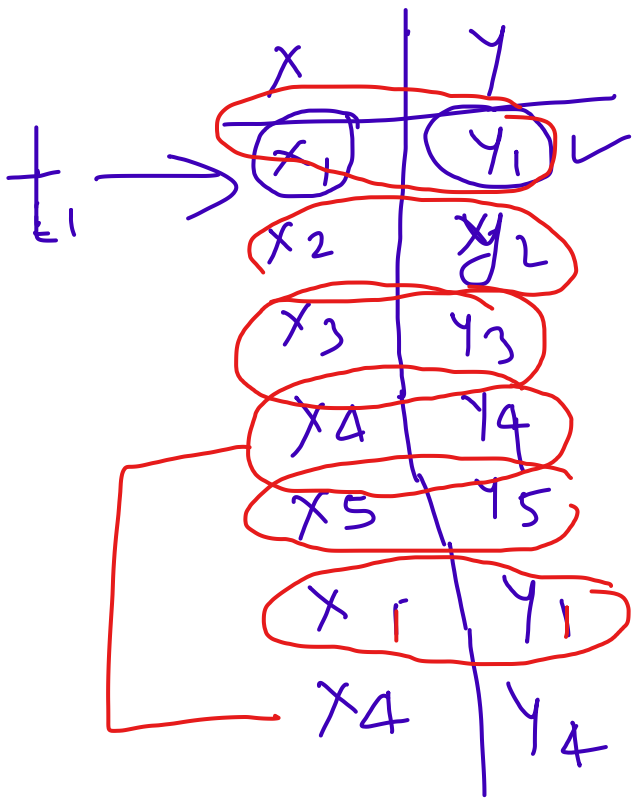


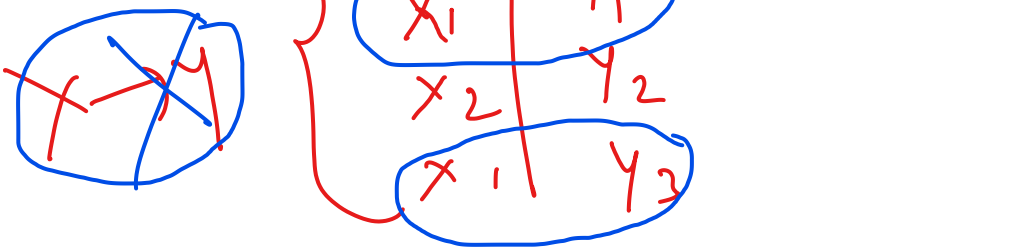
if $t_1[X] = t_2[X]$

then

$t_1[Y] = t_2[Y]$

$X \to Y$

$X \to Y$



Armstrong Rule :-

IR1 : (Reflexive Rule)

if $X \supseteq Y$ then $X \to Y$

$AB \to A$

$AB \to B$

$X \supseteq Y \quad X \to Y$

$X \to Y$?!

$A \to B \not\Rightarrow X$

$A \Rightarrow Y$

$X \supseteq Y$ $\Leftrightarrow$ $X \to Y$

$X = \{A, B, C\}$

$Y = \{B, C\}$

Augmentation Rule (IR_2)

$X \to Y \models XZ \to YZ$

Transitive Rule (IR_3)

$\{X \to Y, \; Y \to Z\} \models X \to Z$

Decomposition (IR_4)

$\{X \to YZ\} \models \{X \to Y, X \to Z\}$

union or additive (IR_5)

$\{X \to Y, X \to Z\} \models \{X \to YZ\}$

Pseudo Transitive Rule (TR_6)

$\{X \to Y, WY \to Z\} \models \{WX \to Z\}$

Closure set of Attribute

$R = \{A, B, C, D, E, F\}$

$FD = \{AB \to C, BC \to AD, D \to E, CF \to B\}$

Closure of Attributes

$X\{A\}^+ = \{A$ ~~X~~ P.K

$X\{AB\}^+ = \{A, B, C, D, E\}$ X P.K

$\{A,F\}^+ = \{A, F\}$ X P.K

$\{A,B,F\}^+ = \{A, B, C, D, E, F\}$ P.K

$AB\,F \Rightarrow$ P.K

A B F — Prime Attribute

$R = \{A, B, C, D, E, F\}$

$FD = \{A \to C,\ C \to D,\ D \to B,\ E \to F\}$

Find out P.K ??

