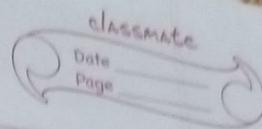


DBMS



DataBase → Group of interrelated Records.

DBMS → Software that manages DataBase

Advantage :

- (I) Control Data Redundancy.
- (II) Easy Maintenance
- (III) Reduce Time (searching)
- (IV) Backup.

SQL → Data is in the form of Table
NoSQL → Data is in Hierarchical fashion / form

ATTRIBUTES (COLUMN)

- (I) Simple Attribute : Can't be divided further

E.g → Age

(II) Composite Attribute → can be further divided

E.g. → Name ⇒ First Name, Last Name

(III) Multi Valued Attribute → That can have multi-value.

E.g. ⇒ Mobile No. ⇒ 9463, 83604

(IV) Derived Attribute → which can be derived from some other attribute

E.g. ⇒ Age ⇒ Derived from D.O.B

(V) KEY Attribute → have unique value
↳ P.K

E.g. ⇒ Roll No..

KEYS IN SQL

Any P&C
classmate
Date _____
Page _____

① Super Key → All the possible combination through which u can uniquely identify.

E.g ⇒ { Roll No., RollNo.Name, RollNo.Age, RollNo.Mobile, RollNo.DOB, Name, ... }
----- Y

② Candidate Key : Subset of Super Key
↳ min to uniquely identify Rar SKs

⇒ { Roll No., Name, Mobile No., Name Age }

③ Primary Key → Subset of C.K
↳ Winner in C.K

E.g → Roll No.

④ Alternate Key : C.K - P.K

→ used to create Relation
b/w Tables

⑥ Foreign Key : Any attribute that is
used as P.K in other Table.

