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Keys and SQL: Part I

Complete Course on Database Management System

Vishvadeep Gothi • Lesson 5 • June 23, 2023

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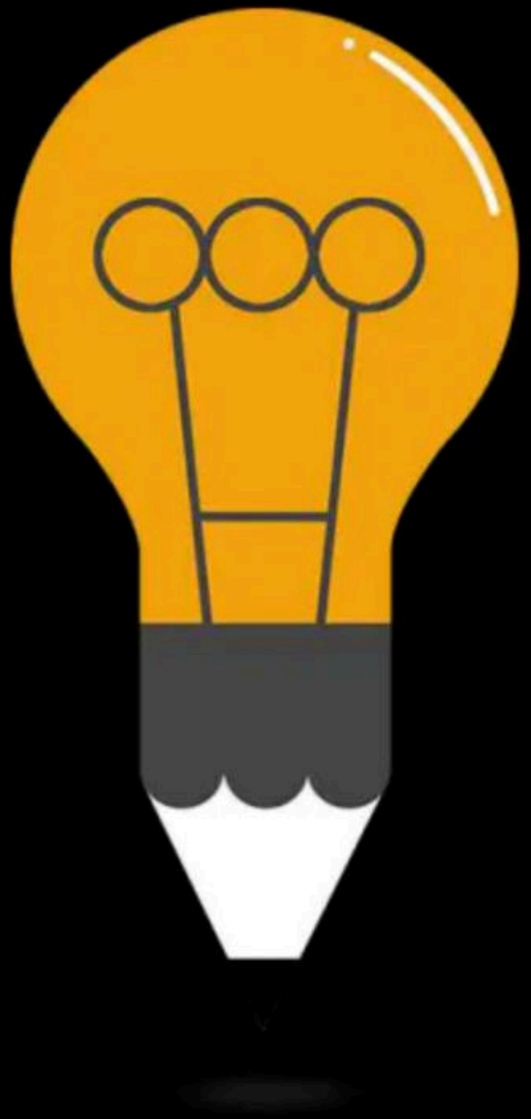

DBMS
Relational Modeling

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Relational Model

The relational model uses a collection of tables to represent both data and the relationships among those data

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Relation (Table)

The main construct for representing data in the relational model is a relation, which is table.

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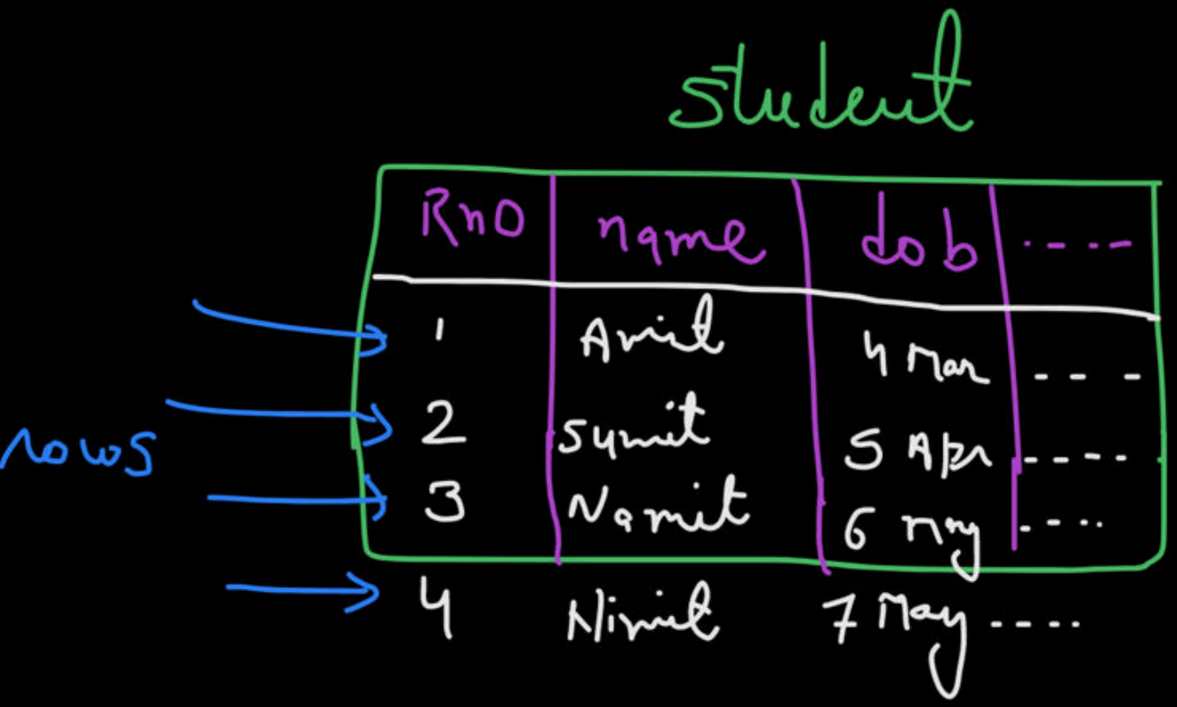
Attribute / column / field

