Name: Lakhan Kumawat

Roll No: 1906055

Branch: CSE1

Course: Database Management Systems

Course Code: CS5401

Date: 01/12/2021

——x——x——

Solution 1) a)

ODIPlayers (PID, Lname, Country, team1, team2, MID,
(P_i) (L) (C) (T_1) (T_2) (M)

Date, Ground, Nruns, Nwickets, Yborn, place)
(D) (G) (N_r) (N_w) (Y) (P)

⇓

ODI Players (P_i, L, C, I_1, T_2, M, D, G, N_r, N_w, Y, P)

Functional Dependencies

$P_i \rightarrow L$

$P_i \rightarrow C$

$M \rightarrow T_1$

$M \rightarrow T_2$

$P_i \rightarrow Y$

$P_i \rightarrow P$

$M \rightarrow D$

$M \rightarrow G$

$P_i M \rightarrow N_r$

$P_i M \rightarrow N_w$

(P_i M) should be part of key because these keys are derived by any functional dependency

Finding

Closure of $P_i = P_i^+$

$P_i \to L$

$P_i \to C$

$P_i \to Y$

$P_i \to P$

$P_i \to P_i$

So $P_i = \{L, C, P_i, Y, P\}$

Similarly $M \to M$ (trivial property)

Closure of $M = M^+$

$= \{T_1, T_2, D, G, M\}$

$(P_i, M)^+ = \{P_i, M, C, L, T_1, T_2, Y, P, D, G, N_r, N_w\}$

Closure of $(P_i; M)$ desire all the attributes, So- it should be key.

(P_i, M) → Candidate keys.

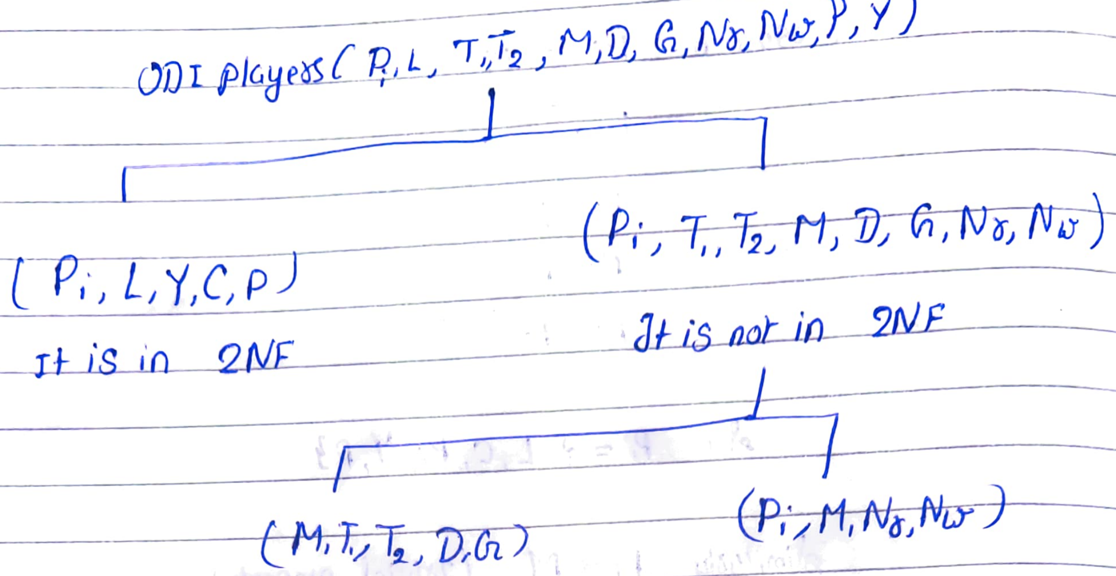
Prime attributes $= \{P_i, M\}$

Non prime attributes $= \{L, T_1, T_2, C, Y, P, D, G, N_r, N_w\}$

Assuming all attributes are non-composite and not multivalued attributes

tables will be in 1st Normal form.

1906055



ODI players(P_i, L, T_1, T_2, M, D, G, N_r, N_w, P, Y)

(P_i , L, Y, C, P)

It is in 2NF

(P_i ; T_1, T_2, M, D, G, N_r, N_w)

It is not in 2NF

(M, T_1, T_2, D, G)

(P_i ; M, N_r, N_w)

So assuming of (a) part is (PID, MID)

Player (PID, Lname, Yborn, Place, Country)

ODI(MID, Team1, Team2, Date, Ground)

performance (PID; MID; Nruns, Nwickets)

We can recover the original tables by taking natural join of all those tables

Name: Lakhan Kumawat
Roll No: 1906055
Branch: CSE1

Course: Database Management Systems
Course Code: CS5401
Date: 01/12/2021

——x——x——

Solution 1) b) Employee (Name, project No, Emp id, Marks)

for Sake of Convinience,:

Let A. denotes name
B " Project No.
C " Emp id.
D " Marks
R denotes relation Employee.