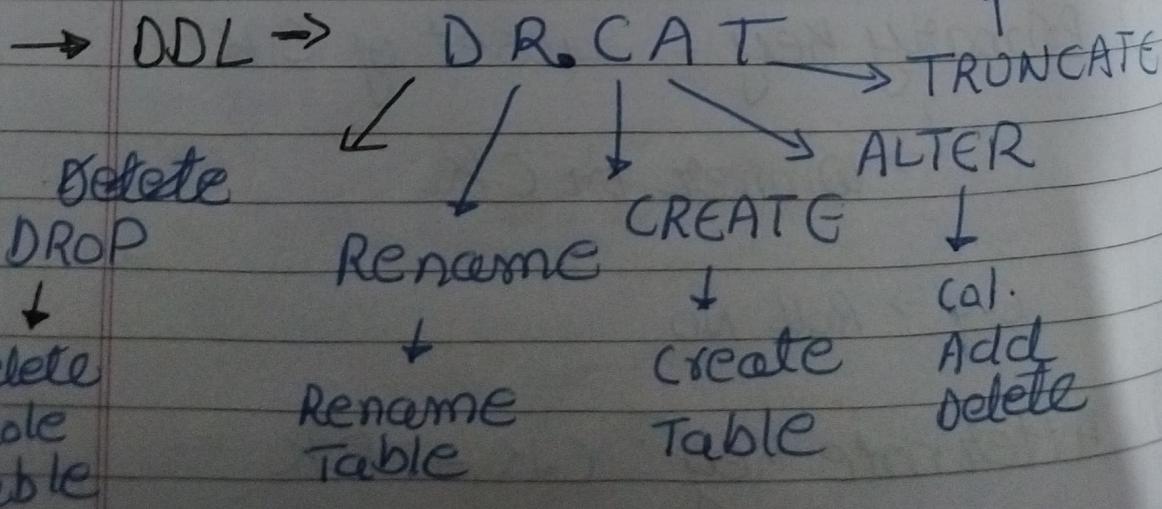
→ Generally that attribute
is also P.K

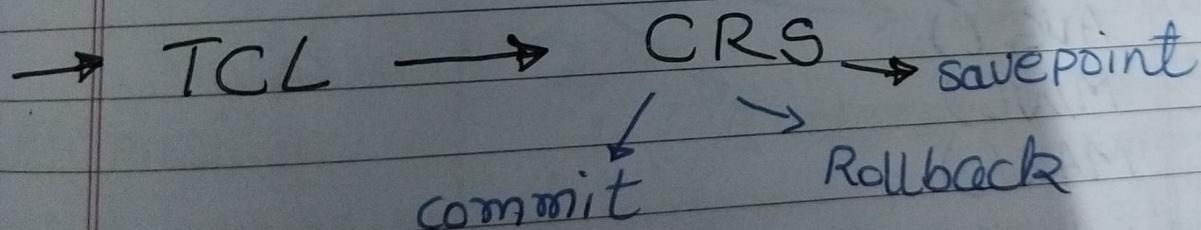
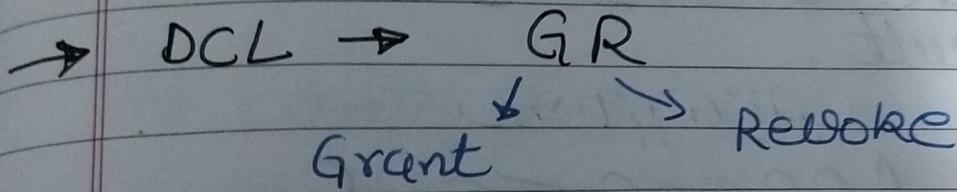
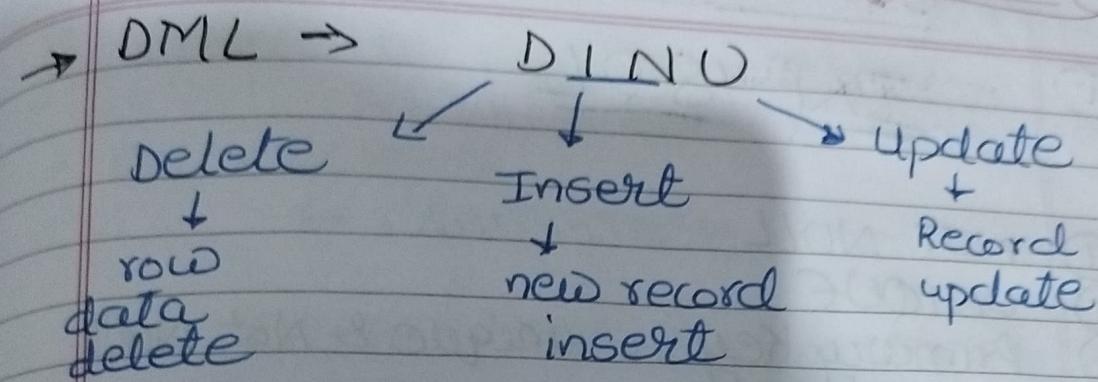
TYPES OF SQL

COMMAND

- ① DDL → Data Definition Language
- ② DML → " Manipulation "
- ③ DCL → " Control " → Access & Denial
- ④ TCL → Transaction "
- ⑤ DQL → Data Query Language
 → select .

data Delete
in Table





CONSTRAINTS (CONDITION)

IN SQL

- (I) NOT NULL
- (II) UNIQUE
- (III) Primary Key \rightarrow unique & Not Null
- (IV) Foreign key -
- (V) Check \rightarrow
- (VI) Default

AGGREGATE FXN

COUNT()

\hookrightarrow Used with Groupby,

SUM()

AVG()

MIN()

MAX()

\hookrightarrow SQL QUERY TO FIND NTH HIGHEST SALARY?

SELECT salary FROM employee ORDER BY salary DESC limit (n-1, 1);
 $(1-1) = 0^{\text{th}}$ place ka hase \leftarrow Kitne

Q create a copy of a Table?

- ONLY SCHEMA

↳ `CREATE TABLE new FROM`

`CREATE TABLE new LIKE old;`

- DATA with Schema

↳ `CREATE TABLE new SELECT * FROM old;`

ACID PROPERTY

Atomicity

Atomic

⇒ Transaction Consistency

Atomic in Nature

Either Done
or Not Done

should be
maintained

if A - 50

Then
 $B + 50$

Durability

↳ After

Trans-

changes

All Trans made

-action

are isolated to DB

prest even if

B Don't interfere

there sys.

each other failure

INTERVIEW ASKED DIFFERENCE

(I) DELETE VIS TRUNCATE VIS DROP

→ Delete one or
more rows
at a time

→ Delete all
the data in
the table

→ Delete
the Table
(str + data)

(II) can do
undo
(Roll Back)

(II) can't be
undo

(II) can't be
undo

(III) DML comm
- and

(III) DDL
Command

(III) DDL comm
- and.

