

Presented by:

Sharon Dodda

Sanchita Jain

Varun Hande

## ## Database Keys

This article explains the following database keys: **\*\*Primary Key\*\***, **\*\*Unique Key\*\***, **\*\*Foreign Key\*\***

Keys play an essential role in the relational database. It 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.

**\*\*Primary Key\*\*:** A primary key is a key that can uniquely identify every record in a database table. The primary key contains unique values. It will not accept duplicate or null values. There can be only one primary key in a table.

The screenshot shows a database management interface with a SQL editor window. The code creates a 'student' table with columns: first\_name (primary key), last\_name, id, phone\_number, and email\_address. It then inserts five rows of data. The last insert fails because the 'first\_name' 'Kevin' appears twice, which violates the primary key constraint. The error message is: "Error occurred in: insert into student values ('Varun', 'Hande', 'USF001', 4151234567, 'varun@usfca.edu'), ('Sanchita', 'Jain', 'USF002', 4151234576, 'sanchita@usfca.edu'), ('Sharon', 'Dodda', 'USF003', 4151234675, 'sharon@usfca.edu'), ('Kevin', 'Kimmel', 'USF004', 4151235674, 'kevinkim@usfca.edu'), ('Kevin', 'Yang', 'USF005', 4151245673, 'kevinyang@usfca.edu'); -- fails because 'Kevin' is repeated; PK must have unique values".

```
-- PRIMARY KEY -- Scenario 1: assign first_name as primary key -- create student table with the following columns
create table student (
    first_name varchar(50) primary key,
    last_name varchar(50),
    id varchar(50),
    phone_number bigint,
    email_address varchar(100)
);

-- insert values into student table
insert into student values
('Varun', 'Hande', 'USF001', 4151234567, 'varun@usfca.edu'),
('Sanchita', 'Jain', 'USF002', 4151234576, 'sanchita@usfca.edu'),
('Sharon', 'Dodda', 'USF003', 4151234675, 'sharon@usfca.edu'),
('Kevin', 'Kimmel', 'USF004', 4151235674, 'kevinkim@usfca.edu'),
('Kevin', 'Yang', 'USF005', 4151245673, 'kevinyang@usfca.edu'); -- fails because 'Kevin' is repeated; PK must have unique values

-- show content | Error
Error occurred in: insert into student values ('Varun', 'Hande', 'USF001', 4151234567, 'varun@usfca.edu'), ('Sanchita', 'Jain', 'USF002', 4151234576, 'sanchita@usfca.edu'), ('Sharon', 'Dodda', 'USF003', 4151234675, 'sharon@usfca.edu'), ('Kevin', 'Kimmel', 'USF004', 4151235674, 'kevinkim@usfca.edu'), ('Kevin', 'Yang', 'USF005', 4151245673, 'kevinyang@usfca.edu');
Error: ERROR: duplicate key value violates unique constraint "student_pkey"
Detail: Key (first_name)=(Kevin) already exists.
SQLState: 23505
ErrorCode: 0
```

Connect to: My Local DB Active Session: 1 - My Local DB (postgres) ...

Aliases Divers Recent Aliases

Objects SQL

```
-- show contents of student table select * from student;
-- Scenario 2: assign id as primary key
-- create student table with the following columns and 'id' as the primary key
create table student (
    first_name varchar(50),
    last_name varchar(50),
    id varchar(50) primary key,
    phone_number bigint,
    email_address varchar(100)
);

-- insert values into student table
insert into student values
('Varun', 'Hande', 'USF001', 4151234567, 'varun@usfca.edu'),
('Sanchita', 'Jain', 'USF002', 4151234576, 'sanchita@usfca.edu'),
('Sharon', 'Dodd', 'USF003', 4151234675, 'sharon@usfca.edu'),
('Kevin', 'Kimmel', 'USF004', 4151234574, 'kevinkim@usfca.edu'),
('Kevin', 'Yang', 'USF005', 4151245673, 'kevinyang@usfca.edu');
```

