

# Computer Science & IT

## Database Management System

Relational Model & Normal Forms

Lecture No. 01



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# Topics to be Covered



- Topic** Syllabus
- Topic** Introduction to DBMS
- Topic** Relational Database Model
- Topic** Functional dependency



## Topic : Syllabus



- ✓ ➤ Relational Model & Normal Forms
- ✓ ➤ Query Languages
- ✓ ➤ Transactions and concurrency control
- ✓ ➤ File Organization & Indexing
- ✓ ➤ ER model

Not in the  
Syllabus of  
DA Paper.



## Topic : Introduction to DBMS



Database: Database is organized collection of information

Information can be organized in multiple ways, ∵ we have multiple database models.

from GRATE  
Point of view

We will discuss

(i) Relational Model

& (ii) ER Model.

↳ { Relational Model  
ER model

Network Model

Hierarchical Model

Object oriented Model

DBMS: It is the software used to manage & process the database efficiently.

- ④ "File system" can be used to manage and access the database, but file system fails to do the task efficiently if database is too large.
- ⑤ Database files are stored in the non-volatile memory i.e., secondary memory.
- ⑥ Unit of transfer between secondary memory and main memory is "One disk block".

IO Cost :- IO cost of a "record access" can be defined as number of secondary memory disk blocks that needs to be transferred from secondary memory to main memory in order to access that record from the database.

- it is stored in the blocks of the disk

Sid	Sname				
S <sub>1</sub>					
S <sub>100</sub>					
S <sub>150</sub>					
S <sub>4</sub>					
S <sub>227</sub>					
S <sub>15</sub>					
S <sub>225</sub>					
S <sub>3</sub>					
⋮	⋮	⋮	⋮	⋮	⋮
S <sub>2</sub>	S <sub>11</sub>				

Let 'N' blocks of the disk are required to store the file Student.txt

{ B<sub>N</sub>

(Too large)

Student.txt file

other information related to student

- Retrieve record of the student with Sid = S<sub>240</sub>

{ Manually search the record

↓  
It will be time consuming

{ write a program to search within the file

↓  
To write a program we need to know the physical details of the file

{ it is stored in the  
blocks of the disk }

Student.txt file

Sid	Sname	-----
B <sub>1</sub>	S <sub>1</sub> S <sub>100</sub>	
B <sub>2</sub>	S <sub>150</sub>	
B <sub>3</sub>	S <sub>4</sub> S <sub>227</sub>	
B <sub>4</sub>	S <sub>15</sub> S <sub>225</sub>	
S <sub>3</sub>		
:	:	:
:	:	:
S <sub>2</sub>	S <sub>11</sub>	