(IV) WHERE VIS HAVING

i) Individual record
apply karne ke
ram

ii) Group of Records
pe condition
lgaane ke ram

(V)

(I)

classmate
Date _____
Page _____

IS DROP

Delete
Table
(+ Data)

can't be
into

comm
d.

IG

Records

on
aam

⑪ GROUP BY

→ Data Grouping

ORDER BY

→ Sort the data

⑫ CHAR(2)

① Fixed length

→ Abb tumhe doh
length ka he
daaln padega

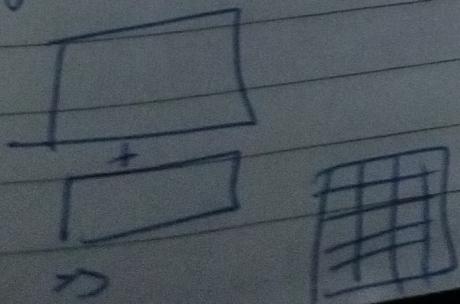
VARCHAR(2)

① Not of fixed
length

→ Can be of 1 or 2
length

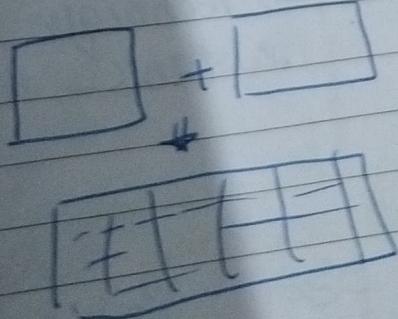
⑬ UNION

① Column wise
join



JOIN

① Row-wise join



(VI)

IN

→ Act as multiple
OR

EXISTS EXISTS

→ True or False
Return

(VII)

UNION

→ Duplicate Data
Not Allowed

UNION ALL

→ Duplicate Data
Allowed

NORMALISATION

↳ Technique to redundancy in a table

↳ reduce

→ Technique to reduce duplication
in table.

Solve

- Anomalies → is Insert Problem
i) Delete
ii) Update

Q Explain Briefly Insert, Delete & Update Anomaly.

① Insert Anomaly: when certain data cannot be inserted into the DB w/o presence of other data.

(Mein data ko add nahi kar pa rha hu kyuki mere paas dusra data nahi hai) → jo were unrelated bi hai

Student ID	S_Name	Course ID	Course Name
1	John	CSE 101	DBMS
2	Alice	CSE 102	Networks

→ You want to add new course (SE103 (Operating System))

→ Now ∵ of that you have to add dummy data in that field i.e.

DBMS Babbu (:-)) ki integrity hurt hui.

UPDATE ANOMOLY

↳ Multiple rows mein ja jaake update karna pdta hai & ek bi ~~one~~ row breh gyi

↳ ACID ki ma bhen hojaye
 ↳ Inconsistency.

S. ID	S. Name	Course ID	Professor
1	Viku	CSE 101	Jyoti
2	Anamul	CSE 103	Anil
3	Kanu	CSE 101	Jyoti
4	Sarthee	CSE 101	Jyoti

--> Professor of CSE 101 is now Renlu

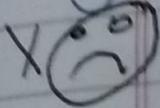
--> One change is required

↳ But we need to do multiple changes

DELETE ANOMOLY

- 2, Arises when deleting a record inadvertently results in loss of important info that should be deleted (other)

St. ID	S. Name	Course ID	Course Name
1	Vikru	CSE 101	O.S
2	Anamu	CSE 101	O.S
3	Kanu	CSE 103	DBMS



- > Deleting student with S.ID 1 or 2 don't effect other info & don't cause Deleting anomaly
- Deleting Kanu will cause deletion anomaly as Course ID & Course Name exist independently but will be lost

NORMALISATION

TYPE

- 1NF → No multivalued Attribute
- 2NF → 1NF & No partial dependency
- 3NF → 2NF & No transitive "
- 4NF
- BCNF → 3NF & LHS of final dependency must be part of Super Key

(A) \rightarrow B

Partial Dependency

Condition : P.K is composite

- ↳ made with two or more column

Partial dependency → When an attribute

(non-prime one) doesn't depends only on
one that is not part of P.K → actually CK

part of P.K it is Partially Dependent

For 2NF, 3NF, BCNF \Rightarrow No Partial dependency

~~Attribute
Dependency~~
" \rightarrow B
~~Partial
be~~

= No multivalued column
= INF + No Partial Dependency
= INF + No Partial Dependency + No Transitive Dependency
= INF + No P.D. + No T.D. + LHS (part of Super Key)

TRANSITIVE DEPENDENCY

↳ When a non-prime attribute can be determined by some other non-prime attribute.

