Database Management System (DBMS)

Lecture-14

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Relational Model

Relational data model represents the database as a collection of relations. A relation is nothing but a table of values. Every row in the table represents a collection of related data values. These rows in the table denote a real-world entity or relationship.

Some concepts related with relational data model

Relation: A relation is a table with columns and rows.

Field: A column in a table is called the field of a relation.

Tuple: It is nothing but a single row of a table, which contains a single record.

Relation schema: A relation schema represents the name of the relation with its attributes. If $A_1, A_2, ..., A_n$ are attributes then R= $(A_1, A_2, ..., A_n)$ is a relation schema.

Example: A relation schema student with their attributes are like the followings:-

student=(rollNo, name,branch,contactNo).

Some concepts related with relational data model(Cont.)

Relation Instance: Relation instance is a finite set of tuples in the RDBMS system. Relation instances never have duplicate tuples.

Attribute domain: The set of all possible values of a relation is said to be domain of an attribute.

Degree: The total number of attributes exist in the relation is called the degree of the relation.

Cardinality: Total number of rows present in the table.

Atomic values: A value is said to be atomic if it is not divisible.

Note: Domain of an attribute is said to be atomic if all its possible values are atomic i.e. not divisible.

Integrity Constraints

- Integrity constraints are a set of rules. It is used to maintain the quality of information.
- Integrity constraints ensure that the data insertion, updating, and other processes have to be performed in such a way that data integrity is not affected.
- Thus, integrity constraint is used to guard against accidental damage to the database.

Types of Integrity Constraint

1. Domain Constraints
2. Entity Integrity Constraints
3. Referential Integrity Constraints
4. Key Constraints

Domain Constraints

- Domain constraints can be defined as the definition of a valid set of values for an attribute.
- The data type of domain includes string, character, integer, time, date, currency, etc. The value of the attribute must be available in the corresponding domain.

Example: Consider the following table

ID	NAME	SEMENSTER	AGE
1000	Tom	1st	17
1001	Johnson	2nd	24
1002	Leonardo	5th	21
1003	Kate	3rd	19
1004	Morgan	8th	A

Not allowed. Because AGE is an integer attribute

Entity integrity constraints

- The entity integrity constraint states that primary key value can't be null.
- This is because the primary key value is used to identify individual rows in relation and if the primary key has a null value, then we can't identify those rows.
- A table can contain a null value other than the primary key field.

Example: Consider the following table

EMPLOYEE

EMP_ID	EMP_NAME	SALARY
123	Jack	30000
142	Harry	60000
164	John	20000
	Jackson	27000