Attributes are used to describe relations

Or

Columns of relations are attributes



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Tuple Or Record / row

A row in a relation

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Relation Example

The account relation with unordered tuples

account

account-number	*branch-name*	*balance*
A-101	Downtown	500
A-215	Mianus	700
A-102	Perryridge	400
A-305	Round Hill	350
A-201	Brighton	900
A-222	Redwood	700
A-217	Brighton	750

Database Schema

Logical design of database

Tool used

Ex:- e-Commerce DB

Shirts

Sid	Sname	Size	Color	Price

Pants

Pid	Pname	color	.....

.....

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Database Instance

Snapshot of the data in the database at a given instant in time

ex :-

Account

Ac_no	branch	Balance
1	B1	5000
2	B2	6000
3	B1	8000
4	B1	4000
5		

Account

Domain

Ac-no => ____

branch => ____

Balance => ____

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Domain

A unique set of values permitted for an attribute

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Domain Constraint

Specifies an important condition that we want each instance of relation to satisfy

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Degree or Arity

Number of attributes in relation

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Cardinality

Number of tuples in a relation

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Relational Database

A relational database is a collection of relations

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Keys

An attribute or set of attributes whose values can uniquely identify a tuple in a relation

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Rno	name	fathername	dob
1	Amit	Naresh	1 Jan
2	Sumit	Naresh	1 Jan
3	Ankit	Suresh	2 Dec
4	Neha	Mahesh	5 Nov
5	Riya	Rakesh	5 Nov
6	Neha	Ram	5 Nov

key ⇒ rno

name fname

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Keys

1. Super Key
2. Candidate Key
3. Primary Key
4. Alternate Key
5. Foreign Key

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Super key

All possible keys of a relation

ex:- rno,

name fname,

rno name,

rno fname,

rno dob,

rno name fname,

rno fname dob,

rno name fname dob,

name fname dob

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Candidate key

minimal super key

or

A super key whose proper subset is not key

exc:- sno,

name fname

Prime attributes :-

Attributes of candidate keys

Ex:-

Relation ⇒ R

Attributes ⇒ A, B, C, D, E, F

Candidate key ⇒ ABC

A
B
C
AB
AC
BC

} not keys

ABCD ⇒ ?

↳ super key but not c. key

Ques) $R(A, B, C, D, E, F)$

only one c.k. $\Rightarrow$ ACD

Total no. of super keys = ?

Ans = 8

ACD

B, E, F

$\Downarrow$

Power set $\Rightarrow 2^3$ elements

$\{\phi, B, E, F, BE, BF, EF, BEF\}$

S.k. $\begin{cases} ACD \\ ACDB \\ ACDE \\ ACDF \\ ACDBE \\ \vdots \end{cases}$

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Primary key

chosen c.key for implementatn

ex:-

c.keys => rno
name fname

Primary key => rno

Alternate key

all other candidate keys apart from primary key

ex:-

name fname

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Foreign key

Branch

Branch_id	Branch_name
B1	MG Road
B2	Indira nagar
B3	New road

Account

AC_no.	Branch_id	Amount
1	B1	5000
2	B2	7000
3	B1	9000
4	~~B4~~	5000

Branch => attribute Branch_id => P.k.

Account => Attribute Branch_id => foreign_key

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Referential Integrity

we wish to ensure that a value that appears in one relation for a given set of attributes also appears for a certain set of attributes in another relation. This condition is called referential integrity.