$\{AE\}^+ = \{A, C, D, B, E, F\}$ K

candidate key -

Full Functional Dependency

$FD: \{X \to Y,\ XZ \to Y,\ AB \to C\}$

(1) is C is FFD on AB?

(2) is Y is FFD on XZ?

Ans:-

(1) yes $AB \to C$

$X \begin{cases} A \to C \\ B \to C \end{cases}$ true / false

(2) NO $XZ \to Y$ and $X \to Y$, $Z \to Y$

So Y NOT FFD on XZ.

Trivial FD ⇒

XY

$XY \rightarrow X$
$XY \rightarrow Y$ } trivial.

Transitive FD

$X \rightarrow Y, Y \rightarrow Z \models X \rightarrow Z$

Normalization:-

1. Insertion Anomalies
2. Updation Anomalies — CS $E \rightarrow L$ → New L_2
3. Deletion Anomalies

EMP

id	E-name	Dept-id	Department	Dept-loc
1	A	D_1	CSE	~~L_1~~ L_2
Null	~~B~~ Null	D_2	ECE	L_2
2	B	D_1	CSE	~~L_2~~ L_1
3	C	D_1	CSE	L_1

→4 D D_3 IT L3

Delete

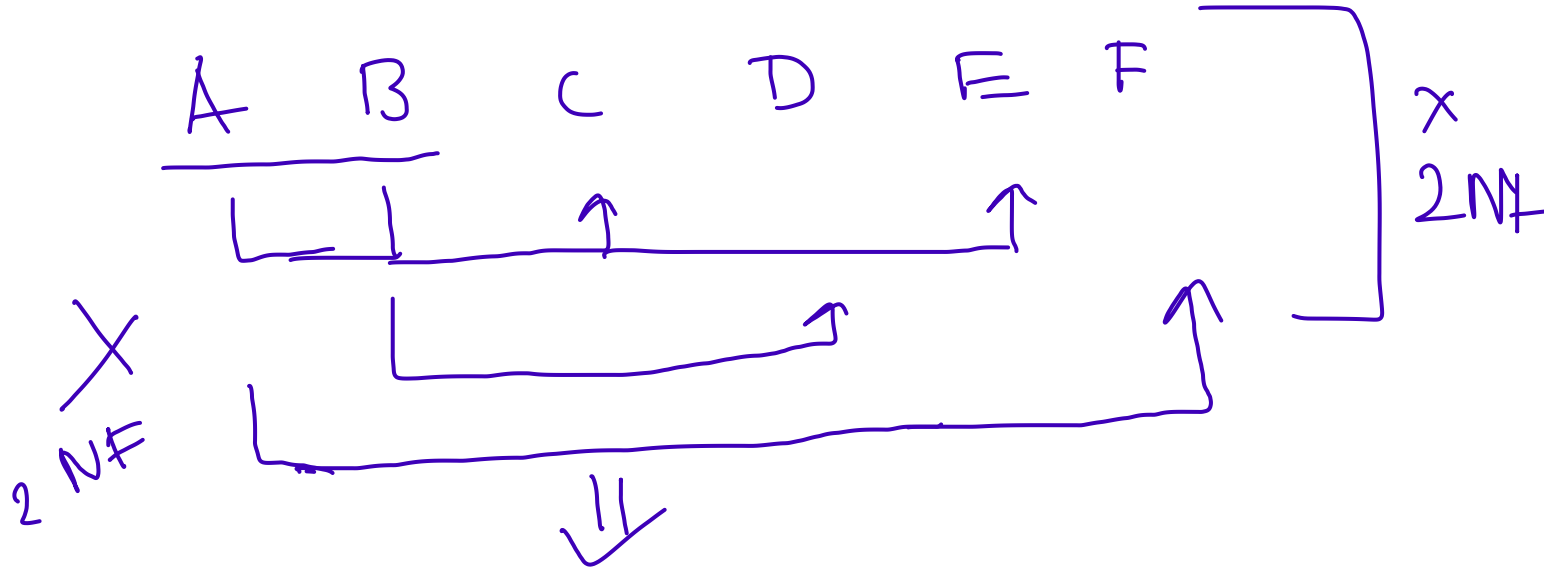
2NF

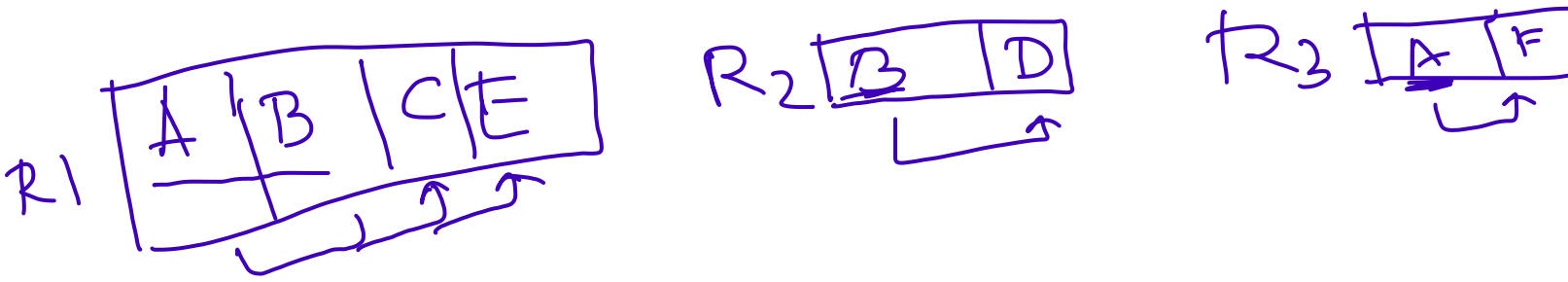
$AB \Rightarrow C$, $B \Rightarrow D$, $A \Rightarrow F$, $AB \Rightarrow E$

P.K $\Rightarrow \{AB\}^+ = \{A, B, C, D, F, E\}$

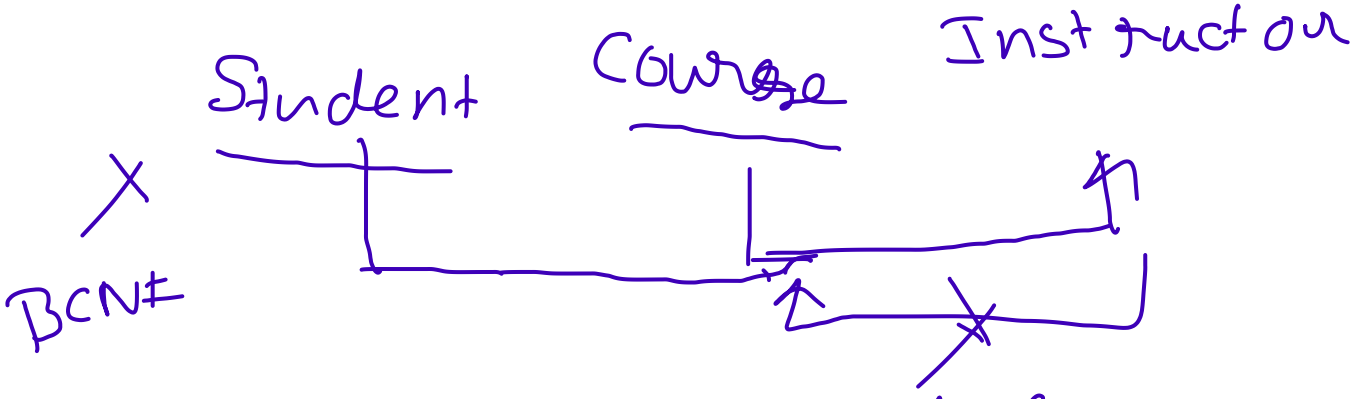
Prime attribute – A, B

Non-prime → C, D, E F





BCNF


Student
Course
Instructor
BCNF
Student, Course

P. K =>


R1
Student
Course
R2
Instructor
Course