



GALGOTIAS
UNIVERSITY

School of Computing Science and Engineering

Program: BCA

CourseCode:BCAC2102

CourseName:Database Management System

Lecture-11

Topic- Primary Keys

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Lecture-10(RECAP)

Lecture 10

Topic-Cardinality Constraints

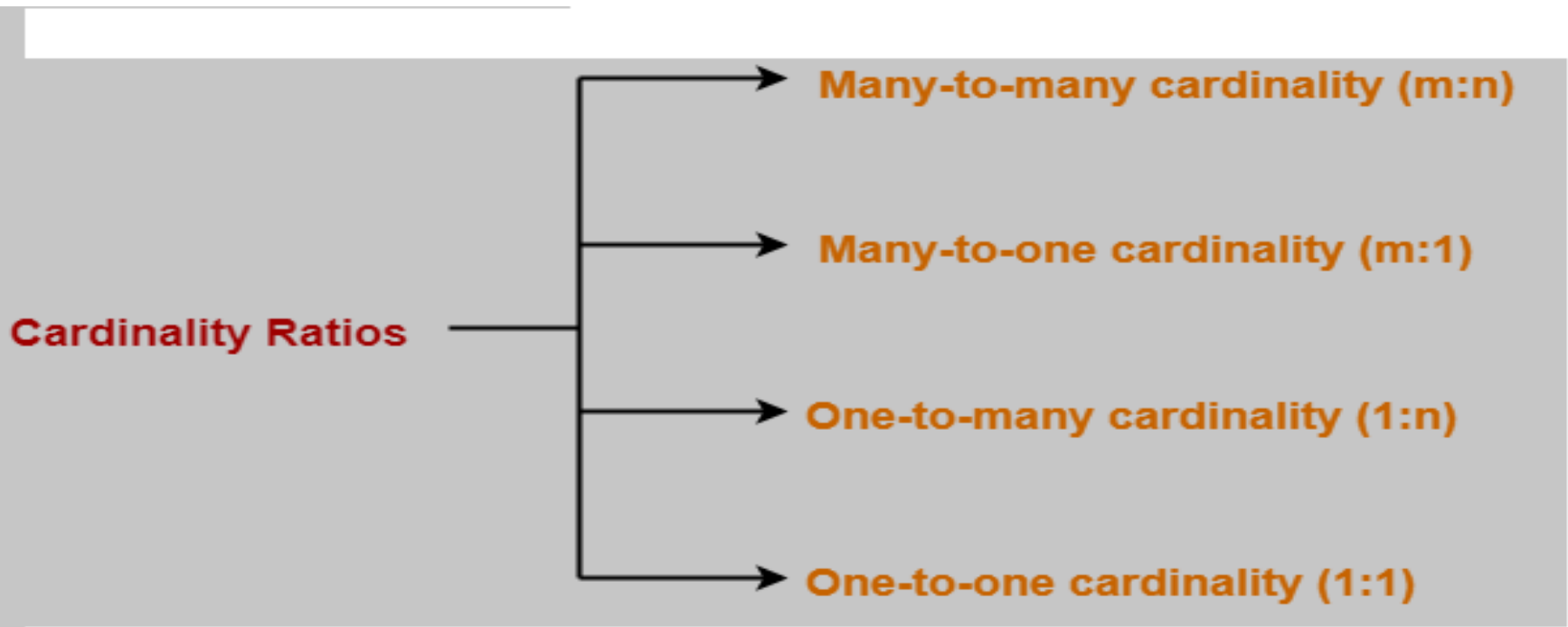
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Topic- Cardinality Constraints

Objective :

To be familiar with Cardinality Constraints

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1. Many-to-Many cardinality (m:n)
2. Many-to-One cardinality (m:1)
3. One-to-Many cardinality (1:n)
4. One-to-One cardinality (1:1)

