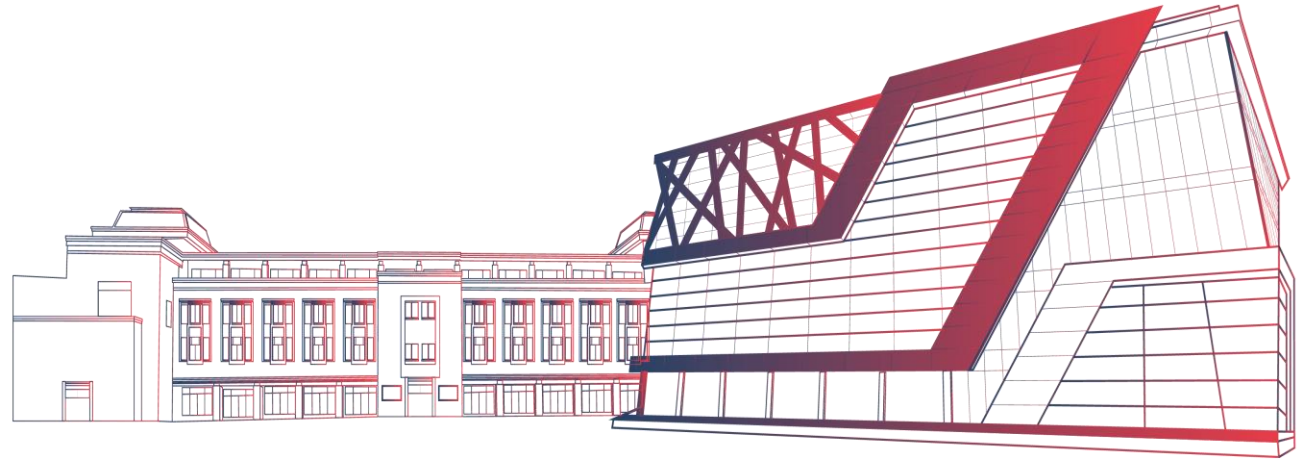


Lecture 1: Database Systems



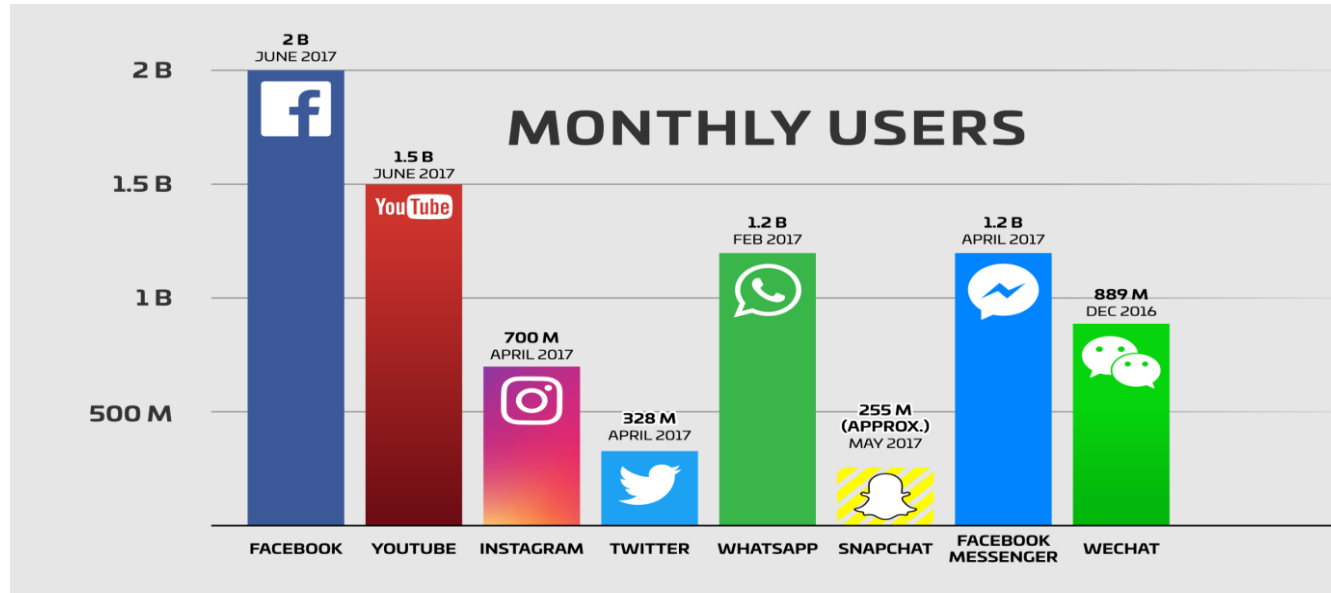
What is Data??

