Keys in DBMS

- ***Definition***: A **key** is an **attribute** or **set of attributes** that **uniquely identifies** any record (or tuple) from the table.
- ***Purpose:***
  - **Key** is used **to uniquely identify any record or row of data from the table.**
  - It is also used to establish and identify **relationships** between **tables.**

Example: Employee Table

Emp_Id	Name	Aadhar_No	Email_Id	Dept_Id
01	Aman	775762540011	aa@gmail.com	1
02	Neha	876834788522	nn@gmail.com	2
03	Neha	996677898677	ss@gmail.com	2
04	Vimal	796454638800	vv@gmail.com	3

1. Super Key

- A **super key** is a combination of all possible attributes that can uniquely identify the rows (or tuple) in the given relation.
  - Super key is a superset of a candidate key.
  - A table can have many super keys
  - A super key may have additional attribute that are not needed for unique identity

Super Keys

Emp_Id	Name	Aadhar_No	Email_Id	Dept_Id
01	Aman	775762540011	aa@gmail.com	1
02	Neha	876834788522	nn@gmail.com	2
03	Neha	996677898677	ss@gmail.com	2
04	Vimal	796454638800	vv@gmail.com	3

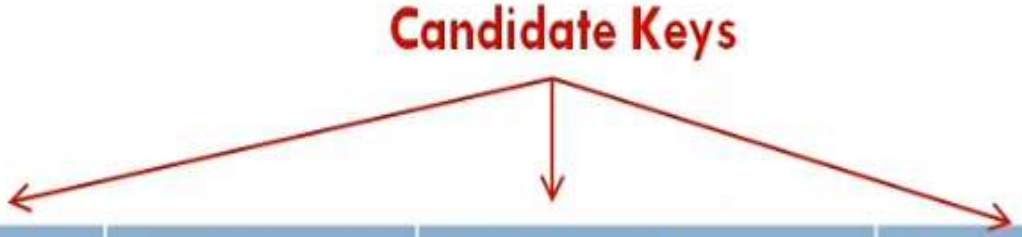
Super Keys:

1. {Emp_Id}
2. {Aadhar_No}
3. {Email_Id}
4. {Emp_Id, Aadhar_No}
5. {Aadhar_No, Email_Id}
6. {Emp_Id , Email_Id}
7. {Emp_Id, Aadhar_No, Email_Id}
8. {Emp_Id, Name}
9. {Emp_id, Name, Dep_Id}
10. {Emp_Id,Name, Aaadhar_No, Email_Id, Dept_Id}, etc....

2. Candidate Key

- A candidate key is an attribute or set of an attribute which can uniquely identify a tuple.
- A candidate key is a **minimal super key**; or a Super key with no redundant attributes.
  - It is called a minimal super key because we select a candidate key from a set of super key such that selected candidate key is the minimum attribute required to uniquely identify the table
- Candidate keys are defined as distinct set of attributes from which **primary key can be selected**

- Candidate keys are not allowed to have NULL values



Emp_Id	Name	Aadhar_No	Email_Id	Dept_Id
01	Aman	775762540011	aa@gmail.com	1
02	Neha	876834788522	nn@gmail.com	2
03	Neha	996677898677	ss@gmail.com	2
04	Vimal	796454638800	vv@gmail.com	3

- **Candidate Keys**

1. {Emp_Id}
2. {Aadhar_No}
3. {Email_Id}

3. Primary Key

- A **primary key** is one of the candidate key chosen by the database designer to uniquely identify the tuple in the relation
  - The value of primary key can never be NULL.
  - The value of primary key must always be unique (not duplicate).
  - The values of primary key can never be changed i.e. no updation is possible.
  - The value of primary key must be assigned when inserting a record.
  - A relation is allowed to have only one primary key.

Primary Key

Emp_Id	Name	Aadhar_No	Email_Id	Dept_Id
01	Aman	775762540011	aa@gmail.com	1
02	Neha	876834788522	nn@gmail.com	2
03	Neha	996677898677	ss@gmail.com	2
04	Vimal	796454638800	vv@gmail.com	3

- **Primary Key**

  1. {Emp_Id}

4.Alternate Keys

- Out of all candidate keys, only one gets selected as primary key, remaining keys are known as alternate keys.
- In the Employee table
  - **Emp_Id** is best suited for the **primary key**.
  - Rest of the attributes like **Aadhar_No, Email_Id** are considered as a **alternate keys**.

Primary Key

Alternate Keys

Emp_Id	Name	Aadhar_No	Email_Id	Dept_Id
01	Aman	775762540011	aa@gmail.com	1
02	Neha	876834788522	nn@gmail.com	2
03	Neha	996677898677	ss@gmail.com	2
04	Vimal	796454638800	vv@gmail.com	3

- **Alternate Keys**
  1. {Aadhar_No}
  2. {Email_Id}

5. Foreign keys

- A **Foreign Key** is:
  - A **key** used to link two tables together.
  - An **attribute (or set of attributes)** in one table that refers to the **Primary Key** in another table.
- The **purpose** of the **foreign key** is
  - to ensure (or maintain) **referential integrity** of the data.

Foreign Keys

Employee Table (Referencing relation)

Emp_Id	Name	Aadhar_No	Email_Id	Dept_Id
01	Aman	775762540011	aa@gmail.com	1
02	Neha	876834788522	nn@gmail.com	2
03	Neha	996677898677	ss@gmail.com	2
04	Vimal	796454638800	vv@gmail.com	3

Foreign Key:

In Employee Table

1. Dept_Id

Primary Key

Department Table (Referenced relation)

Dept_Id	Dept_Name
1	Sales
2	Marketing
3	HR

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Foreign Key

- Foreign key references the primary key of the table.
- Foreign key can take only those values which are present in the primary key of the referenced relation.
- Foreign key may have a name other than that of a primary key.
- Foreign key can take the NULL value.
- There is no restriction on a foreign key to be unique.
- In fact, foreign key is not unique most of the time.
- Referenced relation may also be called as the master table or primary table.
- Referencing relation may also be called as the foreign table.

6. Composite Key

- A key that has more than one attributes is known as composite key. It is also known as compound key.

Cust_Id	Order_Id	Product_Code	Product_Count
C01	001	P111	5
C02	012	P111	8
C02	012	P222	6
C01	001	P333	9

- **Composite Key:**

  {Cust_Id, Product_Code}