Referential Integrity Example

Publisher (PublisherID, PublisherName, PublisherAddress)

Book (ISBN, Title, Revision, PublisherID)

foreign key

I1	T1	1	P1
I2	T2	1	P1

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Foreign Key

The FOREIGN KEY constraint prevents invalid data from being inserted into the foreign key column, because it has to be one of the values contained in the parent table

Foreign key can have NULL.

on update cascade ⇒ if parent table value updated then automatically foreign key values are also updated accordingly.

on delete cascade ⇒

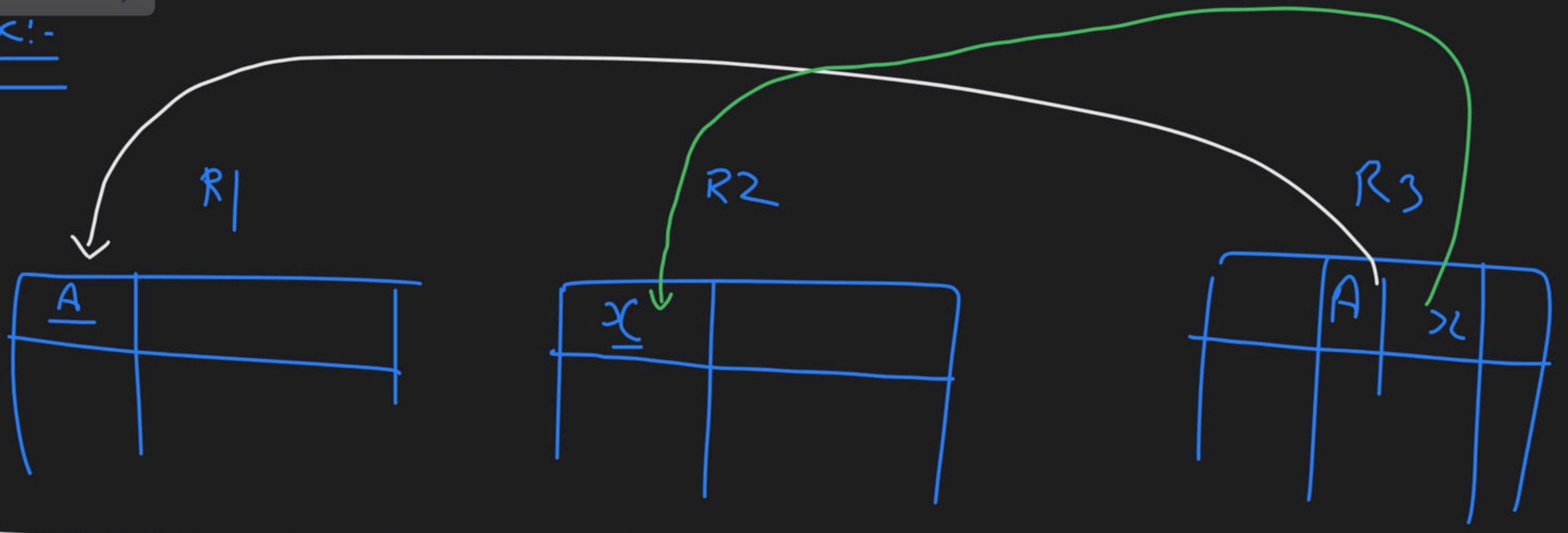
Branch

Bid	Bname
B1	ABC
B2	XYZ
~~B3~~ B6	MNO

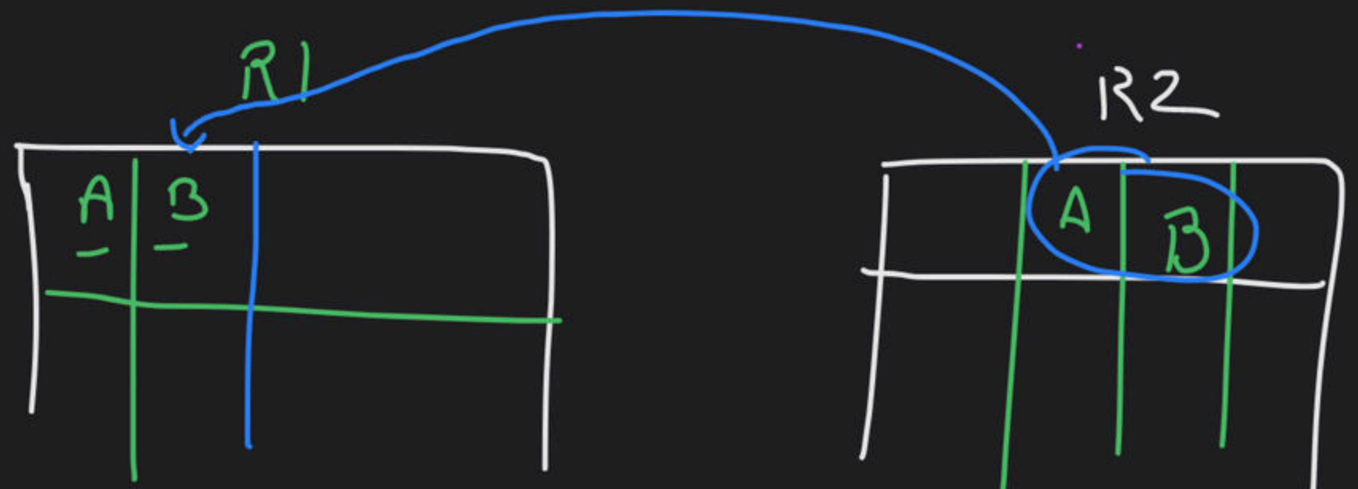
Account

Bid
B1
~~B3~~ B6
B2
~~B3~~ B6

Ex:-



ex:-



on delete cascade ⟶ ✓

—||— No action ✗

—|'— set NULL ⟶ ✓

↳ only foreign key set to NULL

SQL: Structured Query Language

Domain-specific language used in programming and designed for managing data held in a RDBMS

SQL: Structured Query Language

Domain-specific language used in programming and designed for managing data held in a RDBMS

Operations performed using SQL:

Inserting data

Retrieving data

Updating data

Deleting data

And many more ....

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Customers Table

CustomerID	CustomerName	ContactName	Address	City	PostalCode	Country
1	Alfreds Futterkiste	Maria Anders	Obere Str. 57	Berlin	12209	Germany
2	Ana Trujillo Emparedados y helados	Ana Trujillo	Avda. de la Constitución 2222	México D.F.	05021	Mexico
3	Antonio Moreno Taquería	Antonio Moreno	Mataderos 2312	México D.F.	05023	Mexico
4	Around the Horn	Thomas Hardy	120 Hanover Sq.	London	WA1 1DP	UK
5	Berglunds snabbköp	Christina Berglund	Berguvsvägen 8	Luleå	S-958 22	Sweden
6	Blauer See Delikatessen	Hanna Moos	Forsterstr. 57	Mannheim	68306	Germany
7	Blondel père et fils	Frédérique Citeaux	24, place Kléber	Strasbourg	67000	France