Let 'N' blocks  
of the disk are  
required to  
store the file  
Student.txt

B<sub>N</sub>

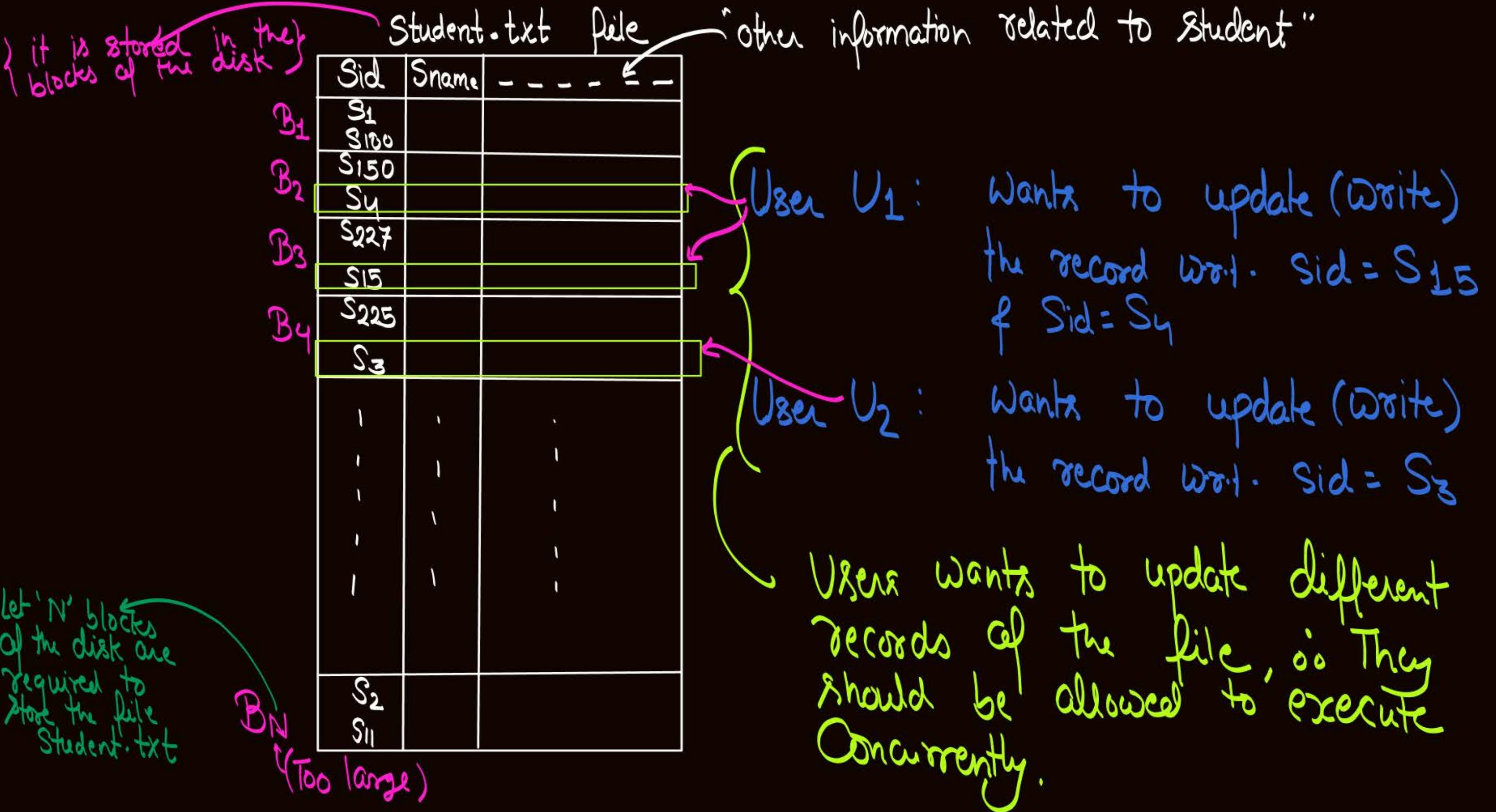
(Too large)

"other information related to Student"

- Retrieve record of the student with Sid = S<sub>240</sub>

Even if we have written a program to search within the file, then we will transfer the blocks of the file from secondary memory to main memory (One-by-one) and we will search for Sid: S<sub>240</sub>.

In worst case we may have to transfer all the blocks of the file from secondary mem. to main memory {High IO wait}



{ it is stored in the blocks of the disk }

Student.txt file

"other information related to Student"

	Sid	Sname	- - -
B <sub>1</sub>	S <sub>1</sub>	S <sub>100</sub>	
B <sub>2</sub>	S <sub>150</sub>		
B <sub>3</sub>	S <sub>4</sub>		
B <sub>4</sub>	S <sub>227</sub>		
	S <sub>15</sub>		
	S <sub>225</sub>		
B <sub>N</sub> (Too large)	S <sub>3</sub>		
	S <sub>2</sub>		
	S <sub>11</sub>		

(W.r.t. File System)

User U<sub>1</sub>

User U<sub>2</sub>

lock (Student.txt)

it will  
be granted ✓ Update (S<sub>15</sub>)

lock (Student.txt)

This request  
will be denied  
because file is  
already locked  
by U<sub>1</sub>

Let 'N' blocks  
of the disk are  
required to  
store the file  
Student.txt

User U<sub>1</sub> & U<sub>2</sub> wants to update  
different records, but still they  
are not allowed to execute them  
concurrently.

∴ Low Concurrency level using File System

## File System vs DBMS :-

### File System

VS

### DBMS

- ① If we want to access the record from the file using a program, then in order to write the program we need to know physical details of the file.

