Boyce-Codd Normal Form :

Consider the relation ADVISOR

SID	MAJOR	FNAME
100	MATH	CAUCHY
100	PHYSICS	JUNG
150	PHYSICS	JUNG
200	MATH	CAUCHY
300	PHYSICS	PERL

- FNAME is the unique name of a faculty person.
- Faculty member can advise in only one MAJOR.
- There may be several advisor in each MAJOR.
- Functional dependency BOX exist

1. Deletion anomaly -> suppose student 300 drops out. If we delete student 300 tuple we lose the fact that PERL advise PHYSICS. This is deletion anomalies.
2. If we want to store the fact that KEYNES advises in ENGLISH ? we can't insert until a student major is ENGLISH . This is an Insertion anomaly.

To remove this we use BCNF- A relation is in BCNF if every determinant is Candidate key.
If relation is in BCNF then there is no anomalies regarding functional dependence.

STU_ADV

SID	FNAME
100	CAUCHY
100	JUNG
150	JUNG
200	CAUCHY
200	PERL

ADV_SUB

FNAME	MAJOR
CAUCHY	MATH
JUNG	PHYSICS
PERL	PHYSICS

$(a'+b')'$

Example

Convert into BCNF

R(A B C)

AB → C — ①

C → B — ②

R(A B C) A is not having any incoming edge

$(A)^+$ — (A) Not a candidate key

$(AB)^+$ — (ABC) AB is candidate key

$(AC)^+$ — (ACB) AC is also candidate key

in ① AB is candidate key but in ② C is not candidate key

So this relation is not in BCNF

R₀(ABC)

- R1 (C B)
- R2 (A C)] table for candidate keys
- R3 (A B)]

In R1 and R3 B is common attribute but B is not a candidate key in any one relation

In R1 and R2 C is common attribute and C is candidate key in R1

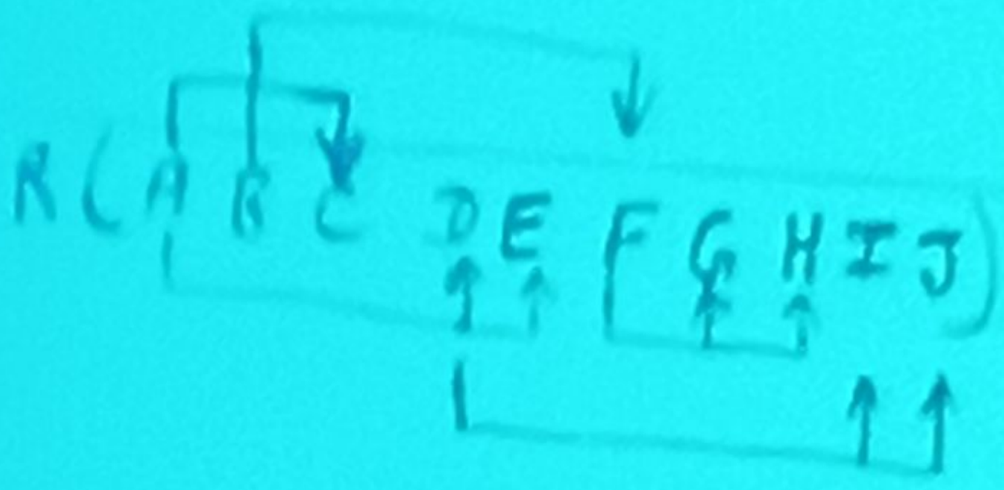
So for lossless decomposition we should keep R2 relation and R3 should be remove

- R1 (C B)
- R2 (A C) table for candidate key

(A + B)