-- show content

Rows 5; -- show contents of student table select \* from student;

first_name	last_name	id	phone_number	email_address
Varun	Hande	USF001	4151234567	varun@usfca.edu
Sanchita	Jain	USF002	4151234576	sanchita@usfca.edu
Sharon	Dodd	USF003	4151234675	sharon@usfca.edu
Kevin	Kimmel	USF004	4151234574	kevinkim@usfca.edu
Kevin	Yang	USF005	4151245673	kevinyang@usfca.edu

5 Row(s) Inserted  
Query 1 of 1, Rows read: 0, Elapsed time (seconds) – Total: 0.002, SQL query: 0.002, Reading results: 0  
Query 1 of 1, Rows read: 5, Elapsed time (seconds) – Total: 0.018, SQL query: 0.001, Reading results: 0.018

Logs: Errors 0, Warnings 0, Infos 11 40 of 50 MB 2:51:38 PM PDT

**\*\*Unique Key\*\*:** A unique key refers to a column/a set of columns that identify every record uniquely in a table. All the values in this key would have to be unique. Remember that a unique key is different from a primary key. It is because it is only capable of having null values. A primary key, on the other hand, cannot have a null value.

Connect to: My Local DB Active Session: 1 - My Local DB (postgres) ...

-- show contents of student table select \* from student;

```
try inserting null value in primary key column
insert into student values ('Akul', 'Bajaj', null, 4151223007, 'akul@usfca.edu');
```

Error occurred in: insert into student values ('Akul', 'Bajaj', null, 4151223007, 'akul@usfca.edu')

Error: ERROR: null value in column "id" of relation "student" violates not-null constraint  
 Detail: Failing row contains (Akul, Bajaj, null, 4151223007, akul@usfca.edu).  
 SQLState: 23502  
 ErrorCode: 0

/My Local DB Query connection pool size = 0, pool inactive Current schema: public Logs: Errors 0, Warnings 0, Infos 11 37 of 50 MB 2:51:55 PM PDT

Detail: Failing row contains (Akul, Bajaj, null, 4151223007, akul@usfca.edu).  
 SQLState: 23502  
 ErrorCode: 0

Connect to: My Local DB Active Session: 1 - My Local DB (postgres) ...

-- show contents of student table select \* from student;

```
-- UNIQUE KEY
-- create student table with the following columns
create table student (
    first_name varchar(50),
    last_name varchar(50),
    id varchar(50) primary key,
    phone_number bigint unique,
    email_address varchar(100) unique
);
-- insert values into student table
insert into student values
('Varun', 'Hande', 'USF001', 4151234567, 'varun@usfca.edu'),
('Sanchita', 'Jain', 'USF002', 4151234576, 'sanchita@usfca.edu'),
('Sharon', 'Doddha', 'USF003', 4151234675, 'sharon@usfca.edu'),
('Kevin', 'Kimmel', 'USF004', 4151235674, 'kevinkim@usfca.edu'),
('Kevin', 'Yang', 'USF005', 4151245673, 'kevinyang@usfca.edu');
```

-- show content select \* from student;

Rows 5; select \* from student;

first_name	last_name	id	phone_number	email_address
Varun	Hande	USF001	4151234567	varun@usfca.edu
Sanchita	Jain	USF002	4151234576	sanchita@usfca.edu
Sharon	Doddha	USF003	4151234675	sharon@usfca.edu
Kevin	Kimmel	USF004	4151235674	kevinkim@usfca.edu
Kevin	Yang	USF005	4151245673	kevinyang@usfca.edu

/My Local DB Query connection pool size = 0, pool inactive Current schema: public Logs: Errors 0, Warnings 0, Infos 11 40 of 52 MB 2:55:59 PM PDT

5 Row(s) Inserted  
 Query 1 of 1, Rows read: 0, Elapsed time (seconds) - Total: 0.003, SQL query: 0.003, Reading results: 0.004

SQuirreLSQL File Drivers Aliases Plugins Session Windows Help

SQuirreLSQL Client Version 4.4.0 / User directory: -userdir /Users/varunhande/.squirrel-sql

Connect to: My Local DB Active Session: 1 - My Local DB (postgres) ...