For e.g. if Age & DOB are not P.K \rightarrow actually C.K

↳ Then they have Transitive Dependency as Age can be determined by DOB.

\rightarrow 3NF, BCNF \rightarrow No Transitive Dependency

Eg

S.ID	Subject ID	Exam Name	Total Marks
1	001	ML	100
2	001	CS/2 ADA	150
3	002	CS+ ML	100

non-prime

CLASSmate
non-prime

Determine

BCNF

↳ left part of final dependency
should be part of P.K \Rightarrow actually S.K

Eg ->

StudentID	Subject	Professor
101	Java	P. Java
102	C++	P. CPP
102	Java	P. Java
103	C++	P. C hash
104	C#	P. JAVA

ASSMATE
- prime
tel Markers

100
150
100

4
e

S.K

Professor → Subject
+
non-prime

→ Not Allowed in BCNF.

PATTERN MATCHING (LIKE)

- ① $\cdot^0 \rightarrow$ 0 or more character
- ② $_ \rightarrow$ 1 character

Q Select name of Student whose name start with 'pa'

SELECT name from student WHERE name like "pa%"

Q Select name of student whose " with P & have 3 characters?
like "P--"

INTERVIEW QUESTIONS

- Q1) Advantage of DBMS?
- Data Security
 - Reliability
 - Faster Access Data
 - Data Backup
 - Simplicity
 - CRUD
 - Data Redundancy
 - (↓)

- Q2) Difference between DBMS & RDBMS

DBMS → software for database management

RDBMS → Relational DBMS

DBMS

- ① DBMS stores the data in a flat file format.

RDBMS

- ① Stores data in the form of tables, consisting of rows & columns.

(ii) There is no relationship b/w the data

(iii) Normalization X

(ii) There is relationship b/w tables.

(iii) Normalization Q

Q 3) What is Query Optimization?

→ Finding Best Method for implementing Query.

↳ so, that we can speedup the process of fetching info

Q 4) What is Normalization & its type?

→ Normalization : Process of organizing data in such a way that it reduces data redundancy.

what is Normalization, How its done,
Types.

→ How its done

↳ Done by dividing large tables
into multiple Tables & establish Rela-
tionship b/w them

→ Types

① 1NF → i) No Multivalue Attribute
ii) Every column ~~have unique~~
name

② 2NF → 1NF + No Partial Dependency

③ 3NF → 2NF + No Transitive //
e.g. → Age & DOB

Q5) What is Denormalization? DB
→ Done only on Normalized

Technique to add redundant data
to the table in order to optimize
DB speed across speed.

→ To get rid of JOIN operation as
it will make slow
let's see example.

student Details

S.ID	Name	Age	Sport ID
1	ABC	23	101
2	PQR	17	102

Sports Detail

Sport ID	Sports	Coach
101	Football	XYZ
102	BasketBall	STQ

Student Details

S.ID	Name	Age	Sports	Coach
1	ABC	23	Football	XYZ
2	PQR	17	BasketBall	STQ

Q6)

6)

* Q7:

7>

* Read speed will be increased
But write speed ↓

Q6) Difference b/w P.K & Unique Key?

6) Unique Key → can contain NULL values

* Q7) What are Indexes?
Difference b/w Clustered & Non-Clustered Index

7) → Index → Indexes are specialized data structure used in DB to improve the speed of data retrieval system operations

(optional)
Indexing: Technique that creates

Index (data structure) to quickly locate the desired rows in a table w/o scanning the entire table.

Excela



CLASSMATE

Date
Page

CLASSMATE

Date
Page

Q) Explain Clustered Index & Non-Clustered Index?

→ Clustered index is an index for which the order of rows of the index corresponds to the rows of table.

Q8) What is SQL & where it is used?
↳ Structured Query Language

Used for interacting with DB in order to insert, delete, update the DB

Q9) SubQuery?

