





A **unique key** is a database **constraint** that ensures all values in a specified column or set of columns are unique across all rows in a table, thus preventing duplicate entries and enforcing data integrity.

ଅର୍ଥାତ୍, ବୁଝାଇ କଲା(ମଧ୍ୟ ଯଦି pow tuple) ରୁ ବାଲେ
ଏକ ଗୋଡ଼ ପାଇଁ ଏହା ଏକ unique key implement
ବନ୍ଦୀ କରୁ । (ଯମର ପାତ୍ର passport & License
number ଏହା ଏକିଟି pows unique.
also - 2021-22 second half ସାଲେ ଏହା ରୁ ।

Example: D123456 Second ft 20 नाइट्रो वी ।

A **primary key** is a special type of database **constraint** that serves as a unique identifier for every single record (row) within a database table. It is essential for organizing data and establishing relationships between different tables.

अर्थात् Employee_ID प्रतिकृति वर्गाम के लिए
मुख्य वास्तविक प्रक्रिया uniquely identify करता
है ताकि primary key

Feature	Primary Key (PK)	Unique Key (UK)
Purpose	Uniquely identifies each row (main identifier)	Ensures uniqueness of a column/columns (alternate identifier)
Uniqueness	<input checked="" type="checkbox"/> All values must be unique	<input checked="" type="checkbox"/> All non-NULL values must be unique
NULL Values Allowed?	<input checked="" type="checkbox"/> No — must be NOT NULL	<input checked="" type="checkbox"/> Yes — multiple NULLs allowed (in MySQL, PostgreSQL, SQL Server) ⚠ Oracle: only one NULL allowed
Number per Table	<input checked="" type="checkbox"/> Exactly one	<input checked="" type="checkbox"/> Multiple allowed
Index Type	<input checked="" type="checkbox"/> Automatically created (Often clustered by default)	<input checked="" type="checkbox"/> Automatically created (Usually non-clustered)
Can Be Composite?	<input checked="" type="checkbox"/> Yes (e.g., (OrderID, ProductID))	<input checked="" type="checkbox"/> Yes
Used as Foreign Key Target?	<input checked="" type="checkbox"/> Yes (most common)	<input checked="" type="checkbox"/> Yes (possible, but less common)
Modifiable/Updatable?	⚠ Avoid changing — breaks referential integrity	<input checked="" type="checkbox"/> Can be updated (if no FK depends on it)
Example SQL	PRIMARY KEY (id)	UNIQUE (email) or CONSTRAINT uk_email UNIQUE (email)

A **Foreign Key (FK)** is a column (or set of columns) in one table that references the **Primary Key** (or a **Unique Key**) of another table — establishing a **relationship** between the two tables.

A **candidate key** is a column, or a set of columns, in a database table that could *potentially* serve as the unique identifier for every row in that table.

→ एक टेबल में candidate key select करना एक key जैसा है Alternate Key भी हो सकता है

The Relationship to **Primary Key**

Once you have identified all possible candidate keys, the database designer selects one of them to be the official **primary key** for the table. The primary key is the one used by the database system to establish relationships and index the data by default.

Any candidate keys that are *not* chosen as the primary key are typically implemented as **unique keys** (which maintain uniqueness but might allow one NULL value, depending on the specific database system).

→ Candidate key is a selecting process of a primary key. एक primary key select करना एक candidate key select करने का है।

Three Conditions of a Candidate Key

#	Condition	What It Means	Why It Matters
1	Uniqueness	The set of columns must uniquely identify every row in the table — no two rows can have the same values for all columns in the set.	Ensures each record can be distinguished.
2	Minimality (Irreducibility)	No proper subset of the set should be unique. That is, if you remove <i>any one column</i> , uniqueness is lost.	Eliminates redundancy — keeps the key as small as possible.
3	Non-nullability	Every attribute in the set must be NOT NULL (i.e., every row must have a value for all columns in the key).	Guarantees <i>every</i> row can be identified — no "missing" IDs.

Example:

Candidate Key: {StudentID, CourseCode, Semester}

Let's test it:

StudentID	CourseCode	Semester	Full Key (S,C,Sem)
101	CS101	Fall24	(101, CS101, Fall24) <input checked="" type="checkbox"/>
102	CS101	Fall24	(102, CS101, Fall24) <input checked="" type="checkbox"/>
101	MATH201	Fall24	(101, MATH201, Fall24) <input checked="" type="checkbox"/>
101	CS101	Spring25	(101, CS101, Spring25) <input checked="" type="checkbox"/>

All 4 combinations are unique → this set uniquely identifies every row.

if we remove Semester, studentID and the coursecode isn't enough for making combined key,

Remove Semester → Try just {StudentID, CourseCode}

StudentID	CourseCode	→ Combined Key
101	CS101	(101, CS101) <input checked="" type="checkbox"/>
102	CS101	(102, CS101) <input checked="" type="checkbox"/>
101	MATH201	(101, MATH201) <input checked="" type="checkbox"/>
101	CS101	(101, CS101) <input checked="" type="checkbox"/> ← Duplicate! (Row 1 & Row 4)

● Not unique! So {StudentID, CourseCode} is not a candidate key.

- ⇒ A **super key** is any set of attributes (columns) that can uniquely identify a row in a table.
It may contain **extra unnecessary attributes**, unlike a candidate key.
- ⇒ A **super key** is a **superset** of a candidate key that can uniquely identify each record, even if it has additional attributes.

Consider a **Students** table:

RollNo	Email	Name	Phone
101	ali@gmail.com ↗	Ali	0123456789
102	sara@gmail.com ↗	Sara	0987654321

Candidate Keys:

- {RollNo}
 - {Email}
 - {Phone}

Super Keys:

A super key can contain a candidate key plus any extra columns:

- {RollNo}
 - {Email}
 - {Phone}
 - {RollNo, Name}
 - {Email, Phone}
 - {RollNo, Email, Name, Phone}
 - etc.

etc.
not

⚠ Note the Difference

Type	Meaning
Candidate Key	<u>Minimal unique identifier</u>
Super Key	Any unique identifier (may include extra attributes)

Example.

- $\{RollNo\} \rightarrow$ minimal \rightarrow candidate key + super key
 - $\{RollNo, Name\} \rightarrow$ unique but not minimal \rightarrow super key only

✓ Summary

A super key is:

- Unique
 - Can have extra attributes
 - Includes all candidate keys
 - Candidate key is the *minimal* form of a super key