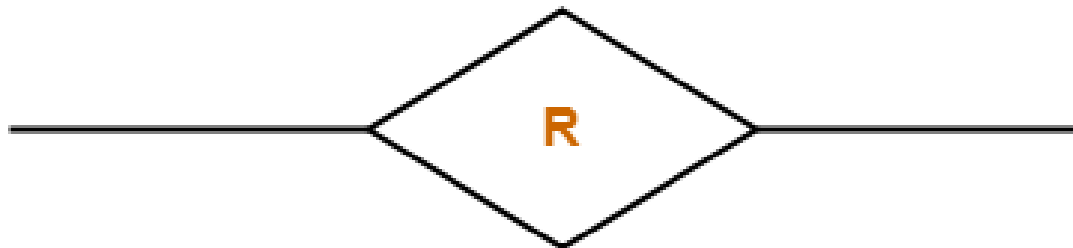
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1. Many-to-Many Cardinality-

By this cardinality constraint,

- An entity in set A can be associated with any number (zero or more) of entities in set B.
- An entity in set B can be associated with any number (zero or more) of entities in set A.

Symbol Used-



Cardinality Ratio = m : n

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Example-

Consider the following ER diagram-



Many to Many Relationship

Here,

- One student can enroll in any number (zero or more) of courses.
- One course can be enrolled by any number (zero or more) of students.

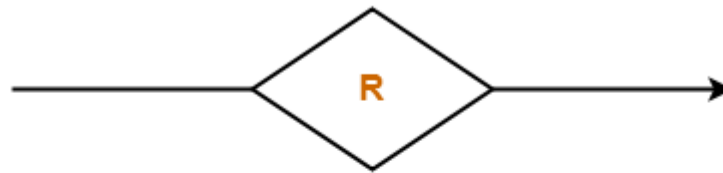
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2. Many-to-One Cardinality-

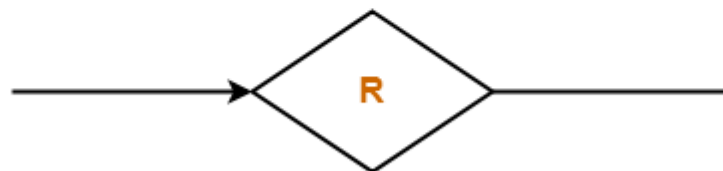
By this cardinality constraint,

- An entity in set A can be associated with at most one entity in set B.
- An entity in set B can be associated with any number (zero or more) of entities in set A.

Symbol Used-



OR



Cardinality Ratio = m : 1

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Example-

Consider the following ER diagram-



Many to One Relationship

Here,

- One student can enroll in at most one course.
- One course can be enrolled by any number (zero or more) of students.

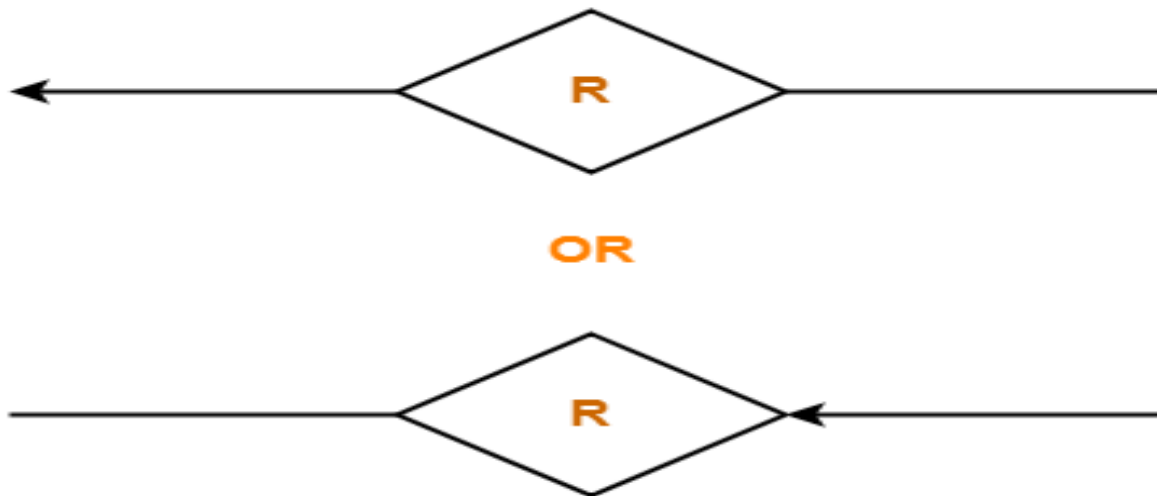
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3. One-to-Many Cardinality-