Query inside another query.

↳ SubQuery is first executed

Q10) Having & Where difference?

- Where clause filters data by including dual rows whereas Having filter data based on group of data

- Where clause can't be used with aggregate fxn but having clause can

Types of DATABASE (DBMS)

- ① Hierarchical DataBase
 - ② Network DataBase
 - ③ Object oriented DataBase
 - ④ RDBMS
- Diagram illustrating RDBMS:
-
- ```
graph TD; A[Table] --- B[Table]; A --- C[Table]; A --- D[Table]; B --- E[Table]; B --- F[Table];
```
- Diagram illustrating Object-oriented DataBase:
- 
- ```
graph TD; O1((Object)) --> DF1((Data Fxn)); O1 --> DF2((Data Fxn)); O1 --> DF3((Data Fxn));
```

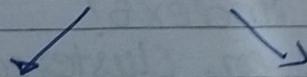
Q1

Q2

Q Explain Index Trade Off?
Ans Select

→ Improves Read / query performance
but can slightly slow down write operations
(Insert, Update, Delete).

- There are Two Column in Index

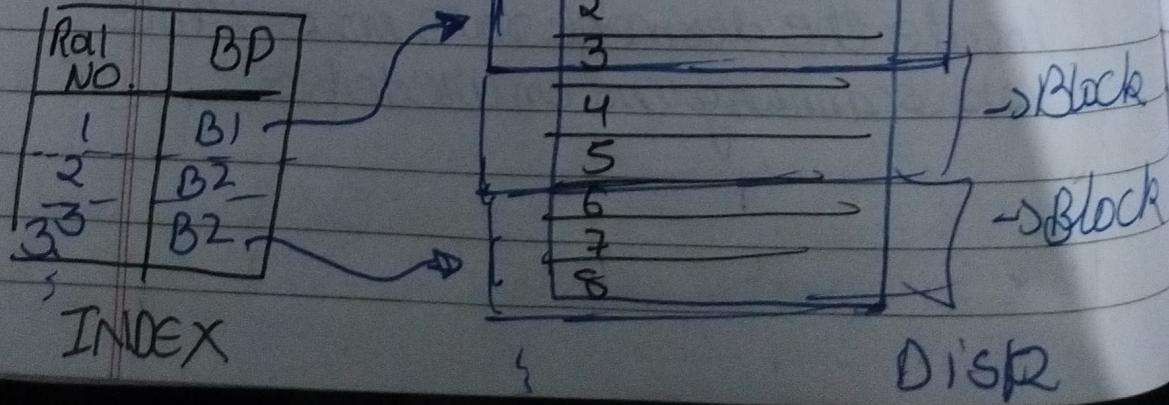


Key Column Pointer Column

METHODS OF INDEXING

★ Data files in Disk are stored in Blocks

Roll No. → P.K



1, 2, 3, ---,

- * Index file is always sorted

Types of INDEXING / METHODS

① Primary Index (Clustering Index)

↳ only applied on Datafile that is sequentially ordered on some search key.

Primary index is an index whose search key (key column) defines the sequential order of file

Dense Index

① The Dense index contains an index record for every search key value in the data file.

