Database Management Systems

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Sai University

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Why DBMS?

Store data

Access data

↓

Retrieval

Efficiently

Who needs this?

Company

Any org.

Large

Hospitals

Univs Banks

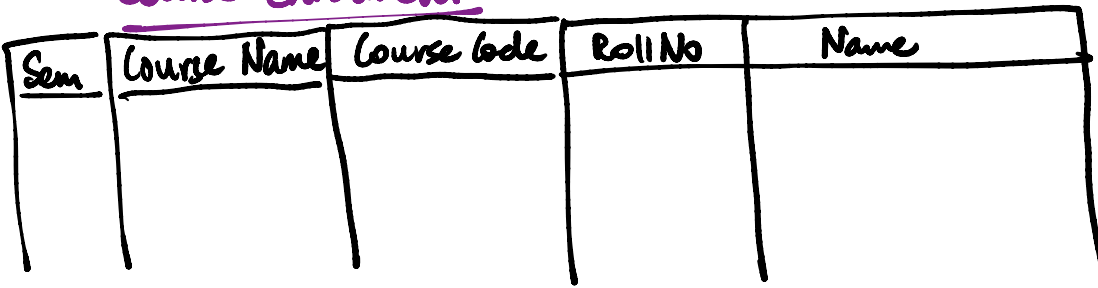
Why DBMS?

University

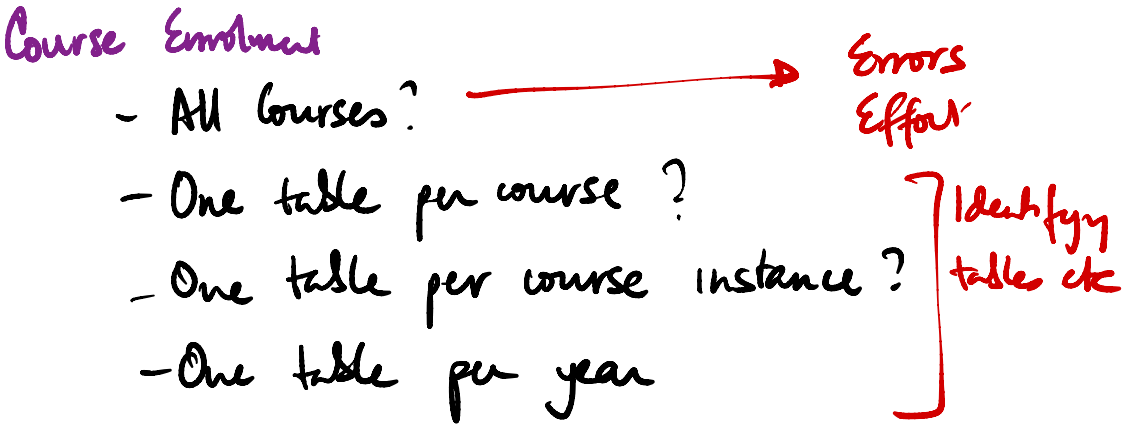
Personnel

Academic data

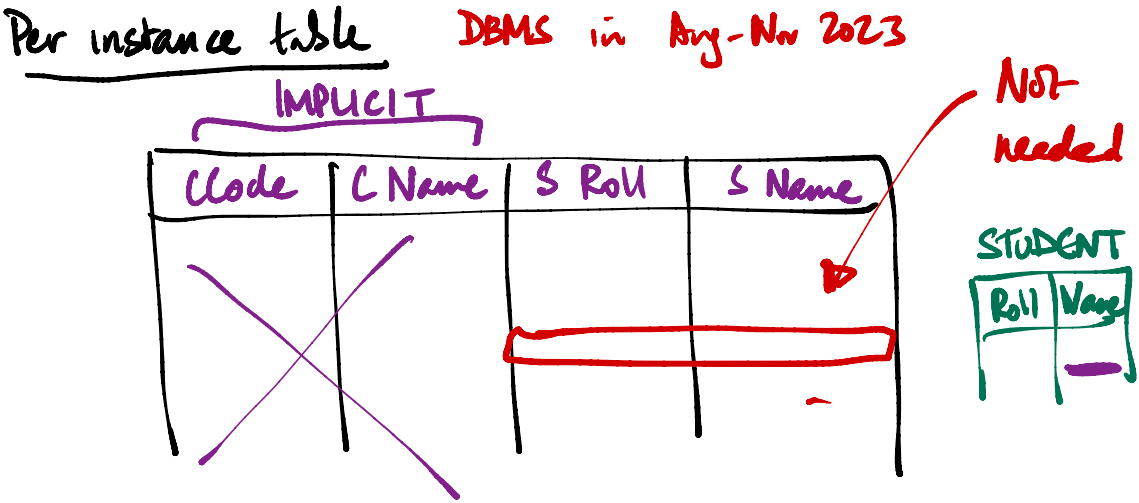
Course Enrolment – "All courses"