8	Bólido Comidas preparadas	Martín Sommer	C/ Araquil, 67	Madrid	28023	Spain

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SQL Datatypes

String

Data Type	Description
CHAR(size)	A FIXED length string (can contain letters, numbers, and special characters). The size parameter specifies the column length in characters - can be from 0 to 255. Default is 1
VARCHAR(size)	A VARIABLE length string (can contain letters, numbers, and special characters). The size parameter specifies the maximum column length in characters - can be from 0 to 65535

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SQL Datatypes

Numeric

Data Type	Description
Bit(size)	A bit-value type. The number of bits per value is specified in size. The size parameter can hold a value from 1 to 64. The default value for size is 1
BOOL	Zero is considered as false, nonzero values are considered as true.
BOOLEAN	Equal to BOOL
INT(Size)	A medium integer. Signed range is from -2147483648 to 2147483647. Unsigned range is from 0 to 4294967295. The size parameter specifies the maximum display width (which is 255)
INTEGER(Size)	Equal to INT(size)

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SQL Datatypes

Numeric

Data Type	Description
BIGINT(size)	A large integer. Signed range is from -9223372036854775808 to 9223372036854775807. Unsigned range is from 0 to 18446744073709551615. The size parameter specifies the maximum display width (which is 255)
FLOAT(size, d)	A floating point number. The total number of digits is specified in size. The number of digits after the decimal point is specified in the d parameter. This syntax is deprecated in MySQL 8.0.17
FLOAT(p)	A floating point number. MySQL uses the p value to determine whether to use FLOAT or DOUBLE for the resulting data type. If p is from 0 to 24, the data type becomes FLOAT(). If p is from 25 to 53, the data type becomes DOUBLE()