3	
4	

Sparse Index

① An index records appear for only some of search-key values

index

1	
55	
77	
99	

* Every Block first
Searches key value stored

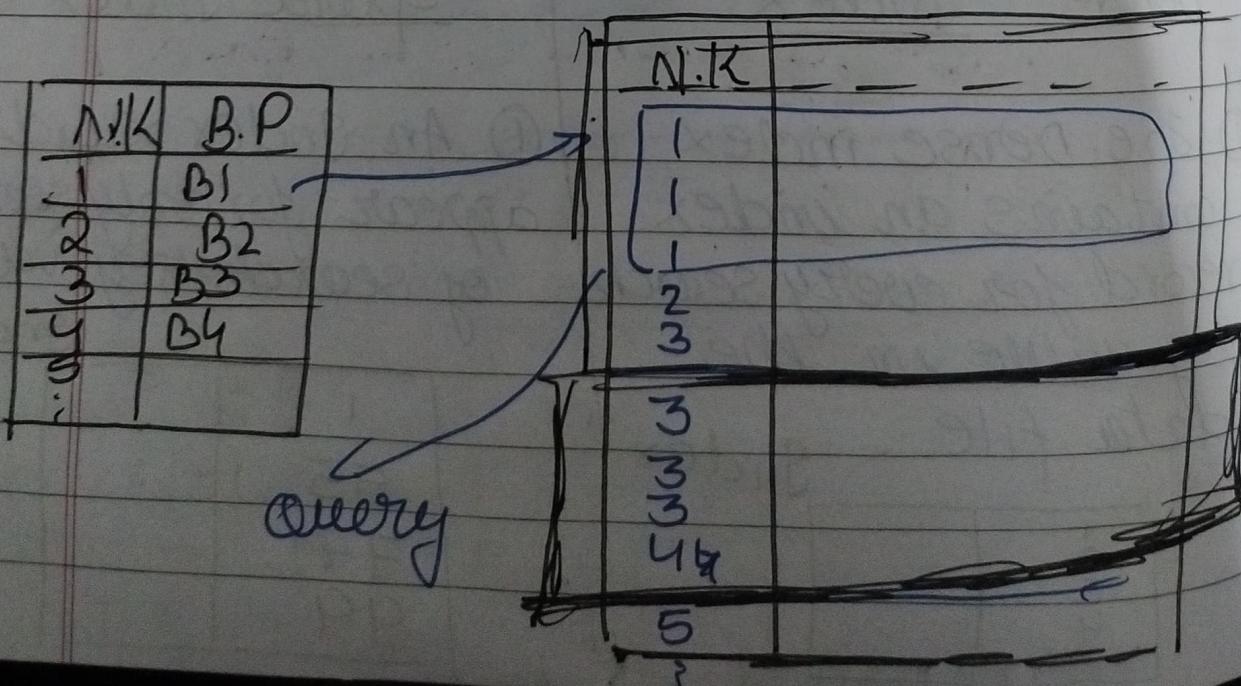
① Based on Key Attribute (Ordering of Datafile Based on some Key Attribute)

↳ Used Sparse Index.

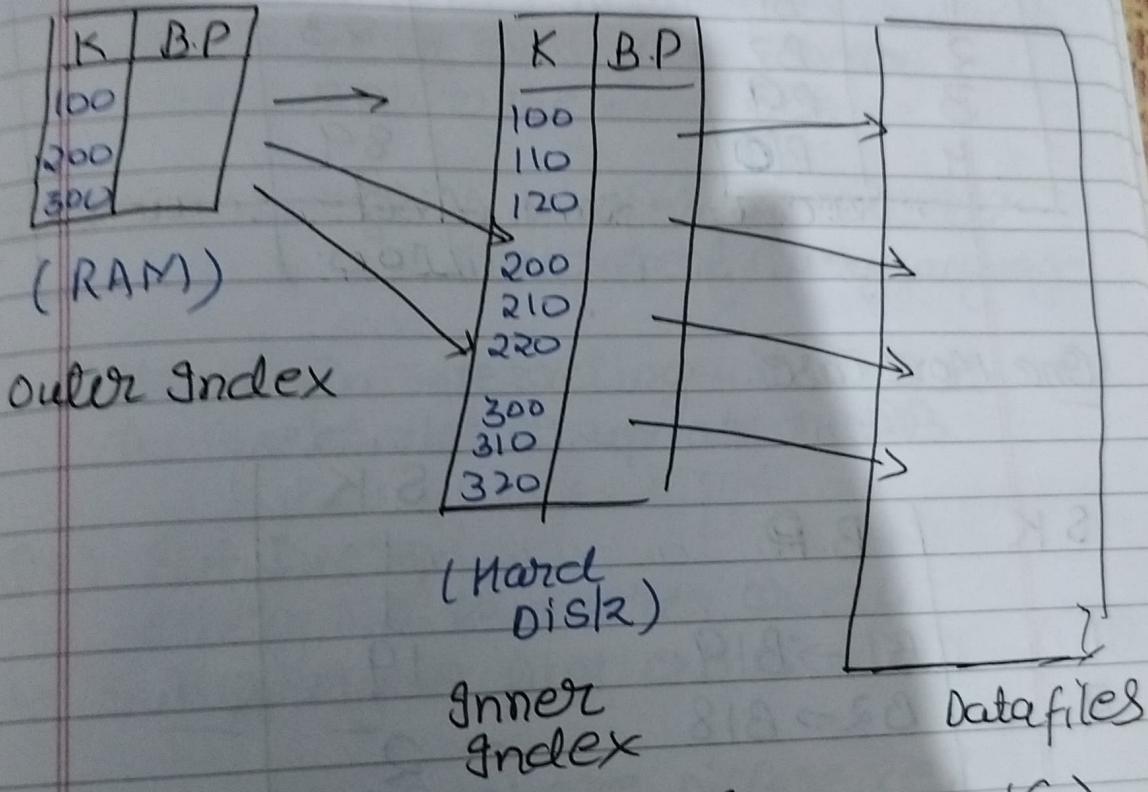
↳ No. of entries in Index = No. of Block