R (A,B,C,D)

Functional dependency → AB → D, BC → D, A → C, C → A.

$(AB)^+ = \{\underbrace{A,B}_{\text{trivial}}, \underbrace{D,C}_{\text{Above dependency key}}\}$

↓
AB will be Candidate key

R (ABCD)

$AB \to D,\ BC \to D,\ \underset{\downarrow}{A \to C},\ C \to A$

Partial dependency (not in 2NF)

Name: Lakhan Kumawat
Roll No: 1906055
Branch: CSE-1
Course: Database Management Systems.
Course Code: CS5401
Date: 01/12/2021

Class Test-2

$(A)^+ = \{A, C\}$

R(ABD) R(AC)

$AB \rightarrow D$ primary key

$A \rightarrow C$

So in 2NF → because No partial dependency

$C \rightarrow A$ → Non prime holds prime

primary attr → A

Non " attr → C

In 3NF → LHS is Super key

For 3NF, if $X \rightarrow Y$

In BCNF → LHS is Super key

then i> either X → Super key

ii> Else Y → prime attr.

So $R_1(AC)$ is in 3NF.

→ R(BAC) is in BCNF because for a binary relation it ~~for a binary relation it~~ ~~Will be always in BCNF. LHS~~ of ~~C→A is not primary/Super key~~ will be alwayn in BCNF.

So, Employee (Name, project No, Emp Id, Marks)

R_1(Name, ProjectNo, Marks) R_2(Name, Emp Id)

Functional dependency preservation holds after we merge R_1 & R_2 for Name → Emp id.

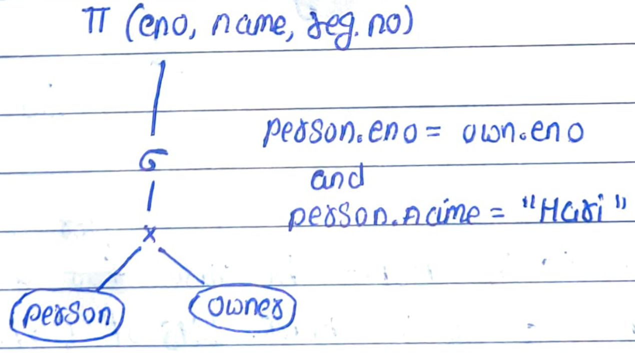
Name: Lakhan Kumawat
Roll No: 1906055
Branch: CSE-1

Course: Database Management Systems
Course Code: CS5401
Date: 01/12/2021

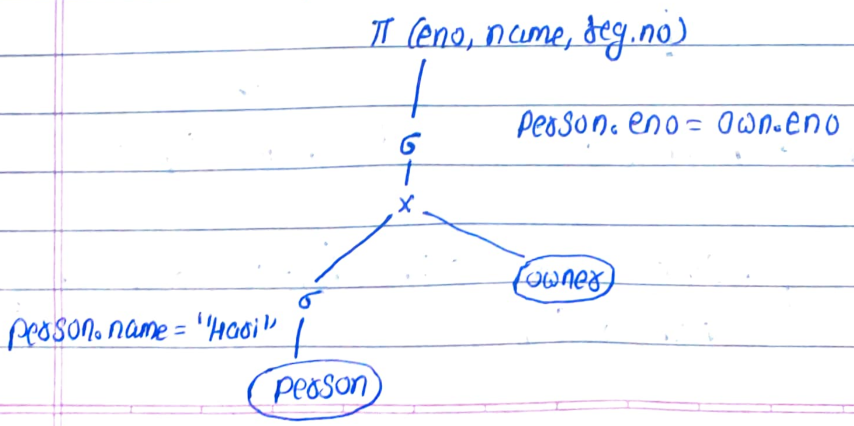
olution 2> vehicle (reg.no, make, color)
person (eno, name, address)
owner (eno, reg-no)

[Query]
Select eno, name, reg-no, from person, owner where person.eno = own.eno and person.name = "Hari";

Query tree: (Basic tree)



now, (Apply restrictive select operator) ↓



Name: Lakhan Kumawat

Roll No: 1906055

Branch: CSE-1

Page No.

