Employee Database Design & Normalization

Agenda

- Introduction to Database Design
- Given Table Structure
- Normalization Process
- Why Normalization is Important
- ER Diagram
- Thank you

Introduction to Database Design

- A well-structured database ensures data integrity, eliminates redundancy, and enhances efficiency in data retrieval.
- The given dataset describes an **EMPLOYEE** table, which we will optimize using **Normalization** and **ER Diagrams**.

Given Table Structure

The original table contains the following attributes:

EMPLOYEE (EID, NAME, AGE, SALARY, BASIC, HRA, TA, DA, PF, DESIGNATION, DEPARTMENT, HOD)

Issues in this table:

- **Redundancy: SALARY** is derived from **BASIC, HRA, TA, DA, PF**, making some attributes redundant.
- **Dependency: DEPARTMENT** and **HOD** are linked, requiring a separate table.
- **Atomicity: SALARY Breakdown** should be in a different table.

Example Data:

EID	NAME	AGE	SALARY	BASIC	HRA	TA	DA	PF	DESIGNATION	DEPARTMENT	HOD
101	Alice	30	80000	50000	15000	5000	5000	5000	Manager	HR	John Doe
102	Bob	28	60000	40000	10000	3000	4000	3000	Analyst	Finance	Jane Smith

First Normal Form (1NF) - Remove Repeating Groups: Each column should have

atomic values. The given table is already in 1NF since there are no multivalued attributes.

Second Normal Form (2NF) - Remove Partial Dependencies

- The salary components (**BASIC, HRA, TA, DA, PF**) depend only on **EID** but not on the entire primary key.
- **DEPARTMENT** and **HOD** are separate entities.

New Tables after 2NF:

- **EMPLOYEE (EID, NAME, AGE, DESIGNATION, DEPARTMENT_ID)**
- **SALARY (EID, BASIC, HRA, TA, DA, PF, TOTAL_SALARY)**
- **DEPARTMENT (DEPARTMENT_ID, DEPARTMENT_NAME, HOD)**

Third Normal Form (3NF) - Remove Transitive Dependencies

- **HOD** is dependent on **DEPARTMENT_ID**, not directly on **EID**.
- Thus, we separate the **DEPARTMENT** table further.

Final Normalized Tables:

- **EMPLOYEE (EID, NAME, AGE, DESIGNATION, DEPARTMENT_ID)**
- **SALARY (EID, BASIC, HRA, TA, DA, PF, TOTAL_SALARY)**
- **DEPARTMENT (DEPARTMENT_ID, DEPARTMENT_NAME, HOD_ID)**
- **HOD (HOD_ID, HOD_NAME)**

Example Data:

EMPLOYEE Table

EID	NAME	AGE	DESIGNATION	DEPARTMENT_ID
101	Alice	30	Manager	1
102	Bob	28	Analyst	2

SALARY Table

EID	BASIC	HRA	TA	DA	PF	TOTAL_SALARY
101	50000	15000	5000	5000	5000	80000
102	40000	10000	3000	4000	3000	60000

DEPARTMENT Table

DEPARTMENT_ID	DEPARTMENT_NAME	HOD
1	HR	John Doe
2	Finance	Jane Smith

Example Data:

HOD Table

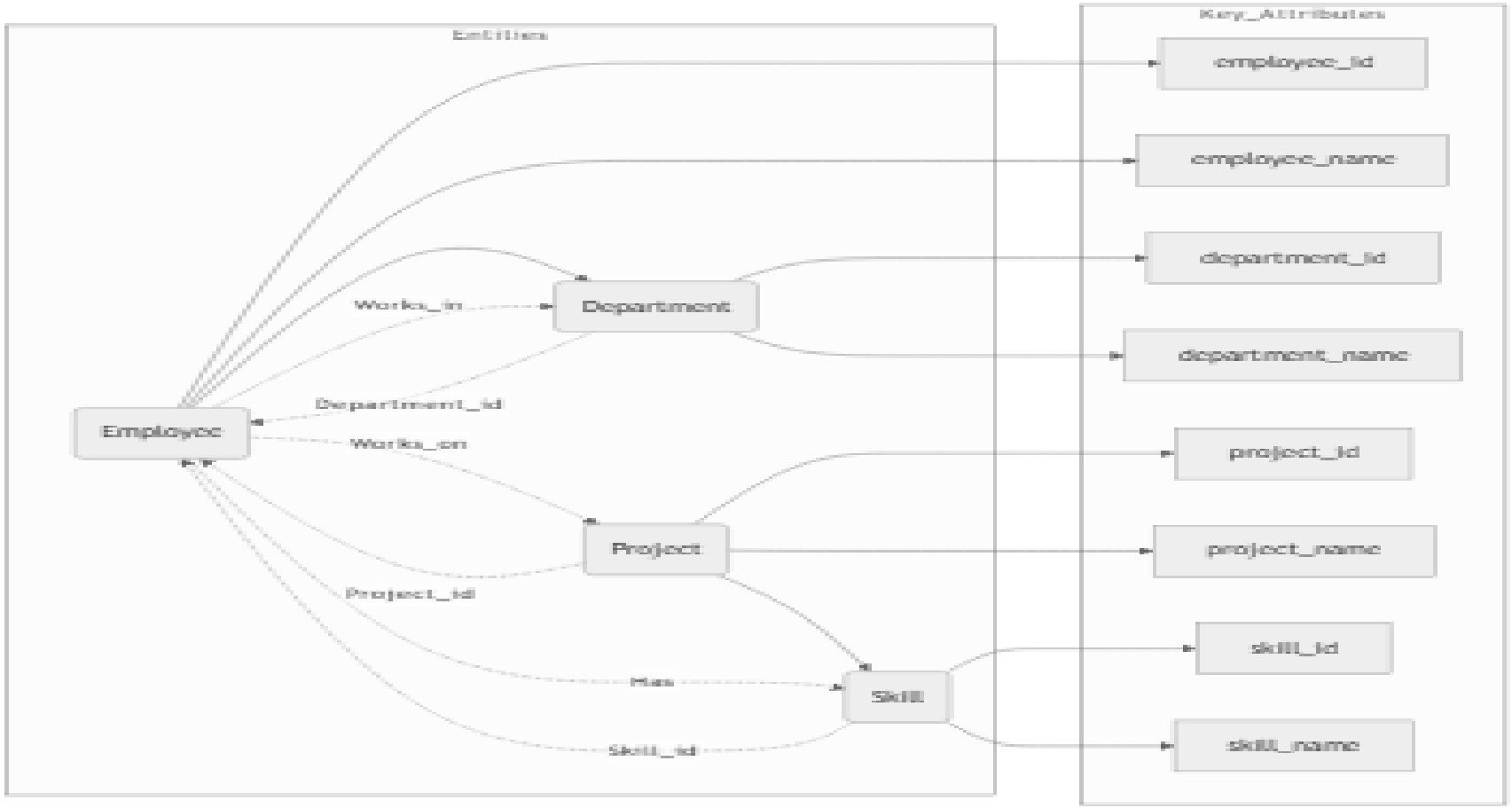
HOD_ID	HOD_NAME
1	John Doe
2	Jane Smith

Normalization Process

Why Normalization is Important

Benefits of Normalization:

- **Reduces Redundancy**: Prevents duplicate data storage.
- **Enhances Data Integrity**: Ensures consistent and accurate data.
- **Improves Query Performance**: Optimized structure enables faster data retrieval.
- **Easier Data Maintenance**: Updates require fewer modifications across tables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ER Diagram

Thank you