Why DBMS?


Course Enrolment
- All Courses?
- One table per course ?
- One table per course instance ?
- One table per year
Errors
Effort
Identifying
table etc

Why DBMS?


Per instance table
DBMS in Aug-Nov 2023
IMPLICIT
CCode
C Name
S Roll
S Name
Not-needed
STUDENT
Roll
Name

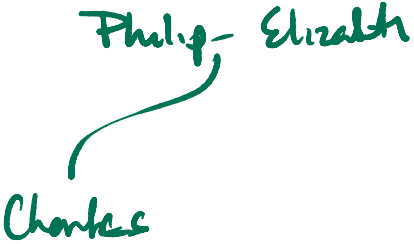
Why DBMS?

Store data coursewise or studentwise,

but NOT BOTH

Organizing the data

Family Tree



Univ.

Prerequisites

Historically ~ 1960s

Custom solutions

Organizing the data

Can we find a "universal" way to store data

Storage is standardized

Querying can be designed independent of individual needs

- Selecting rows & choosing columns

The relational model

E. F. Codd ≈ 1969-70 – Query "language" Relational Algebra

ID	*name*	*dept_name*	*salary*
22222	Einstein	Physics	95000
12121	Wu	Finance	90000
32343	El Said	History	60000
45565	Katz	Comp. Sci.	75000
98345	Kim	Elec. Eng.	80000
76766	Crick	Biology	72000
10101	Srinivasan	Comp. Sci.	65000
58583	Califieri	History	62000
83821	Brandt	Comp. Sci.	92000
15151	Mozart	Music	40000
33456	Gold	Physics	87000
76543	Singh	Finance	80000

dept_name	*building*	*budget*
Comp. Sci.	Taylor	100000
Biology	Watson	90000
Elec. Eng.	Taylor	85000
Music	Packard	80000
Finance	Painter	120000
History	Painter	50000
Physics	Watson	70000

IBM System R project '70s

Prog lang. SQL

Textbooks

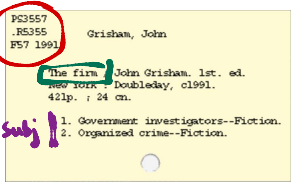
1. Silberchatz, Korth, Sudarshan — 7th ed

2. Garcia-Molina, Ullman, Widom — 2nd ed

Storing information

Indexing information

Indexing information



Index is organized by what you know

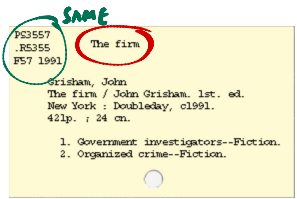
Points to physical location

Indexing information

PG3557
.R5355 Grisham, John
F57 1991

The firm / John Grisham. 1st. ed.
New York : Doubleday, c1991.
421p. ; 24 cm.