Date

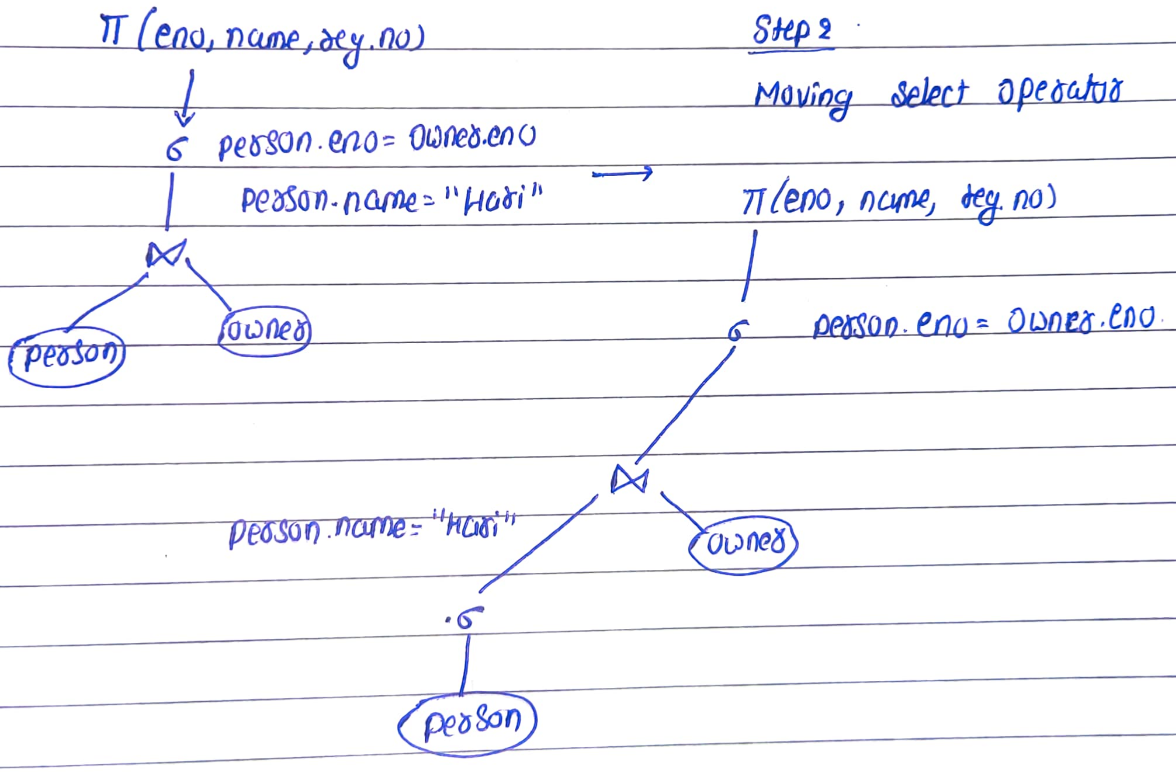
Course: Database Management Systems.

Course Code: CS5401

Date: 01/12/2021

Class Test-2

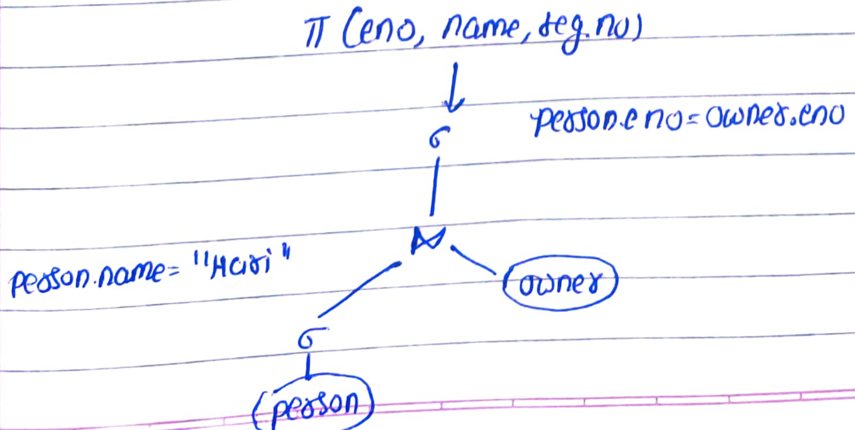
Solution. (b) Now query efficienty using heuristic approach.



Step 2

Moving select operator

Now Replacing Cartesian product with Join operator.


π (eno, name, reg.no)
σ person.eno = owner.eno
⋈
person.name = "Hari"
owner
σ
person