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SQL Datatypes

Numeric

Data Type	Description
DOUBLE(size, d)	A normal-size floating point number. The total number of digits is specified in size. The number of digits after the decimal point is specified in the d parameter
DECIMAL(size, d)	An exact fixed-point number. The total number of digits is specified in size. The number of digits after the decimal point is specified in the d parameter. The maximum number for size is 65. The maximum number for d is 30. The default value for size is 10. The default value for d is 0.
DEC(size, d)	Equal to DECIMAL(size,d)

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Case Sensitivity

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Semicolon Mandatory?

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Select Command

Used to retrieve data from one or more tables

Syntax:

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Select Command: All Columns

Select Command: Selected Column

Select Command: Selected Multiple Columns

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Select Command with distinct

Need to be used with select, to fetch only unique values of designated column(s)

Select Command with distinct

```
select distinct Country from Customers
```

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Customers Table

CustomerID	CustomerName	ContactName	Address	City	PostalCode	Country
1	Alfreds Futterkiste	Maria Anders	Obere Str. 57	Berlin	12209	Germany
2	Ana Trujillo Emparedados y helados	Ana Trujillo	Avda. de la Constitución 2222	México D.F.	05021	Mexico
3	Antonio Moreno Taquería	Antonio Moreno	Mataderos 2312	México D.F.	05023	Mexico
4	Around the Horn	Thomas Hardy	120 Hanover Sq.	London	WA1 1DP	UK
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8	Bólido Comidas preparadas	Martín Sommer	C/ Araquil, 67	Madrid	28023	Spain

Select Command with distinct

```
select distinct Country, PostalCode from Customers
```

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Select Command with distinct

select distinct itemp from itemmaster

item	itemp
1	2
2	4
3	*null*
4	*null*

Select Command with distinct

```
select distinct Country, PostalCode from Customers
```

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Select Command with where

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Select Command with where

Used with select, update, delete, insert commands

Used to filter specific rows from table

Select Command with where

Return all such customers' information who live in country Germany

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Select Command with where

Return all such customers' information have their CustomerId 3

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Select Command with where

Return name of the customer who has CustomerId 3

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Select Command with where

Return city and country of customers who have their CustomerId 3

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Select Command with where

Can we use only = with where command?

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Select Command with where

Relational Operators used in where clause:

1. Equal
2. Not Equal
3. Less than
4. Less than or equal to
5. Greater than
6. Greater than or equal to

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OrderDetails Table

OrderDetailID	OrderID	ProductID	Quantity
1	10248	11	12
2	10248	42	10
3	10248	72	5
4	10249	14	9
5	10249	51	40
6	10250	41	10
7	10250	51	35
8	10250	65	15
9	10251	22	6
10	10251	57	15
11	10251	65	20
12	10252	20	40
13	10252	33	25
14	10252	60	40
15	10253	31	20
16	10253	39	42

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Select Command with where

Return all such orders details when quantity is atleast 10

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Select Command with where

Return all such orders details when quantity is greater than 15

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Select Command with where

Return all such orders details when quantity is maximum 10

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Select Command with where

Return all such orders details when quantity is less than 15

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Select Command with where

Return all such orders details when quantity is not 10

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Select Command with where

Logical Operators:

1. AND
2. OR
3. NOT

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OrderDetails Table

OrderDetailID	OrderID	ProductID	Quantity
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2	10248	42	10
3	10248	72	5
4	10249	14	9
5	10249	51	40
6	10250	41	10
7	10250	51	35
8	10250	65	15
9	10251	22	6
10	10251	57	15
11	10251	65	20
12	10252	20	40
13	10252	33	25
14	10252	60	40
15	10253	31	20
16	10253	39	42

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Select Command with where

Select all such orders where quantity is atleast 5 and atmost 30

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Between Operator

Used to filter the records in the specific range

Between LB and UB

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Between Operator

Return all such orders details when quantity is lesser than 10 or greater than 20