② More IO Cost

③ Low Concurrency:  
{In file system, locking is at file level}

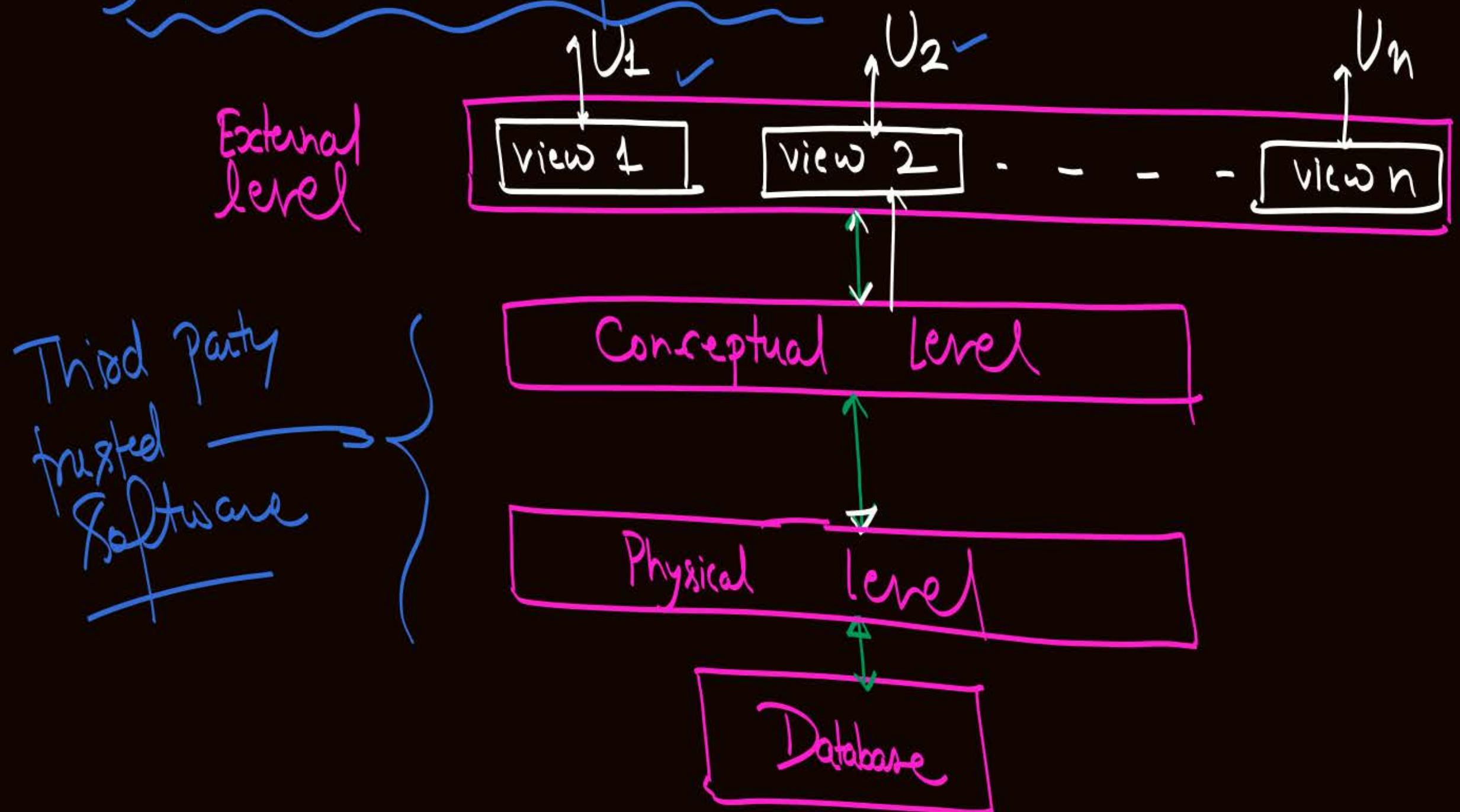
- ① DBMS uses 3-tier architecture.  
3-tier architecture of DBMS Providers,  
→ (i) Data abstraction : {It allows us to hide the Physical details of database from External User}

- (ii) Data independence: {Changes performed at lower level will not affect higher levels}

② Less IO Cost  
{It uses indexing}

③ High Concurrency level:  
{In DBMS, locking is at record level}

## \* 3-tier Architecture of DBMS:-





## 2 mins Summary



Topic

Syllabus

Topic

Introduction to DBMS

Topic

Relational Database Model

Topic

Functional dependency

Next class

# THANK - YOU