

Keys in a Database

- Super Key, Primary Key and Candidate Key
 - A super key is any combination of fields which is unique.
Consider the table students with the following data:-

Students

The RollNo is unique and cannot be repeated.

RollNo	Name	Age	Course
1	Himanshu	35	MBBS
2	Himanshu	35	MBBS
3	Ashish	15	MD

Now, just concatenate the fields and write down:-

1,Himanshu,35,MBBS

2,Himanshu,35,MBBS

3,Ashish,15,MD

All the three rows are different. Even in the case of the two students each named Himanshu with the same data, the rows are still different.

Now, the Primary Key is defined as unique and not null. For this table the combination (RollNo, Name, Age, Course) satisfies both these criteria and therefore can be made the Primary Key. However, the part that is unique is the RollNo and the combination only becomes unique because it is concatenated with the RollNo.

Therefore, in reality only the RollNo should be made the Primary Key. This gives another definition for the Primary Key:- A Primary Key is the minimum Super Key.

We can also state that any row from any table having an unique column will always constitute a Super Key if concatenated.

Example:-

Create table Student(RollNo int primary key,Name varchar(50),Age int,Course varchar(50))

User: SYSTEM

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```
Create table Student(RollNo int primary key,Name varchar(50),Age int,Course varchar(50))
```

Results Explain Describe Saved SQL History

Table created.

0.78 seconds

☒ Autocommit Display

Insert into Student values(1,'Himanshu',35,'MBBS')

Results

Explain

Describe

Saved SQL

History

1 row(s) inserted.

0.01 seconds

☒ Autocommit Display

Insert into Student values(1,'New Himanshu',34,'MD')

Results

Explain

Describe

Saved SQL

History

ORA-00001: unique constraint (SYSTEM.SYS_C004628) violated

0.14 seconds

☒ Autocommit Display 10

Insert into Student values (NULL, 'New Himanshu', 34, 'MD')

Results

Explain

Describe

Saved SQL

History

ORA-01400: cannot insert NULL into ("SYSTEM"."STUDENT"."ROLLNO")

0.00 seconds

Thus we see that the Database is enforcing the unique and not null rule.

Composite Primary Key

In certain tables the primary key is a combination of fields and not a single field. Considering the last table once again, we might have a situation where roll numbers are given course wise, and therefore we can have a rollno 1 in MBBS and also rollno in MD. There cannot be the same rollno in the same course.

Create table Student(RollNo int, Name varchar(50), Age int, Course varchar(50), Primary Key(RollNo, Course))

☒ Autocommit Display 10

Create table Student (RollNo int, Name varchar(50), Age int, Course varchar(50), Primary Key(RollNo, Course))

Results

Explain

Describe

Saved SQL

History

Table created.

0.01 seconds

Now, we have inserted the following data:-

☒ Autocommit Display 10 ▼

select * from Student

Results Explain Describe Saved SQL History

ROLLNO	NAME	AGE	COURSE
1	Himanshu	34	MD
1	Himanshu	34	MBBS

2 rows returned in 0.10 seconds [CSV Export](#)

RollNo 1 is allowed once in both the courses. If we try another insertion into MBBS with rollno 1 it is denied.

Insert into Student values(1,'Himanshu',34,'MBBS')

Results Explain Describe Saved SQL History

ORA-00001: unique constraint (SYSTEM.SYS_C004629) violated

0.00 seconds

The same will happen for MD.

```
Insert into Student values(NULL,'Himanshu',34,'MBBS')
```

Results Explain Describe Saved SQL History

ORA-01400: cannot insert NULL into ("SYSTEM"."STUDENT"."ROLLNO")

0.00 seconds

☒ Autocommit Display 10

```
Insert into Student values(101,'Himanshu',34,NULL)
```

Results Explain Describe Saved SQL History

ORA-01400: cannot insert NULL into ("SYSTEM"."STUDENT"."COURSE")

0.00 seconds

Candidate Key

Often, a table will have more than one combination which is unique. Since only one combination can be declared as the Primary Key the others are Candidate Keys. A Candidate Key is a possible Primary Key. These are marked using Unique.

Consider the following table:-

Ticket

TicketNo, PNRNo, PassengerName, TrainNo, DateofJourney, CoachNo, BerthNo.

The unique combinations are

1) TicketNo

- 2) PNRNo
- 3) TrainNo, DateofJourney, CoachNo, BerthNo

Suppose that we make the TicketNo the Primary Key, then the others will be Candidate Keys.

create table ticket(TicketNo varchar(50) primary key,PNRNo varchar(50) unique,PassengerName varchar(50),DateofJourney date,TrainNo varchar(50),CoachNo varchar(50),BerthNo int,unique(DateofJourney,TrainNo,CoachNo,BerthNo))

TICKETNO	PNRNO	PASSENGERNAME	DATEOFJOURNEY	TRAINNO	COACHNO	BERTHNO
1	1	Ashish	01-JAN-13	1	S1	1

1 rows returned in 0.02 seconds

[CSV Export](#)

```
insert into ticket values('1','11','New Ashish','1-Jan-2013','1','S2','1')
```

Results Explain Describe Saved SQL History

ORA-00001: unique constraint (SYSTEM.SYS_C004630) violated

The TicketNo Primary Key is violated.