Aliases Drivers Recent Aliases

Objects SQL

```
select * from msds610;
insert into msds610 values ('USF001',1,'A', 'varun@usfca.edu');
('USF002',1,'A', 'sanchita@usfca.edu'),
('USF003',1,'A', 'sharon@usfca.edu'),
('USF004',1,'A', 'kevinkim@usfca.edu'),
('USF005',1,'A', 'kevinyang@usfca.edu');

insert into msds610 values ('USF007',1,'A', 'akul@usfca.edu');

insert into msds610 values ('USF006',1,'A', 'akul@usfca.edu');

-- show contents of msds610 table
select * from msds610;
```

Rows 6; select \* from msds610;

id	section	gr...	email
USF001	1	A	varun@usfca.edu
USF002	1	A	sanchita@usfca.edu
USF003	1	A	sharon@usfca.edu
USF004	1	A	kevinkim@usfca.edu
USF005	1	A	kevinyang@usfca.edu
USF006	1	A	akul@usfca.edu

/My Local DB

Query connection pool size = 0, pool inactive Current schema: public 113,1 / 3703

1 Row(s) Inserted

Query 1 of 1, Rows read: 0, Elapsed time (seconds) - Total: 0.003, SQL query: 0.003, Reading results: 0

Logs: Errors 0, Warnings 0, Infos 11 35 of 80 MB 4:27:43 pm GMT-07:00

SQuirreLSQL File Drivers Aliases Plugins Session Windows Help

SQuirreLSQL Client Version 4.4.0 / User directory: -userdir /Users/varunhande/.squirrel-sql

Connect to: My Local DB Active Session: 1 - My Local DB (postgres) ...

Aliases Drivers Recent Aliases

Objects SQL

```
create table msds610 ( id varchar(50) REFERENCES student(id), section int, grade varchar(5), email varchar(50));
drop table student;
-- show contents of student table
select * from student;

-- MSDS610 TABLE
-- create msds610 table with the following columns
create table msds610 (
    id varchar(50) REFERENCES student(id),
    section int,
    grade varchar(5),
    email varchar(50)
);

--drop table msds610;
-- insert values into msds610 table

insert into msds610 values
('USF001',1,'A', 'varun@usfca.edu');

select * from s
```

Rows 6; select \* from student

first_name	last_name	id	phone_number	email_a
Sharon	Dodda	USF003	4151234675	sharon@usfca.edu
Kevin	Kimmel	USF004	4151235674	kevinkim@usfca.edu
Kevin	Yang	USF005	4151245673	kevinyang@usfca.edu
Akul	Bajaj	USF006	<null>	akul@usfca.edu

/My Local DB

Query 1 of 1, Rows read: 6, Elapsed time (seconds) - Total: 0.015, SQL query: 0.003, Reading results: 0.012

Logs: Errors 0, Warnings 0, Infos 11 52 of 80 MB 4:26:28 pm GMT-07:00

Connect to: My Local DB Active Session: 1 - My Local DB (postgres) ...

Aliases Drivers Recent Aliases

Objects SQL

```
select * from student;
-- Unique Key can also take null values
-- create student table with the following columns
create table student (
    first_name varchar(50),
    last_name varchar(50),
    id varchar(50),
    phone_number bigint unique,
    email_address varchar(100) unique
);

insert into student values
('Varun', 'Hande', 'USF001', 4151234567, 'varun@usfca.edu'),
('Sanchita', 'Jain', 'USF002', 4151234576, 'sanchita@usfca.edu'),
('Sharon', 'Dodata', 'USF003', 4151234675, 'sharon@usfca.edu'),
('Kevin', 'Kimmel', 'USF004', 4151235674, 'kevinkim@usfca.edu'),
('Kevin', 'Yang', 'USF005', 4151245673, 'kevinyang@usfca.edu');

insert into student values ('Akul', 'Bajaj', 'USF006', null, 'akul@usfca.edu');

-- show content select * from s select * from s
```