1. Government investigators--Fiction.
2. Organized crime--Fiction.



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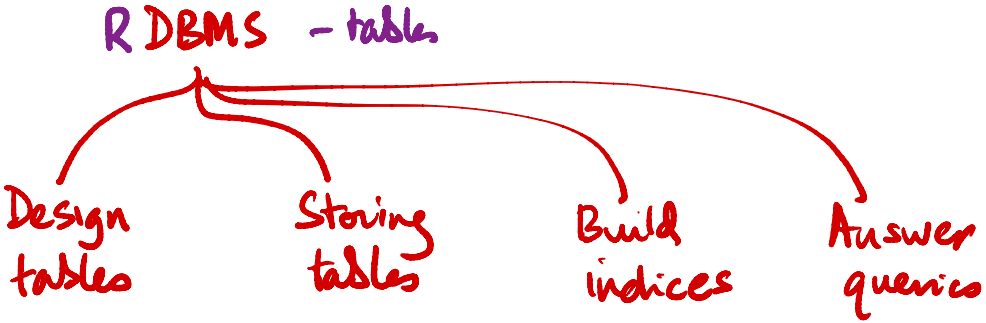
Querying information efficiently

- Find all taxpayers from Chennai with annual income over Rs 5 cr



Querying information efficiently

- Find all taxpayers from Chennai with annual income over Rs 5 cr

2200

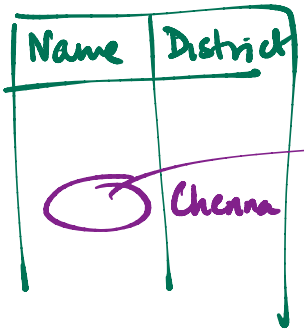
Voter Table for TN

IT database

Table Size

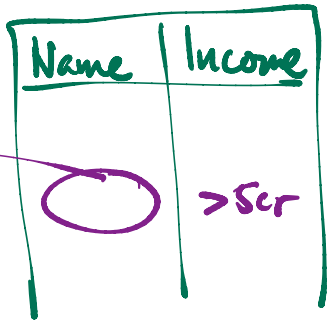
6.2 cr

6×10^7



≈ 8 cr

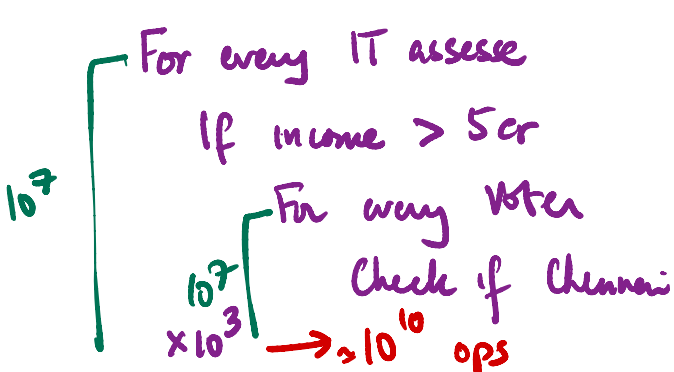
8×10^7

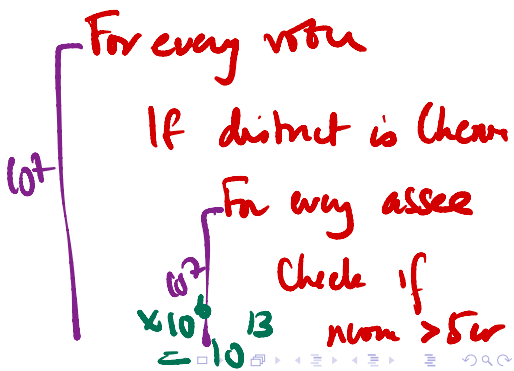


Querying information efficiently

- Find all taxpayers from Chennai with annual income over Rs 5 cr

A typical PC can do $\simeq 10^8$ ops/sec





Querying information efficiently

- Find all taxpayers from Chennai with annual income over Rs 5 cr

First create a table with income > 5cr 2200 10^7

Create table of Chennai vtrs 10^6 10^7

Transactions and concurrency

- Choosing your seat on a flight

2 people looking same seat

1 is moving seat & the other is booking

→ Sequence of updates in one logical operation

Atomicity Consistency Isolation Durability