Raw or unorganized facts and figures (such as alphabets, numbers, symbols).

Example:

- **Student Data: Roll No, Name, Mobile, CGPA etc.**
- **Faculty Data: Name, Designation, Email-id, Mobile etc.**
- **User Profiles on Facebook, Twitter etc.**

What can be done with Data



Data → Information

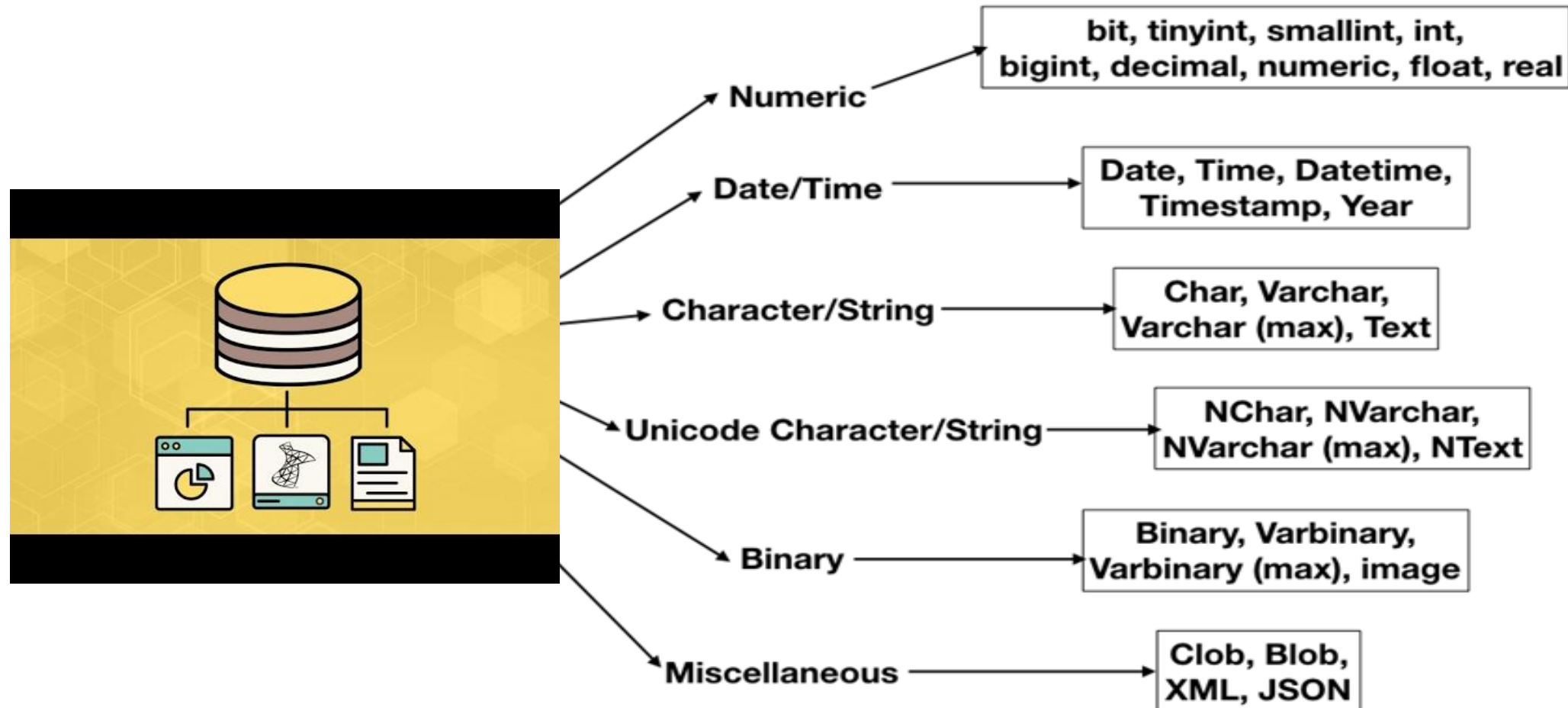
Information → Knowledge

Knowledge → Growth of Business/ Organization

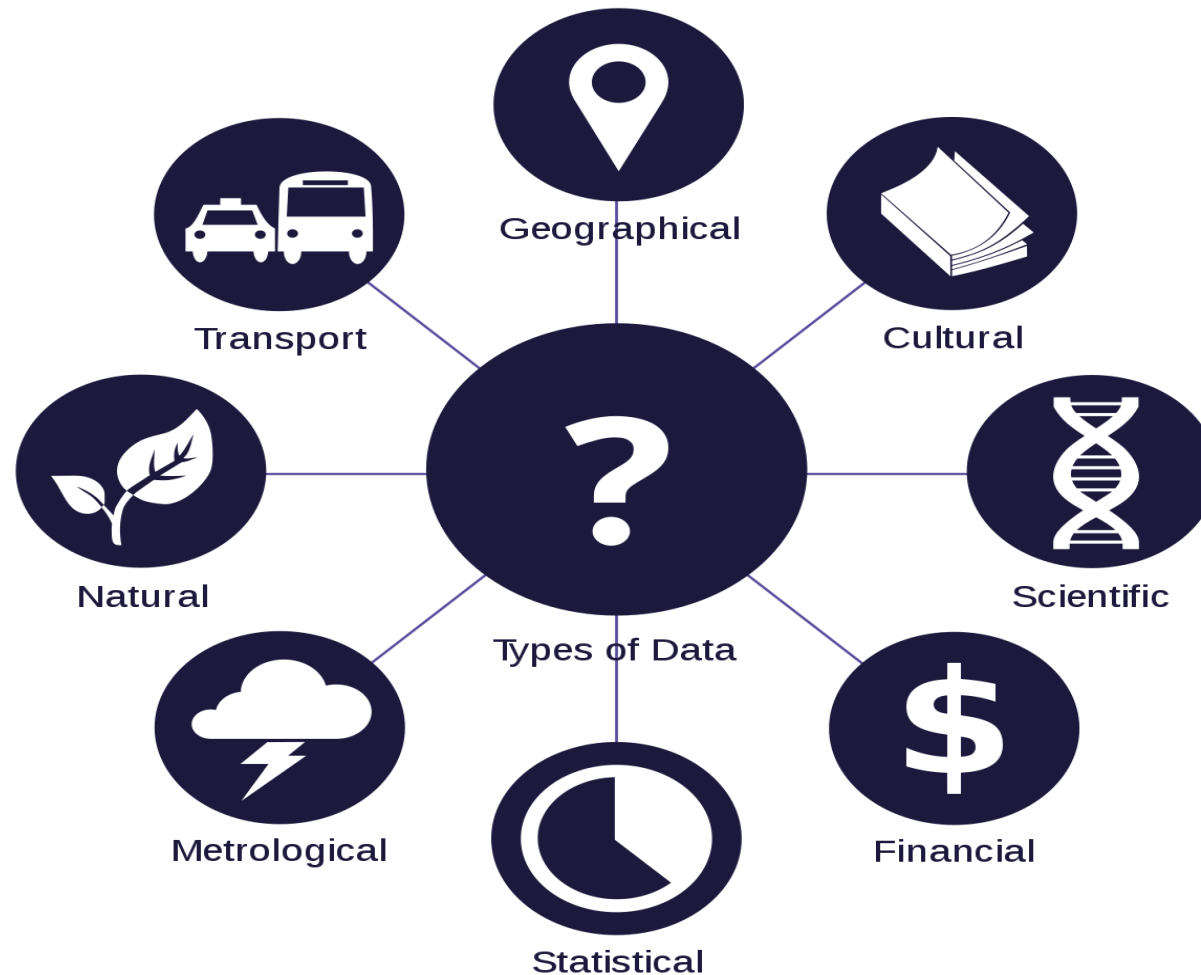
What to do
with this
tremendous
data??