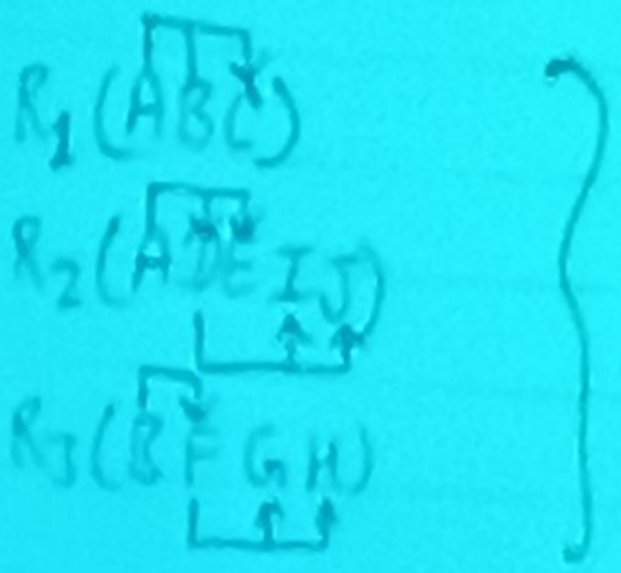
Now these relations R1 and R2 in BCNF

Decompose the relation R in BCNF

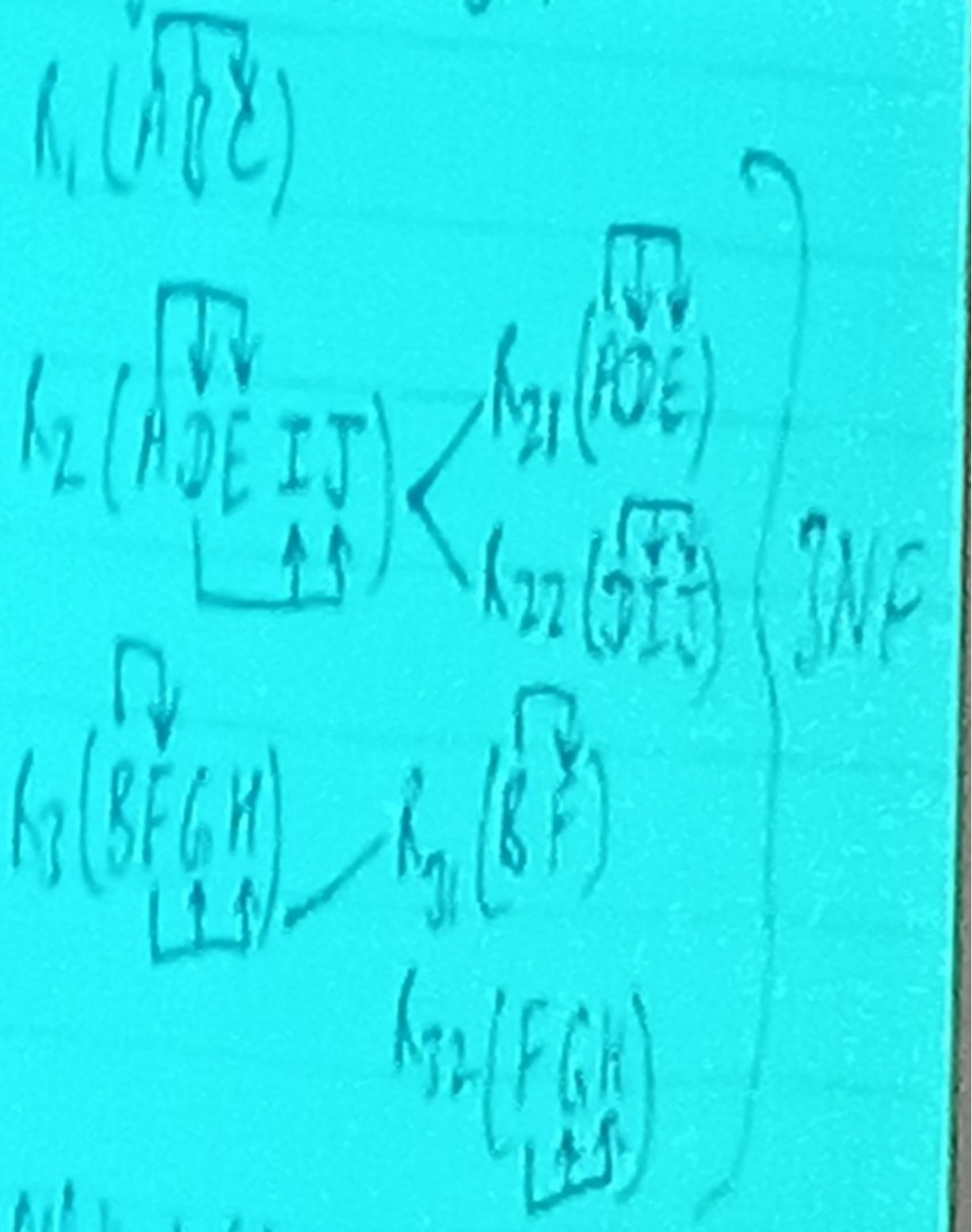


Key → AB

Due to partial dependency A → DE
this relation is not in 2NF.
Thus relation is 1NF



In R_2 and R_3 transitive dependency exist
so they are not in 3NF.



All relations are in BCNF because determinants in all tables are candidate Key.

$AB \rightarrow C$

$B \rightarrow F$

$A \rightarrow DE$

$D \rightarrow EJ$

$F \rightarrow GH$

$AB^+ \rightarrow$ {A B C D E I J F G H}