KEYS IN DBMS

What is a Key?
A DBMS key is an attribute or a set of attributes, which help you uniquely identify a record or a row of data in a relation or table.

Different Types of Keys:
1)Super Key
2)Candidate Key
3) Primary Key
4) Alternate Key
5) Foreign Key
6) Composite Key
7) Compound Key
8) Surrogate Key

1) Super Key:

The set of attributes that can uniquely identify a row or a record is known as Super Key.
For example consider a table **Student** (**StudentID, RegNo , Name, Branch and email)**

StudentID	RegNo.	Name	Branch	Email
1	F12878	John	C.S	john@g.com
2	F17623	Alex	C.S	alexrox@g.com
3	F65748	Adam	I.T	adamcool@g.com
4	F29938	Adam	Electronics	adamner@g.com

Here, we can have multiple super keys which uniquely identify a record.
Like, **StudentID, RegNo, Email.**

Or {StudentID and RegNo},{ StudentID and Email}, {Email and RegNo},
Or {StudentID, RegNo, Email}

All the above can be a super key for the given table.

2) Candidate Key

The minimal set of attributes that can uniquely identify a tuple is known as a candidate key. It is nothing but a minimal subset of super key.
If any proper subset of a super key is a super key then that key cannot be a candidate key. There can be more than one candidate key in a relation.

For example, in the above example, we had 8 super keys.
But, Here the candidate keys can be **StudentID, RegNo, Email.**
We can choose any one as a candidate key from them.
Others cannot be a candidate key because there exists a proper subset of those keys, which is also a super key.

3) Primary Key

The candidate key chosen to uniquely identify a row of data in a table is the Primary Key.
No two rows can have the same primary key value, primary key value cannot be null and every row must have a primary key.
Primary keys are not necessarily to be a single column; more than one column can also be a primary key for a table.

If we consider the above example, we had three candidate keys out of which we can choose a primary key.
StudentID, RegNo, Email.
We can consider **RegNo** as a primary key for the above example, as it will be more meaningful.

4) Alternate Key

The candidate key other than the primary key is called an alternate key. It is a secondary key. All the keys which are not primary keys are called alternate keys.

In the above example of Student Table if we choose RegNo as a primary key then **StudentID** and **Email** can be alternate keys.

5) Foreign Key

Foreign Key is an attribute in a table which is used to define its relationship with another table. Using Foreign key helps maintain integrity or tables in relationship. It is a key that acts as a primary key in one table and acts as secondary key in another table.

For example consider a table **Student (StudentID, RegNo, Name, Branch, Email)** and another table **Branch(Branch_code, Branch_name, HOD)** with branch details.

StudentID	RegNo.	Name	Branch	Email
1	F12878	John	CS	john@g.com
2	F17623	Alex	CS	alexrox@g.com
3	F65748	Adam	IT	adamcool@g.com
4	F29938	Adam	ECE	adamner@g.com

Branch_code	Branch_name	HOD
CS	Computer Science	Alan Lee
IT	Information Technlogy	Ben Mayer
ECE	Electronics and Telecommunication	Jeremy Stark

In the students table, the **branch_code** can be made a foreign key, to set a referential integrity or relationship between tables Student and Branch.
This will not allow to enter a wrong branch name, while adding a student entry.
Hence, Data Integrity in relationship is maintained using foreign keys.

6) Composite Key

Any key with more than one attribute is called as a composite key.
For example, in the above Student relation, we can have Composite keys like:
{StudentID and RegNo},{ StudentID and Email}, {Email and RegNo},
{StudentID, RegNo, Email}

7) Compound Key

If a composite key has at least one attribute which is a foriegn key then it is called a Compound Key.

In the above example of Student , we can have a compound key **(RegID, Branch_code)**, because Branch_code is a foreign key.

8) Surrogate Key

Sometimes natural keys cannot be used to create a unique primary key of the table.
If a relation has no attribute which can be used to identify the data stored in it, then we create an attribute for this purpose.
It adds no meaning to the data but serves the sole purpose of identifying rows uniquely in a table.This type of key is called a surrogate key.