DATABASE ESSENTIALS

Lecture 5

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Relational database

- A relational database consists of a collection of **tables**, each of which is assigned a unique name.
- A table is made up of columns and rows.
- A row is also referred as a **tuple**.
- A column is also referred as an **attribute.**

Relational database…

- A database schema is the logical design of the database.
- A relation schema consists of a list of attributes and their corresponding domains.
- The schema of a relation rarely change.
- A database instance is a snapshot of the data in the database at a given instant in time.

Relational database…

- The contents of a relation instance may change with time as the relation is updated.
- Tuples of distinct relations are related using common attributes in relation schemas.
- Example:

  Consider the following schemas

  student(student_id, name, age)

  subject(subject_id, name, teacher)

  scores(student_id, subject_id, marks)

Relational database…

- Example

student_id	name	age
1	Akon	17
2	Bkon	18
3	Ckon	17
4	Dkon	18

subject_id	name	teacher
1	Java	Mr. J
2	C++	Miss C
3	C#	Mr. C Hash
4	Php	Mr. P H P

student_id	subject_id	marks
1	1	98
1	2	78
2	1	76
3	2	88

KEYS

- In a relation, no two tuples in a relation are allowed to have exactly the same value for all attributes.

- A key refers to an attribute or set of attributes that is used to uniquely identify tuples in entity sets.
  - The attributes which are used as key are known as **key attributes**.
  - Rest of attributes are known as **non-key attributes**.

KEYS

- Types of Keys
  1. Super key
  2. Candidate key
  3. Primary key
  4. Alternate key
  5. Foreign key

KEYS…

Super key

- A super key is one or more than one attributes that can identify data uniquely.
- Any entity set has more than one super key.
- All combinations of attributes can identify data uniquely.

KEYS…

Super key

- Example

Reg. No	ID	Name	Salary	Dept-ID
S1D	1	Mohan	1500	10
A25	2	Sohan	2000	30
33Z	3	Vikas	3000	20
Z4X	4	Madhu	1000	10
A5C	5	Sonal	5000	20

- Super keys include but not limited to:
  - Reg. No, ID, Name, Salary, Dept-ID
  - ID, Name, Salary

KEYS…

Candidate key

- A candidate key is a minimal super key, that is, a set of attributes that forms a super key, but none of whose subsets is a super key.
- Example

Reg. No	ID	Name	Salary	Dept-ID
S1D	1	Mohan	1500	10
A25	2	Sohan	2000	30
33Z	3	Vikas	3000	20
Z4X	4	Madhu	1000	10
A5C	5	Sonal	5000	20

- Candidate keys include:
  - Reg. No, ID
  - Reg. No
  - ID

KEYS…

Primary key

- A primary key is an attribute which identifies data uniquely.
- One of the candidate keys of a relation is chosen as its primary key.
- The primary key should be chosen such that its attribute values are never, or very rarely, changed.
- From the previous relation; either of the following attributes can be a primary key
  - Reg. No
  - ID

KEYS…

Alternate key

- An alternate key(s) refers to all the candidate key(s) other than primary key.

- Example:
  - If you use ID as a primary key. Then, Reg. No. is an alternate key and vice versa.

KEYS…

Foreign key

- Foreign key refers to an attribute in a relation (*r1)* which is a primary key in another relation (*r2)*.
- The relation *r1* is also called the referencing or child relation of the foreign key dependency.
- The relation *r*2 is called the referenced or master relation of the foreign key.

KEYS…

Foreign key

- Referential integrity constraint or foreign key constraint refers to limitations on the foreign key.

- There are two referential integrity constraints:
  - Insert constraint

    Value cannot be inserted in child relation if the value is not lying in master relation.

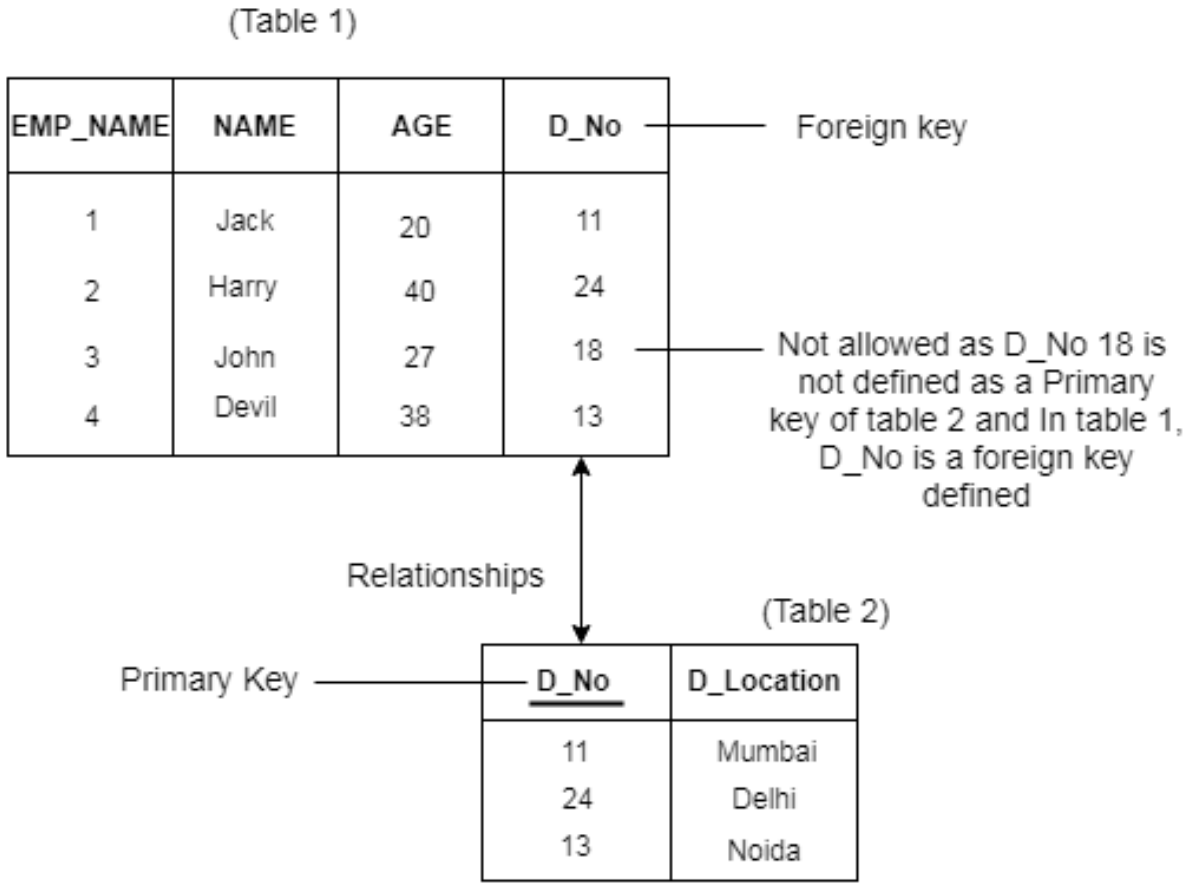
  - Delete constraint

    Value cannot be deleted from the master relation if the value is existing in the child relation.

KEYS…

Foreign key

- Referential integrity constraint or foreign key constraint



It's hard to beat a person who never gives up. – Babe Ruth