Rows 6; select \* from student;

first_name	last_name	id	phone_number	email_address
Varun	Hande	USF001	4151234567	varun@usfca.edu
Sanchita	Jain	USF002	4151234576	sanchita@usfca.edu
Sharon	Dodata	USF003	4151234675	sharon@usfca.edu
Kevin	Kimmel	USF004	4151235674	kevinkim@usfca.edu
Kevin	Yang	USF005	4151245673	kevinyang@usfca.edu
Akul	Bajaj	USF006	<null>	akul@usfca.edu

/My Local DB Query connection pool size = 0, pool inactive Current schema: public 116,80 / 3131

1 Row(s) Inserted  
Query 1 of 1, Rows read: 0, Elapsed time (seconds) - Total: 0.002, SQL query: 0.002, Reading results: 0  
Query 1 of 1, Rows read: 6, Elapsed time (seconds) - Total: 0.003, SQL query: 0.003, Reading results: 0

Logs: Errors 0, Warnings 0, Infos 11 34 of 52 1B 2:56:38 PM PDT

**\*\*Foreign Keys\*\*:** Foreign keys are the column of the table used to point to the primary key of another table.

App SQuirreLSQL File Drivers Aliases Plugins Session Windows Help SQuirreL SQL Client Version 4.4.0 / User directory: -userdir /Users/varunhande/.squirrel-sql

Connect to: My Local DB Active Session: 1 - My Local DB (postgres) ...

Aliases Drivers Recent Aliases

Objects SQL

```
create table msds610 (id varchar(50) REFERENCES student(id), section int, grade varchar(5), email varchar(50));

drop table student;
-- show contents of student table
select * from student;

-- MSDS610 TABLE
-- create msds610 table with the following columns
create table msds610 (
    id varchar(50) REFERENCES student(id),
    section int,
    grade varchar(5),
    email varchar(50)
);

--drop table msds610;
-- insert values into msds601 table

insert into msds610 values
( 'USF001',1,'A', 'varun@usfca.edu');

select * from s
```

Rows 6; select \* from student;

first_name	last_name	id	phone_number	email_address
Ghoni	Dodata	USF003	4151234675	sharon@usfca.edu
Kevin	Kimmel	USF004	4151235674	kevinkim@usfca.edu
Kevin	Yang	USF005	4151245673	kevinyang@usfca.edu
Akul	Bajaj	USF006	<null>	akul@usfca.edu

/My Local DB Query connection pool size = 0, pool inactive Current schema: public 96,1 / 3349

Query 1 of 1, Rows read: 6, Elapsed time (seconds) - Total: 0.015, SQL query: 0.003, Reading results: 0.012  
Query 1 of 1, Rows read: 0, Elapsed time (seconds) - Total: 0.006, SQL query: 0.006, Reading results: 0

Logs: Errors 0, Warnings 0, Infos 11 52 of 80 1B 4:26:28 pm GMT-07:00

SQuirreL SQL Client Version 4.4.0 / User directory: -userdir /Users/varunhande/.squirrel-sql

Connect to: My Local DB Active Session: 1 - My Local DB (postgres) ...

Aliases Drivers Recent Aliases

Objects SQL

```
select * from msds610;

insert into msds610 values
('USF001',1,'A', 'varun@usfca.edu'),
('USF002',1,'A', 'sanchita@usfca.edu'),
('USF003',1,'A', 'sharon@usfca.edu'),
('USF004',1,'A', 'kevinkim@usfca.edu'),
('USF005',1,'A', 'kevinyang@usfca.edu');

insert into msds610 values ('USF007',1,'A', 'akul@usfca.edu');

insert into msds610 values ('USF006',1,'A', 'akul@usfca.edu');

-- show contents of msds601 table
```

select \* from s select \* from m

Rows 5; select \* from msds610;

id	section	gr...	email
USF001	1	A	varun@usfca.edu
USF002	1	A	sanchita@usfca.edu
USF003	1	A	sharon@usfca.edu
USF004	1	A	kevinkim@usfca.edu
USF005	1	A	kevinyang@usfca.edu