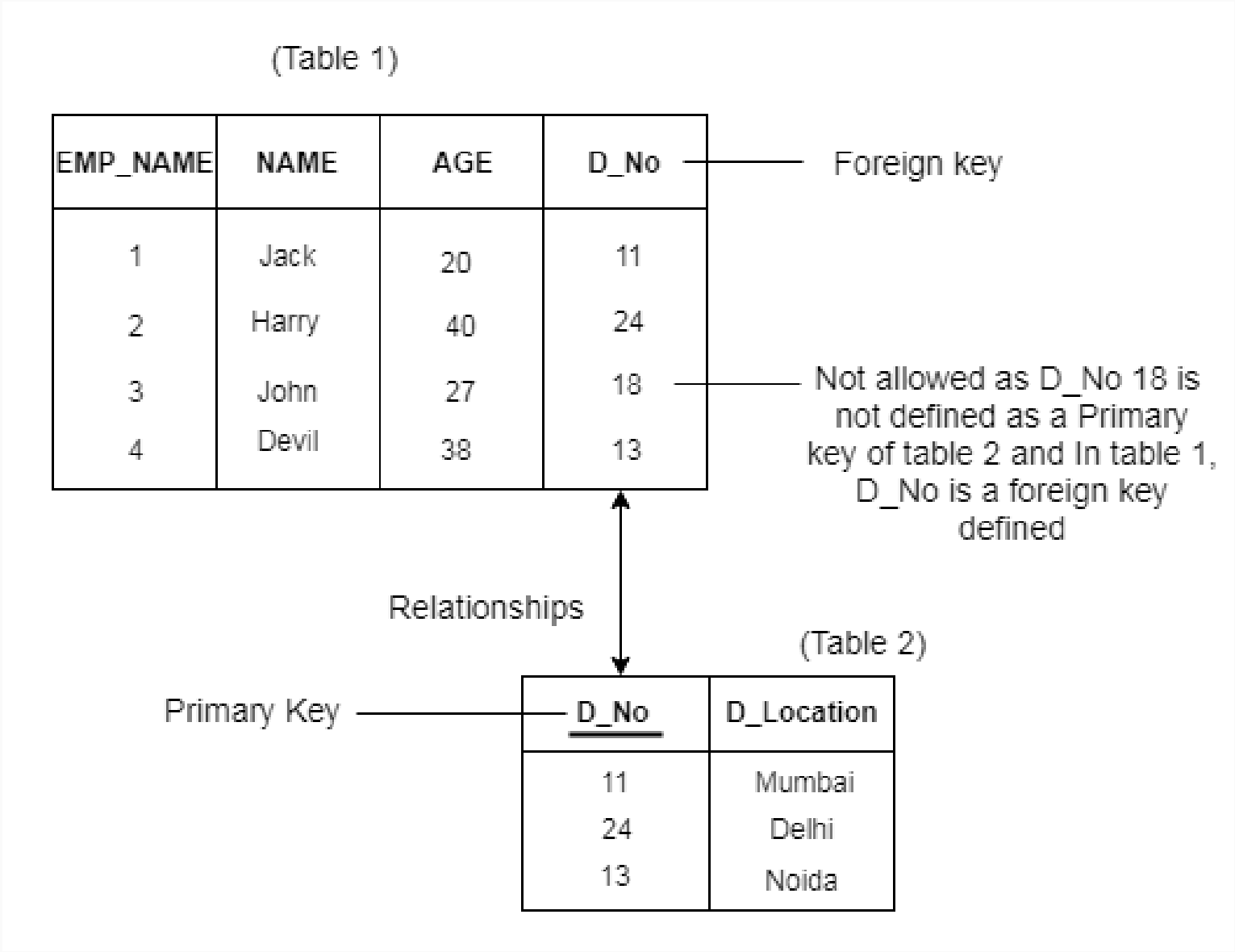
Not allowed as primary key can't contain a NULL value

Referential Integrity Constraints

- A referential integrity constraint is specified between two tables.
- In the Referential integrity constraints, if a foreign key in Table 1 refers to the Primary Key of Table 2, then every value of the Foreign Key in Table 1 must be null or be available in Table 2.

Relational Model

Example: Consider the following table



Key constraints

- Keys in the entity set is used to identify an entity within its entity set uniquely.
- An entity set can have multiple keys, but out of which one key will be the primary key. A primary key can contain a unique and null value in the relational table.

Example: Consider the following table

ID	NAME	SEMENSTER	AGE
1000	Tom	1st	17
1001	Johnson	2nd	24
1002	Leonardo	5th	21
1003	Kate	3rd	19
1002	Morgan	8th	22

Not allowed. Because all row must be unique

Foreign key

- Consider R and S are two tables. An attribute A of table R is said to be foreign key of R if A is the primary key in S.
- A foreign key is a column (or combination of columns) in a table whose values must match values of a column in some other table.
- FOREIGN KEY constraints enforce referential integrity, which essentially says that if column value A refers to column value B, then column value B must exist.

Example: Consider two tables Employee(ID, Name, Dept-ID) and Department(Dept-ID, Dept-name).
Here, attribute Dept-ID in Employee table is a foreign key because Dept-ID in Department table is a primary key.