By this cardinality constraint,

- An entity in set A can be associated with any number (zero or more) of entities in set B.
- An entity in set B can be associated with at most one entity in set A.

Symbol Used-



Cardinality Ratio = 1 : n

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Example-

Consider the following ER diagram-



One to Many Relationship

Here,

- One student can enroll in any number (zero or more) of courses.
- One course can be enrolled by at most one student.

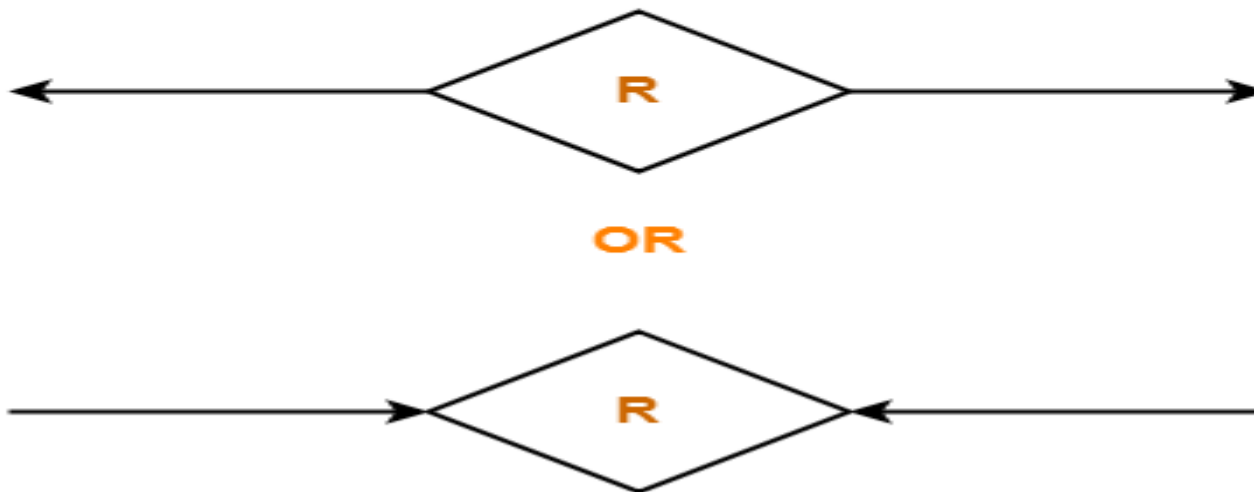
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4. One-to-One Cardinality-

By this cardinality constraint,

- An entity in set A can be associated with at most one entity in set B.
- An entity in set B can be associated with at most one entity in set A.

Symbol Used-



Cardinality Ratio = 1 : 1

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Example-

Consider the following ER diagram-



One to One Relationship

Here,

- One student can enroll in at most one course.
- One course can be enrolled by at most one student.

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Detailed

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(Assignment)

1. Construct an E-R diagram for a car insurance company that has a set of customers, each of whom owns one or more cars. Each car has associated with it zero to any number of recorded accidents.

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Topic- Primary Keys

Objective :

To be familiar with Primary Keys

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What are Keys?

A DBMS key is an attribute or set of an attribute which helps you to identify a row(tuple) in a relation(table). They allow you to find the relation between two tables. Keys help you uniquely identify a row in a table by a combination of one or more columns in that table.

Example:

Employee ID	<u>FirstName</u>	<u>LastName</u>
11	Andrew	Johnson
22	Tom	Wood
33	Alex	Hale

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Why we need a Key?