/My Local DB Query connection pool size = 0, pool inactive Current schema: public 101,1 / 3411

5 Row(s) Inserted  
Query 1 of 1, Rows read: 0. Elapsed time (seconds) – Total: 0.004, SQL query: 0.004. Reading results: 0  
Query 2 of 1, Rows read: 5. Elapsed time (seconds) – Total: 0.009, SQL query: 0.003. Reading results: 0.008

Logs: Errors 0, Warnings 0, Infos 11 43 of 80 MB 4:27:10 pm GMT-07:00

SQuirreL SQL Client Version 4.4.0 / User directory: -userdir /Users/varunhande/.squirrel-sql

Connect to: My Local DB Active Session: 1 - My Local DB (postgres) ...

Aliases Drivers Recent Aliases

Objects SQL

```
select * from msds610;

insert into msds610 values
('USF001',1,'A', 'varun@usfca.edu'),
('USF002',1,'A', 'sanchita@usfca.edu'),
('USF003',1,'A', 'sharon@usfca.edu'),
('USF004',1,'A', 'kevinkim@usfca.edu'),
('USF005',1,'A', 'kevinyang@usfca.edu');

insert into msds610 values ('USF007',1,'A', 'akul@usfca.edu');

insert into msds610 values ('USF006',1,'A', 'akul@usfca.edu');

-- show contents of msds601 table
```

select \* from s select \* from m Error

Error occurred in: insert into msds610 values ('USF007',1,'A', 'akul@usfca.edu')  
Error: ERROR: insert or update on table "msds610" violates foreign key constraint "msds610\_id\_fkey"  
Detail: Key (id)=(USF007) is not present in table "student".  
SQLState: 23503  
ErrorCode: 0

/My Local DB Query connection pool size = 0, pool inactive Current schema: public 111,1 / 3639

Detail: Key (id)=(USF007) is not present in table "student".  
SQLState: 23503  
ErrorCode: 0

Logs: Errors 0, Warnings 0, Infos 11 43 of 80 MB 4:27:22 pm GMT-07:00

SQuirreL SQL Client Version 4.4.0 / User directory: -userdir /Users/varunhande/.squirrel-sql

Connect to: My Local DB Active Session: 1 - My Local DB (postgres) ...

Session Windows Help

Objects SQL

```
select * from msds610;
insert into msds610 values
('USF001',1,'A', 'varun@usfca.edu'),
('USF002',1,'A', 'sanchita@usfca.edu'),
('USF003',1,'A', 'sharon@usfca.edu'),
('USF004',1,'A', 'kevinkim@usfca.edu'),
('USF005',1,'A', 'kevinyang@usfca.edu');

insert into msds610 values ('USF007',1,'A', 'akul@usfca.edu');

insert into msds610 values ('USF006',1,'A', 'akul@usfca.edu');

-- show contents of msds601 table
select * from msds610;
```

Rows 6; select \* from msds610;

id	section	gr...	email
USF001	1	A	varun@usfca.edu
USF002	1	A	sanchita@usfca.edu
USF003	1	A	sharon@usfca.edu
USF004	1	A	kevinkim@usfca.edu
USF005	1	A	kevinyang@usfca.edu
USF006	1	A	akul@usfca.edu

Selected Rows: 1, Cols: 0 Position: Row: 1, Col: 1

/My Local DB Query connection pool size = 0, pool inactive Current schema: public 113,1 / 3703

1 Row(s) Inserted  
Query 1 of 1, Rows read: 0, Elapsed time (seconds) - Total: 0.003, SQL query: 0.003, Reading results: 0  
Query 1 of 1, Rows read: 0, Elapsed time (seconds) - Total: 0.003, SQL query: 0.003, Reading results: 0

Logs: Errors 0, Warnings 0, Infos 11 35 of 80 MB 4:27:43 pm GMT-07:00