



SNS COLLEGE OF TECHNOLOGY

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Department of MCA

DBMS - Relational Constraints

Course Name : 23CAT603 - DATA BASE MANAGEMENT SYSTEM

Class : I Year / I Semester

Unit II – Relational Constraints





Constraints



- **Constraints**
- Every relation has some conditions that must hold for it to be a valid relation. These conditions are called Relational Integrity Constraints. There are three main integrity constraints –
- **Key constraints**
- Domain constraints
- Referential integrity constraints



Constraints



Key Constraints

- There must be at least one minimal subset of attributes in the relation, which can identify a tuple uniquely. This minimal subset of attributes is called key for that relation. If there are more than one such minimal subsets, these are called candidate keys.

Key constraints force that –

- in a relation with a key attribute, no two tuples can have identical values for key attributes.
- a key attribute can not have NULL values.
- Key constraints are also referred to as Entity Constraints.



Constraints



Domain Constraints

Attributes have specific values in real-world scenario. For example, age can only be a positive integer. The same constraints have been tried to employ on the attributes of a relation. Every attribute is bound to have a specific range of values. For example, age cannot be less than zero and telephone numbers cannot contain a digit outside 0-9.



Constraints



Referential integrity Constraints

Referential integrity constraints work on the concept of Foreign Keys. A foreign key is a key attribute of a relation that can be referred in other relation.

Referential integrity constraint states that if a relation refers to a key attribute of a different or same relation, then that key element must exist.



- Relational Model

❖ Relational Model Constraints

★ Constraints on databases:

- **Inherent model-based:** Inherent in the data model.
- **Schema based:** Defined directly in the schemas of the data model.
- **Application based:** Must be expressed and enforced by the application programs.



Constraints



- Relational Model

❖ Schema-based Constraints

★ Domain Constraints:

- Must be an **atomic value**.
- Performs **data type check**.

STUDENT	RollNo	Name	Phone	Age
	1	Jeremy	2563251425	14
	2	Charles	1234568978	14
	3	Weston	3625368914	A

Violates Domain Constraints →

★ Key Constraints:

- An attribute that can uniquely identify each tuple in a relation is called a **key**.

STUDENT	RollNo	Name	Age	Grade
	1	Jeremy	14	A
	2	Charles	14	A
	3	Charles	13	B

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- Relational Model

❖ Schema-based Constraints

★ Key Constraints:

- A **superkey** specifies that no two tuples can have the same value.
- Every relation has at least one superkey → set of all attributes.

STUDENT	RollNo	Name	Age	Email
	1	Jeremy	14	jeremy16@gmail.com
	2	Josh	14	josh25@gmail.com
	3	Charles	15	charly01@gmail.com

SK = { RollNo }, { Email },
{ RollNo, Name }, { RollNo, Age },
{ RollNo, Email }, { Name, Email },
{ Age, Email },
{ RollNo, Name, Age, Email }



- Relational Model

❖ Schema-based Constraints

★ Key Constraints:

- A key satisfies 2 constraints:
 - (i) Two tuples cannot have identical values for all the attributes in the key.
 - (ii) It is a **minimal superkey**.

STUDENT	<u>RollNo</u>	Name	Age	Email
	1	Jeremy	14	jeremy16@gmail.com
	2	Josh	14	josh25@gmail.com
	3	Charles	15	charly01@gmail.com
	3	Alicia	13	alicia22@gmail.com

Not possible

SK = { RollNo }, { Email },
{ RollNo, Name }, { RollNo, Age },
{ RollNo, Email }, { Name, Email },
{ Age, Email },
{ RollNo, Name, Age, Email }



- Relational Model

❖ Schema-based Constraints

★ Constraints on Null Values:

- Specifies whether null values are permitted or not (**NOT NULL**).

STUDENT	<u>RollNo</u>	Name	Age	Grade
	1	Jeremy	14	A
	2	Charles	14	A
	3	Charles	13	B

★ Entity Integrity Constraint:

- States that **no primary key value can be null**.

STUDENT	<u>RollNo</u>	Name	Age	Grade
	1	Jeremy	14	A
	2	Charles	14	A
	null	Charles	13	B

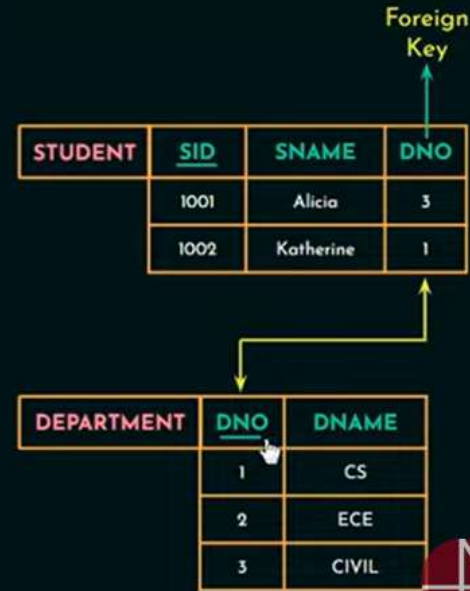


- Relational Model

❖ Schema-based Constraints

★ Referential Integrity Constraint:

- Specified between 2 relations.
- States that a tuple in one relation that refers to another relation must refer to an **existing tuple** in that relation.





Constraints



- Relational Model

❖ Schema-based Constraints

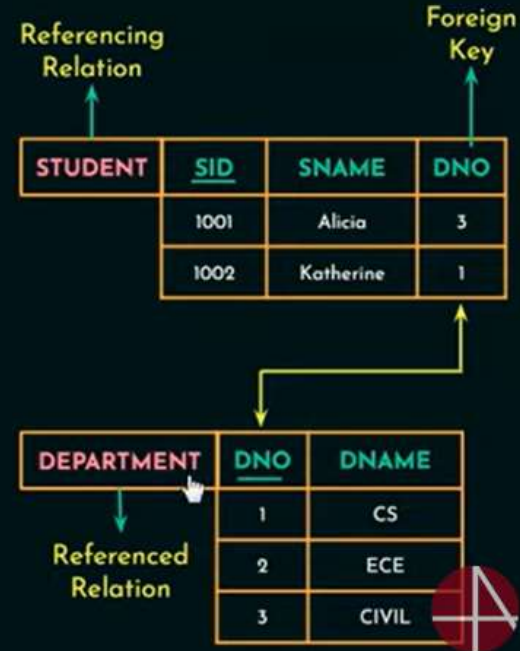
★ Referential Integrity Constraint:

- Foreign key must satisfy the following:

- (i) same domain.
- (ii) Value of FK in a tuple either occurs as a value of PK i.e.,

$$t_1[\text{FK}] = t_2[\text{PK}] \text{ or is null.}$$

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References



1. https://www.tutorialspoint.com/dbms/relational_data_model.htm
2. <https://www.javatpoint.com/dbms-integrity-constraints>
3. <https://www.prepbytes.com/blog/dbms/constraints-in-dbms-and-types/>