Here, are reasons for using Keys in the DBMS system.

- Keys help you to identify any row of data in a table. In a real-world application, a table could contain thousands of records. Moreover, the records could be duplicated. Keys ensure that you can uniquely identify a table record despite these challenges.
- Allows you to establish a relationship between and identify the relation between tables
- Help you to enforce identity and integrity in the relationship.

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Various Keys in Database Management System

DBMS has folwing seven types of Keys each have their different functionality:

- Super Key
- Primary Key
- Candidate Key
- Alternate Key
- Foreign Key
- Compound Key
- Composite Key
- Surrogate Key

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What is the Super key?

A super key is a group of single or multiple keys which identifies rows in a table. A Super key may have additional attributes that are not needed for unique identification.

Example:

EmpSSN	EmpNum	Empname
9812345098	AB05	Shown
9876512345	AB06	Roslyn
199937890	AB07	James

In the above-given example, EmpSSN and EmpNum name are super keys.

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What is a Primary Key?

A column or group of columns in a table which helps us to uniquely identifies every row in that table is called a primary key. This DBMS can't be a duplicate. The same value can't appear more than once in the table

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Rules for defining Primary key:

- Two rows can't have the same primary key value
- It must for every row to have a primary key value.
- The primary key field cannot be null.
- The value in a primary key column can never be modified or updated if any foreign key refers to that primary key.

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Example:

In the following example, `StudID` is a Primary Key.

StudID	Roll No	First Name	LastName	Email
1	11	Tom	Price	abc@gmail.com
2	12	Nick	Wright	xyz@gmail.com
3	13	Dana	<u>Nutan</u>	mno@yahoo.com

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What is a Candidate Key?

- A super key with no repeated attribute is called candidate key.
- The Primary key should be selected from the candidate keys. Every table must have at least a single candidate key.

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Properties of Candidate key:

- It must contain unique values
- Candidate key may have multiple attributes
- Must not contain null values
- It should contain minimum fields to ensure uniqueness
- Uniquely identify each record in a table

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Example: In the given table Stud ID, Roll No, and email are candidate keys which help us to uniquely identify the student record in the table.



StudID	Roll No	First Name	LastName	Email
1	11	Tom	Price	abc@gmail.com
2	12	Nick	Wright	xyz@gmail.com
3	13	Dana	Natan	mno@yahoo.com

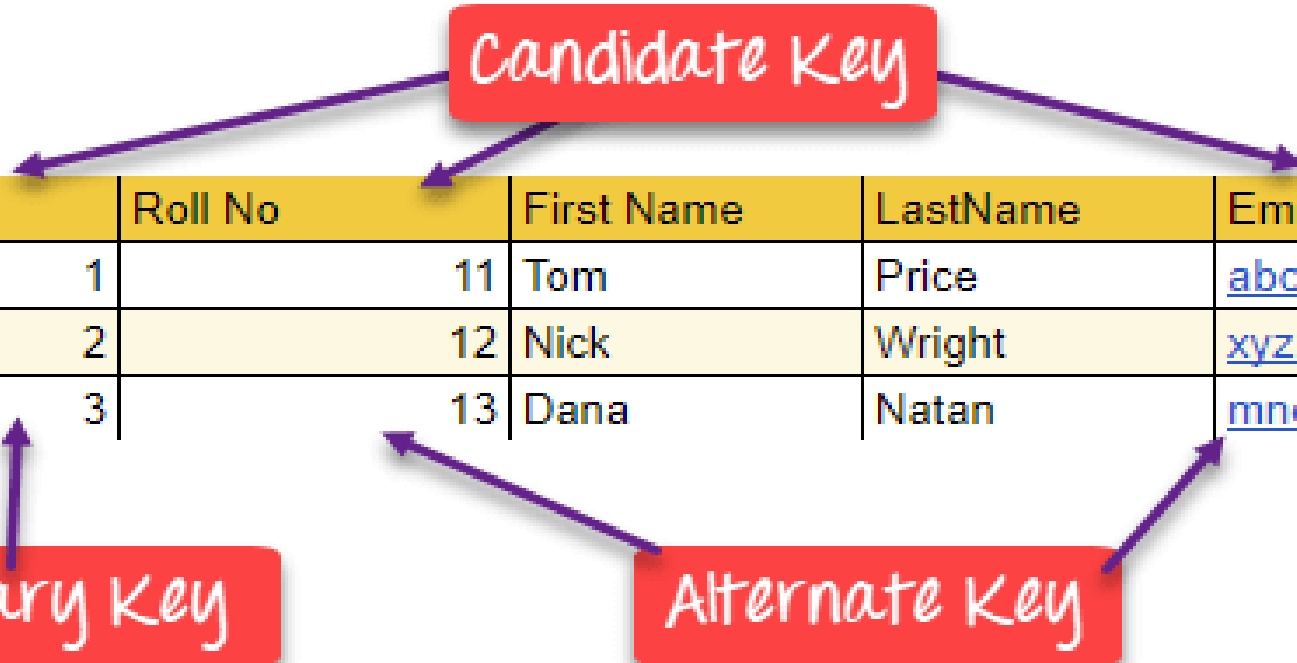
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Candidate Key