② Based on Non-Key Attribute (Clustering Indexing)

↳ Use Dense Matrix



MULTILEVEL INDEXING



(NON-CLUSTERING INDEXING)
SECONDARY INDEXING

(UNSORTED DATA)

↳ Used dense index
 $= \frac{\text{No. of entries in D.B}}{\text{B}}$

S.K	B.P
1	B1
2	B2
3	B3
4	B4

CLASSMATE
Date _____
Page _____

S.K
1
19
23
92
89
2
8
100

One More Case

S.K	B.P
1	B1 → B19
2	B2 → B18

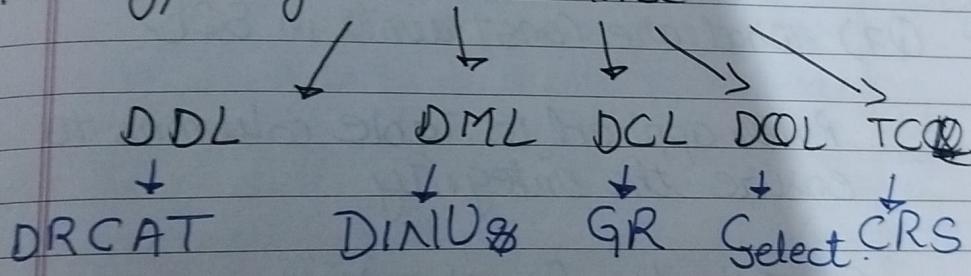
S.K
1
1
19
-
2
89
11
-
8
1
2

SQL INTERVIEW QUESTION

(Q1) What is SQL?

SQL stands for Structured Query language which is used to retrieve data from DB & interact with DB to perform CRUD operation on DB.

(Q2) Types of SQL command.



(Q3) Advantage & Disadvantage of SQL?

(Q4) What is DataBase & how to create DB in SQL?

→ DB => Group of interrelated Records

CREATE DATABASE vikul;

Q5) What is DBMS?
Software that manages the DB

Q6) what are Tables & Fields?
↳ Attribute

→ Tables → collection of related data
organized in rows & columns

→ Fields → column in Table

Q7) What are constraints in SQL?

Rules applied to Table columns to
ensure the integrity

Constraints:

- I Not NULL
- II UNIQUE
- III PRIMARY KEY
- IV FOREIGN KEY
- V CHECK
- VI DEFAULT

Q8) What is Primary Key & Foreign key?

→ Primary Key is a column or combination

of colu
null
recor
row
Foreic
used

Q9) Wh

L
S
T
C

E-g => Mean

Q10) W

→ N

D
f

Q11)

- I
- II
- IV
- V
- VI

classmate
Date _____
Page _____

D.B

ribute
data

to

2 Key?
combination

of columns which is unique & not null & can uniquely identifies each record in Table.

(rows)

→ column

Foreign Key: Any attribute that is used as P.K in other table.

Q9) What is Trigger in SQL?

↳ insert, update, delete

↳ Stored Procedure that automatically triggers executed when a specific event occurs in a database Table

e.g. Main EK Table main Entry Keri Toh Baiki Table mein automatic

Q10) what is Normalization? - ally ho jaye

→ Normalization is technique to reduce Data Redundancy by organizing so that we don't face any anomaly by dividing larger table into smaller Tables

Q11) Scalar Function vs Aggregate Fxn?

- (I) CONCAT()
- (II) LEN()
- (IV) UPPER()
- (V) LOWER()
- (VI) SUBSTRING()
- (VII) TRIM()

- (I) COUNT()
- (II) SUM()
- (III) AVG()
- (IV) MIN()
- (V) MAX()

- where can be used with Select, Update, Delete.
HAVING clause can only be used with Select statement.