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NULL In RDBMS

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NULL In RDBMS

```
SELECT *
FROM itemmaster
WHERE itemp=NULL
```

item	itemp
1	2
2	4
3	*null*
4	*null*

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NULL In RDBMS

```
SELECT *
FROM itemmaster
WHERE itemp is NULL
```

item	itemp
1	2
2	4
3	*null*
4	*null*

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NULL In RDBMS

```
SELECT *
FROM itemmaster
WHERE itemp is NOT NULL
```

item	itemp
1	2
2	4
3	*null*
4	*null*

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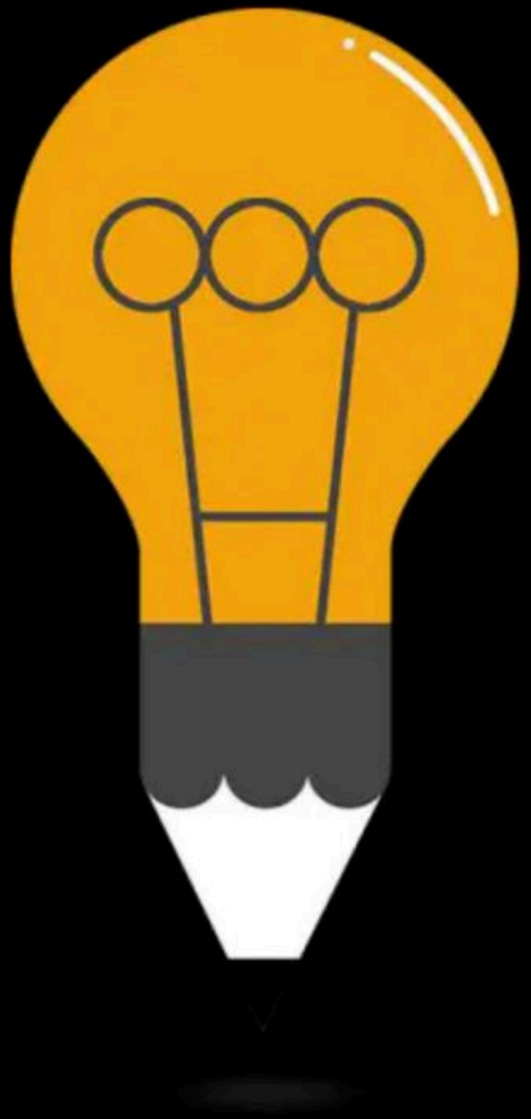

DPP: SQL

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Question

Write query for all below questions on table Customers

1. Select all customers which are from country "Germany“, "Berlin“
2. Fetch that customers’ name, address city, postal code and country who has contact name ‘Yang Wang’
3. Fetch all customers information till customerID 19
4. Fetch all customers information except from Country ‘Germany’, ‘UK’, ‘USA’

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Products Table

ProductID	ProductName	SupplierID	CategoryID	Unit	Price
1	Chais	1	1	10 boxes x 20 bags	18
2	Chang	1	1	24 - 12 oz bottles	19
3	Aniseed Syrup	1	2	12 - 550 ml bottles	10
4	Chef Anton's Cajun Seasoning	2	2	48 - 6 oz jars	22
5	Chef Anton's Gumbo Mix	2	2	36 boxes	21.35
6	Grandma's Boysenberry Spread	3	2	12 - 8 oz jars	25
7	Uncle Bob's Organic Dried Pears	3	7	12 - 1 lb pkgs.	30
8	Northwoods Cranberry Sauce	3	2	12 - 12 oz jars	40
9	Mishi Kobe Niku	4	6	18 - 500 g pkgs.	97
10	Ikura	4	8	12 - 200 ml jars	31
11	Queso Cabrales	5	4	1 kg pkg.	21
12	Queso Manchego La Pastora	5	4	10 - 500 g pkgs.	38
13	Konbu	6	8	2 kg box	6
14	Tofu	6	7	40 - 100 g pkgs.	23.25
15	Genen Shouyu	6	2	24 - 250 ml bottles	15.5

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Question

Write query for all below questions on table Products

1. Select all products which are supplied by suppliers with Id 1 or 2 or 3
2. Fetch the name of all such products which have price in range 5 to 25
3. Find all suppliers who supply the products of category 2?
4. Find all products which are supplied by supplier of ID 2 with price more than 30?
5. Find all products which have price more than 50 but not supplied by supplier with ID 6?
6. Find all products which have price less than 30 but not supplied by supplier with ID 2 or 6?

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Happy Learning.!