StudID	Roll No	First Name	LastName	Email
1	11	Tom	Price	abc@gmail.com
2	12	Nick	Wright	xyz@gmail.com
3	13	Dana	Natan	mno@yahoo.com

primary Key

Alternate Key



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What is the Foreign key?

A foreign key is a column which is added to create a relationship with another table. Foreign keys help us to maintain data integrity and also allows navigation between two different instances of an entity. Every relationship in the model needs to be supported by a foreign key.

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Example:

<u>DeptCode</u>	<u>DeptName</u>
001	Science
002	English
005	Computer

<u>Teacher ID</u>	<u>Fname</u>	<u>Lname</u>
B002	David	Warner
B017	Sara	Joseph
B009	Mike	<u>Brunton</u>

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In this example, we have two table, teach and department in a school. However, there is no way to see which who work in which department.

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In this table, adding the foreign key in Deptcode to the Teacher name, we can create a relationship between the two tables.

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In this table, adding the foreign key in Deptcode to the Teacher name, we can create a relationship between the two tables.

Teacher ID	<u>DeptCode</u>	<u>Fname</u>	<u>Lname</u>
B002	002	David	Warner
B017	002	Sara	Joseph
B009	001	Mike	<u>Brunton</u>

This concept is also known as Referential Integrity.

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▲ Difference between Primary key & Foreign key

Primary Key	Foreign Key
Helps you to uniquely identify a record in the table.	It is a field in the table that is the primary key of another table.
Primary Key never accept null values.	A foreign key may accept multiple null values.
Primary key is a clustered index and data in the DBMS table are physically organized in the sequence of the clustered index.	A foreign key cannot automatically create an index, clustered or non-clustered. However, you can manually create an index on the foreign key.
You can have the single Primary key in a table.	You can have multiple foreign keys in a table.

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Summary

- A DBMS key is an attribute or set of an attribute which helps you to identify a row(tuple) in a relation(table)
- DBMS keys allow you to establish a relationship between and identify the relation **between tables**
- Seven Types of DBMS keys are Super, Primary, Candidate, Alternate, Foreign, Compound, Composite, and Surrogate Key.
- A super key is a group of single or multiple keys which identifies rows in a table.
- A column or group of columns in a table which helps us to uniquely identifies every row in that table is called a primary key
- All the keys which are not primary key are called an alternate key
- A super key with no repeated attribute is called candidate key
- A compound key is a key which has many fields which allow you to uniquely recognize a specific record
- A key which has multiple attributes to uniquely identify rows in a table is called a composite key
- An artificial key which aims to uniquely identify each record is called a surrogate key
- Primary Key never accept null values while a foreign key may accept multiple null values.

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(Assignment)

- 1. Compare Primary keys with Foreign Keys with necessary Example.**



Thank You