**Report on Normalization of ER Diagram for HR Data Analysis**

**Introduction**

Normalization is a database design process that structures data to minimize redundancy and dependency. The process involves organizing columns and tables of a database to ensure that dependencies are properly enforced by database integrity constraints. This report assesses the normalization of the provided Entity-Relationship (ER) diagram for HR data analysis, ensuring it adheres to the first three normal forms (1NF, 2NF, and 3NF).

**First Normal Form (1NF)**

**1NF Criteria:**

* Each table should contain atomic (indivisible) values.
* There should be no repeating groups or arrays within the table.
* Each table should have a primary key that uniquely identifies each record.

**Analysis:**

* All attributes within the tables in the ER diagram have atomic values. For instance, attributes such as employee\_id, department\_name, and country\_name are atomic.
* There are no repeating groups or arrays within any table.
* Every table in the diagram has a designated primary key (denoted as "PK"), which uniquely identifies each record.

**Conclusion:** The ER diagram satisfies the requirements of the First Normal Form (1NF).

**Second Normal Form (2NF)**

**2NF Criteria:**

* The table must be in 1NF.
* All non-key attributes must be fully functionally dependent on the primary key, meaning no partial dependency should exist.

**Analysis:**

* Each table in the diagram is in 1NF.
* All non-key attributes in each table are fully dependent on the primary key. For example:
  + In the employees table, attributes like first\_name, last\_name, email, and hire\_date are dependent on the employee\_id, which is the primary key.
  + In the departments table, attributes like department\_name and location\_id depend on department\_id.
* No partial dependencies are observed.

**Conclusion:** The ER diagram satisfies the requirements of the Second Normal Form (2NF).

**Third Normal Form (3NF)**

**3NF Criteria:**

* The table must be in 2NF.
* There should be no transitive dependency; non-key attributes should not depend on other non-key attributes.

**Analysis:**

* Each table in the diagram is in 2NF.
* There are no transitive dependencies within any of the tables. For example:
  + In the employees table, attributes such as job\_id, salary, and manager\_id are directly related to the primary key employee\_id and do not depend on other non-key attributes.
  + In the jobs table, job\_title, min\_salary, and max\_salary depend solely on the primary key job\_id.
* All non-key attributes depend only on the primary key of the respective tables.

**Conclusion:** The ER diagram satisfies the requirements of the Third Normal Form (3NF).

**Overall Conclusion**

The ER diagram for HR Data Analysis adheres to the principles of database normalization up to the Third Normal Form (3NF). The design ensures that:

* Data redundancy is minimized.
* Data integrity is maintained.
* Each attribute is functionally dependent on the primary key, and there are no partial or transitive dependencies.

The normalization process makes the database more efficient by reducing duplication and enhancing data consistency, making the ER diagram well-suited for HR data analysis.

**Prepared by:** Pranav Manohar Patil  
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