```
insert into ticket values('11','1','New Ashish','1-Jan-2013','1','S2','1')
```

Results Explain Describe Saved SQL History

ORA-00001: unique constraint (SYSTEM.SYS_C004631) violated

0.02 seconds

In this case the PNRNo unique key is violated.

☒ Autocommit Display

insert into ticket values('11','11','New Ashish','1-Jan-2013','1','S1','1')

Results Explain Describe Saved SQL History

ORA-00001: unique constraint (SYSTEM.SYS_C004632) violated

0.00 seconds

In this case the TrainNo, DateofJourney, CoachNo, BerthNo unique key is violated.

☒ Autocommit Display

insert into ticket values('11','11','New Ashish','1-Jan-2013','1','S2','1')

Results Explain Describe Saved SQL History

1 row(s) inserted.

0.00 seconds

☒ Autocommit
 Display 10

```
select * from ticket
```

Results
[Explain](#)
[Describe](#)
[Saved SQL](#)
[History](#)

TICKETNO	PNRNO	PASSENGERNAME	DATEOFJOURNEY	TRAINNO	COACHNO	BERTHNO
1	1	Ashish	01-JAN-13	1	S1	1
11	11	New Ashish	01-JAN-13	1	S2	1

2 rows returned in 0.00 seconds
 [CSV Export](#)

Foreign Key

Consider the following situation. A publishing company maintains a list of publications and a list of subscribers. The following are the tables.

Publications

PublicationName

Subscribers

PublicationName, CustomerId

PublicationName in the Publications table has to be a primary key. In the Subscribers table PublicationName, CustomerId make a composite Primary Key.

Create table Publications(PublicationName varchar(100) primary key)

**Create table Subscribers(PublicationName varchar(100),CustomerId varchar(100),
Primary Key(PublicationName,CustomerId))**

```
select * from publications|
```

Results Explain Describe Saved SQL History

PUBLICATIONNAME
Yuva Bharati
Vivekananda Kendra Patrika

2 rows returned in 0.02 seconds

[CSV Export](#)

```
insert into subscribers values('Vivekananda Kendra Patrika','Manish')
select * from subscribers|
```

Results Explain Describe Saved SQL History

PUBLICATIONNAME	CUSTOMERID
Yuva Bharati	Ashish
Vivekananda Kendra Patrika	Manish

2 rows returned in 0.00 seconds

[CSV Export](#)

Now, what happens if we attempt to insert a record like this.

☒ Autocommit Display

```
insert into subscribers values('Vivekananda Patrika','Mahesh')
```

[Results](#) [Explain](#) [Describe](#) [Saved SQL](#) [History](#)

1 row(s) inserted.

0.00 seconds

☒ Autocommit Display 10

select * from subscribers

Results

Explain

Describe

Saved SQL

History

PUBLICATIONNAME	CUSTOMERID
Yuva Bharati	Ashish
Vivekananda Kendra Patrika	Manish
Vivekananda Patrika	Mahesh

3 rows returned in 0.00 seconds [CSV Export](#)

Mahesh gets a subscription to a non existent publication. The foreign key is designed to prevent this particular problem.

To enforce this we will create the subscribers table again.

Create table Subscribers(PublicationName varchar(100) references Publications(PublicationName),CustomerId varchar(100), Primary Key(PublicationName,CustomerId))

☒ Autocommit Display

```
insert into subscribers values('Yuva Bharati','Ashish')
```

Results Explain Describe Saved SQL History

1 row(s) inserted.

0.00 seconds

☒ Autocommit Display

insert into subscribers values('Vivekananda Kendra Patrika','Manish')

Results

Explain

Describe

Saved SQL

History

1 row(s) inserted.

0.00 seconds

☒ Autocommit Display

insert into subscribers values('Vivekananda Patrika','Mahesh')

Results

Explain

Describe

Saved SQL

History

ORA-02291: integrity constraint (SYSTEM.SYS_C004636) violated - parent key not found

0.01 seconds

This insertion fails because there is no Publication by that name.

The database will deny all possible methods by which a child record without a

parent record can be created. The data in the tables :-

```
select * from publications
```

Results Explain Describe Saved SQL History

PUBLICATIONNAME
Yuva Bharati
Vivekananda Kendra Patrika

2 rows returned in 0.00 seconds

CSV Export

☒ Autocommit Display

```
select * from subscribers
```

Results Explain Describe Saved SQL History

PUBLICATIONNAME	CUSTOMERID
Yuva Bharati	Ashish
Vivekananda Kendra Patrika	Manish

2 rows returned in 0.00 seconds [CSV Export](#)

☒ Autocommit Display

```
insert into subscribers values('Vivekananda Patrika','Mahesh')
```

Results Explain Describe Saved SQL History

ORA-02291: integrity constraint (SYSTEM.SYS_C004636) violated - parent key not found

0.00 seconds

☒ Autocommit Display 10

update subscribers set PublicationName='XYZ'

Results Explain Describe Saved SQL History

ORA-02291: integrity constraint (SYSTEM.SYS_C004636) violated - parent key not found

0.03 seconds

☒ Autocommit Display 10

update publications set PublicationName='XYZ' where PublicationName='Yuva Bharati'

Results Explain Describe Saved SQL History

ORA-02292: integrity constraint (SYSTEM.SYS_C004636) violated - child record found

0.00 seconds

☒ Autocommit Display 10

delete from publications where PublicationName='Yuva Bharati'

Results Explain Describe Saved SQL History

ORA-02292: integrity constraint (SYSTEM.SYS_C004636) violated - child record found

0.00 seconds

☒ Autocommit Display 10

drop table publications

Results

Explain

Describe

Saved SQL

History

ORA-02449: unique/primary keys in table referenced by foreign keys

0.02 seconds

The fields in the two tables must have exactly the same data type including the size.
The names are not important. The parent key must be unique or a primary key.