NORMALIZATION

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NORMALIZED STRUCTURE

EMPLOYEE Table: (EID, NAME, AGE, DEPARTMENT)

SALARY Table: (EID, BASIC, HRA, TA, DA, PF)

DEPARTMENT Table: (DEPARTMENT, DESIGNATION)

HOD Table: (DEPARTMENT, HOD)

1 NF

- **Definition**: A table is in 1NF if all columns contain atomic (indivisible) values and there are no repeating groups of columns.

- **Implementation**: all cells are of **atomic** values

EID	NAME	AGE	DEPARTMENT	DESIGNATION	BASIC	HRA	TA	DA	PF	HOD
1	John	30	HR	Manager	5000	1500	800	1000	400	John
2	Alice	28	IT	Developer	6000	1800	1000	1200	480	Alice
3	Bob	25	HR	Executive	4500	1300	700	900	350	John
4	Charlie	32	IT	Developer	6500	1900	1100	1300	500	Alice

2 NF

- **Definition**: A table is in 2NF if it is in 1NF and all non-key attributes are fully functionally dependent on the primary key.

- **Implementation**: In **EMPLOYEE** table, we had **SALARY** and salary-related components (BASIC, HRA, TA, DA, PF). These components were dependent on **EID**, not just part of the composite key. By moving these salary components into the **SALARY Table**, we eliminated partial dependencies. Now **EID** (in **EMPLOYEE**) is the primary key, and all other attributes are fully dependent on it.

SALARY	BASIC	HRA	TA	DA	PF
10000	5000	1500	800	1000	400
20000	6000	1800	1000	1200	480
30000	4500	1300	700	900	350
40000	6500	1900	1100	1300	500

EID	NAME	AGE	DEPARTMENT	DESIGNATION	HOD	SALARY
1	John	30	HR	Manager	John	10000
2	Alice	28	IT	Developer	Alice	20000
3	Bob	25	HR	Executive	John	30000
4	Charlie	32	IT	Developer	Alice	40000

3 NF

- **Definition**: A table is in 3NF if it is in 2NF and no transitive dependencies exist. This means that non-key attributes should not depend on other non-key attributes.

Implementation: In the original **EMPLOYEE** table, **DESIGNATION** and **HOD** were dependent on **DEPARTMENT**, which was a non-key attribute. By splitting **DESIGNATION** and **HOD** into separate tables, we removed the transitive dependencies. Now **DEPARTMENT** is linked to **DESIGNATION** and **HOD** in their respective tables.

DEPARTMENT	DESIGNATION
HR	Manager
IT	Developer

DEPARTMENT	HOD
HR	John
IT	Alice

EMPLOYEE

PK	EMPLOYEE_ID int NOT NULL
	name char(50) NOT NULL AGE int SALARY decimal DEPARTMENT varchar(20)

SALARY

PK	SALARY decimal NOT NULL
	PF DA HRA TA BASE

DESIGNATION

DEPARTMENT varchar NOT NULL
DESIGNATION

HOD

DEPARTMENT int NOT NULL
HOD varchar