E.g

→ Select * from employee where country = 'INDIA'

→ Select count(ID), country from Employee ~~other~~ Group by Country having count(ID) > 4

Q11) DROP, TRUNCATE, DELETE?

Q12) Order of Execution of SQL?

From > Where > Group By > Having

> Select > Order By > Limits

FWGMSO

FRO
> H
OR

Fi
Sc
le

Q13)

i)

ii)

iii)

iv)

v)

vi)

FROM > JOIN > WHERE > GROUP BY
 > HAVING > SELECT > DISTINCT >
 ORDER BY > LIMIT.

* Firse Jeda wahi ghar heiga
 Saale Daaku othe kutt ke
 lege.

(Q13) SQL Assessment Question

- i) $0 / \text{NULL} \Rightarrow \text{NULL}$
- ii) $\text{NULL} / 9 \text{ or } 0 \text{ or } - \Rightarrow \text{NULL}$
- iii) $\text{NULL} / \text{NULL} \Rightarrow \text{NULL}$
- iv) $0 / 9 \Rightarrow 0$
- v) $0 / 0 \Rightarrow \text{Division Error}$
- vi) WHERE column name $\sim \text{NULL}$
 $\sim \text{NOT NULL}$
 $\Leftrightarrow != \text{NULL}$

VII) LIMIT \Rightarrow TOP ke kitne chahye
OFFSET \Rightarrow Top ke jitne mention
hai row vo chodd dega

E.g \Rightarrow LIMIT(5, 2)
Top \downarrow \Rightarrow offset

LIMIT 5 OFFSET 2)

Q1) w
S
la
da
to

Q2)

D

Q3)

Q4)

Q(12) Window Fxn?

Rank, Dense-Rank, Row_number
cluster index & non-clustered index

Q(13) SQL & NoSQL?

→ SQL & DB are relational database
in which data is stored in the form
of table

→ NoSQL DB are non-relational DB
in which data and it handle unstructured data

Q(14) ACID Property?

Atomicity: Transaction is treated
as single atomic unit.

Either all changes are applied or none

Consistency: Consistency should be
maintained means if A-so happens
then B+so happens

Isolation: → Multiple Transaction can
run concurrently w/o interfering each other

Dura
-f
per

Q(15) IN
ma
Lu

Q

Combi

Duration : After Transaction successful, its changes made are permanent even if system fail

Q(15) INNER JOIN → returns only rows with matching values in both tables

LEFT JOIN → returns all rows from left table and right part of left table that's is unmatched have null values

right Join:

FULL JOIN → LEFT JOIN + RIGHT JOIN

SELF JOIN → when a table is joined with itself

↳ When you need to create relationship with own table

Q(16) UNION vs UNION ALL

Combine result while removing duplicate ↓
Combine result while retaining duplicate

Q17) Group By vs Having

↳ Group the column

Group the rows having same value
in specified column.

↳ Having is used to filter Group by

Q18) What is Correlated Subquery?

↳ When subquery depends on the value
of outer query.

Q19) Transaction?

↳ Sequence of one or more operations
performed on D.B that is treated
as single unit of work & it follows
ACID property.

Q20) Concept of View in SQL?

→ A view is a virtual table generated
by a query.

↳ Ek view create kar dena query ka
so, baar baar query na lekhna the

Create view Aditya as
↳ select from

usecase
→

Select * from Aditya

y

Q ONLY TOPIC LEFT IS
TRANSACTION

Q SQL v/s MySQL?

↳ Query language used to perform
CRUD operation

MySQL → Software used to store, manage
D.B.

Q Difference in char & varchar

Pastor ↗ Slower

↓ ↗ variable
Fixed length datatype length datatype

Eg → char(10)

↳ Data = "ABC" its of 3 byte
but it will still occupy 10 bytes

- * it will pad the remaining spaces

varchar \Rightarrow varchar(10)

\hookrightarrow Data = "ABC" \Rightarrow 3 bytes

\hookrightarrow only take 3 bytes

SQL

\rightarrow ① SELECT * from this ;

② WHERE \exists Having

=
 \downarrow
used to filter
rows from Table based
on Specific Condition

\hookrightarrow used to filter
rows from the
Group.