Data Types



Types of Data – Based on Domain

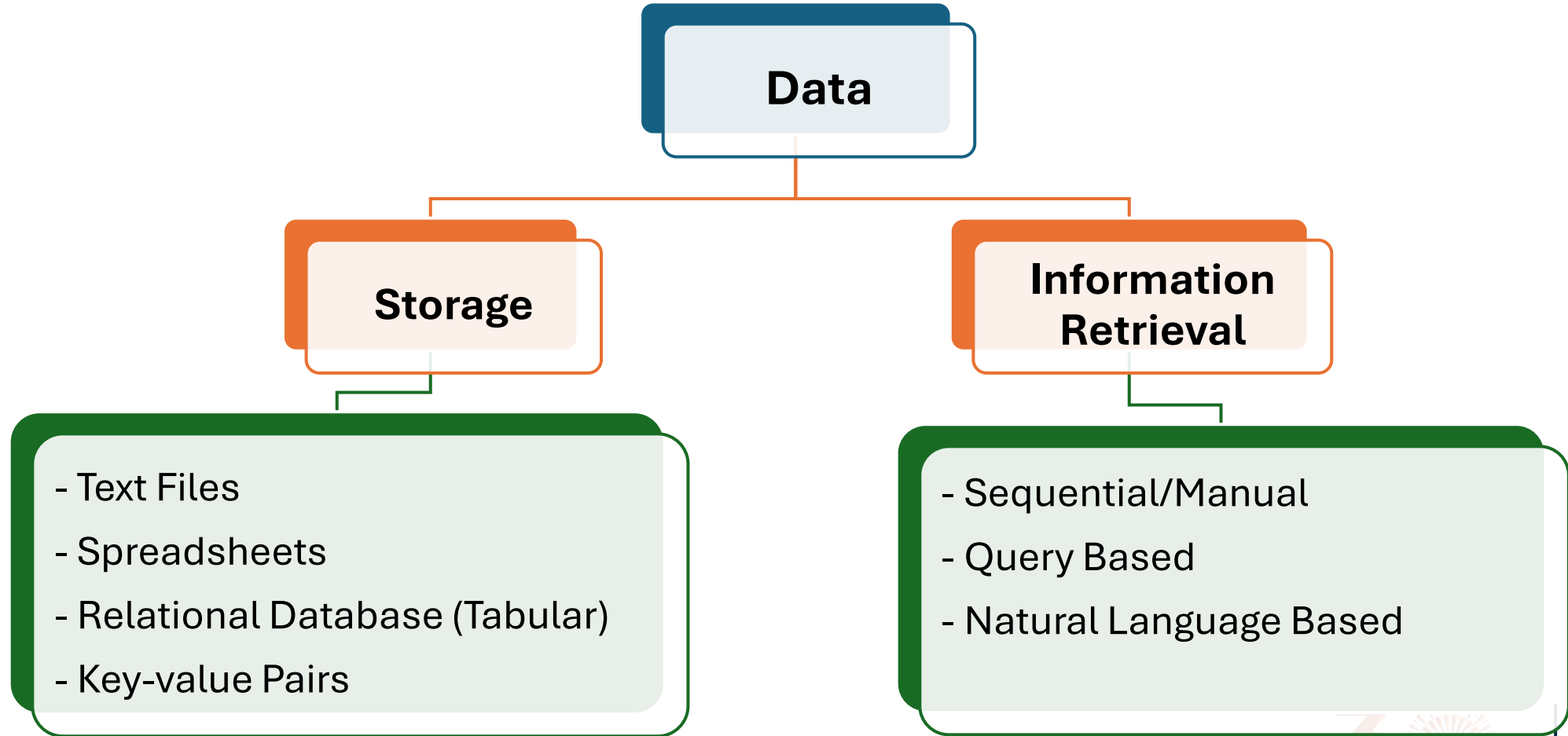


Handling Tremendous Data

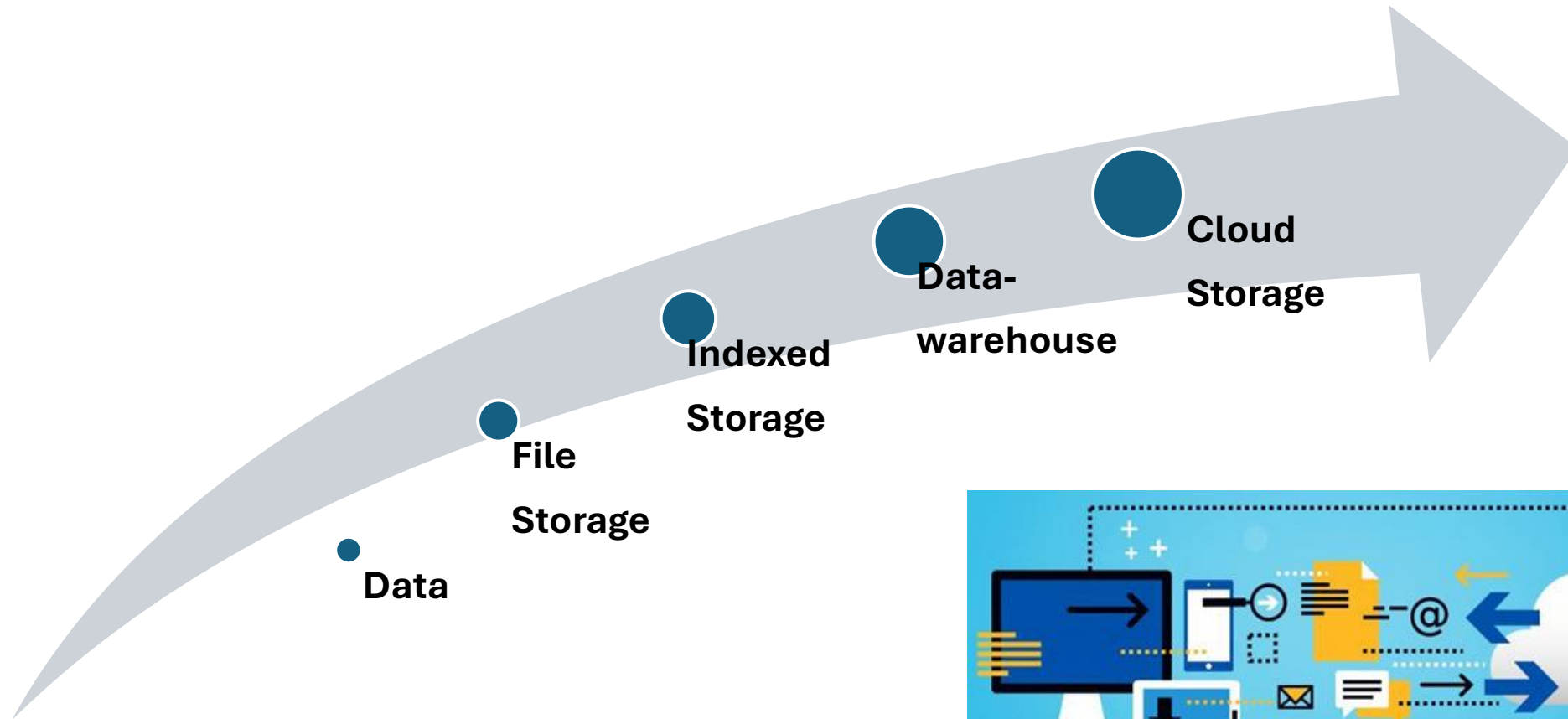


- Handling this tremendous amount of data is overwhelming.
- Thus, we need some automated mechanism to perform this task.

Aspects of Data

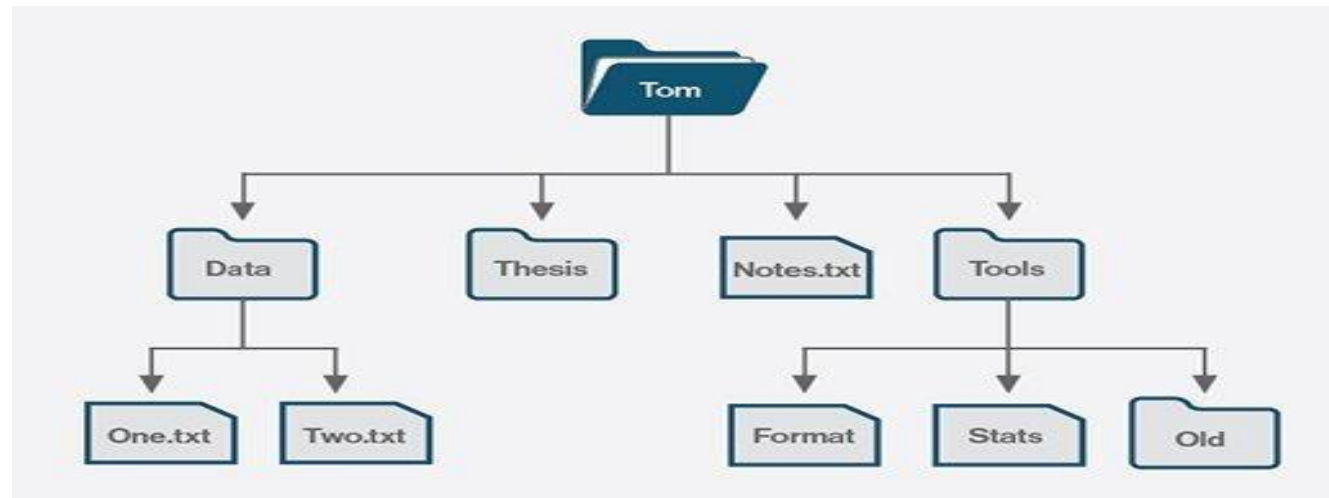


Evolution of Data Storage



File Storage

Alternatively referred to as a flat database or text database, a flat file is a file of data that does not contain links to other files or is a non-relational database. A good example of a flat file is a single text-only file that contains all the data needed for a program that is often separated by some kind of delimiter.



File Storage...

- File handling programs like reading contents of a text file, writing student records in a file are examples of traditional File Storage.

- **Problems with File Systems:**

- Data redundancy and inconsistency
- Difficulty in accessing data
- Data isolation — multiple files and formats
- Integrity problems
- Atomicity of updates
- Concurrent access by multiple users
- Security problems



What is a Database?

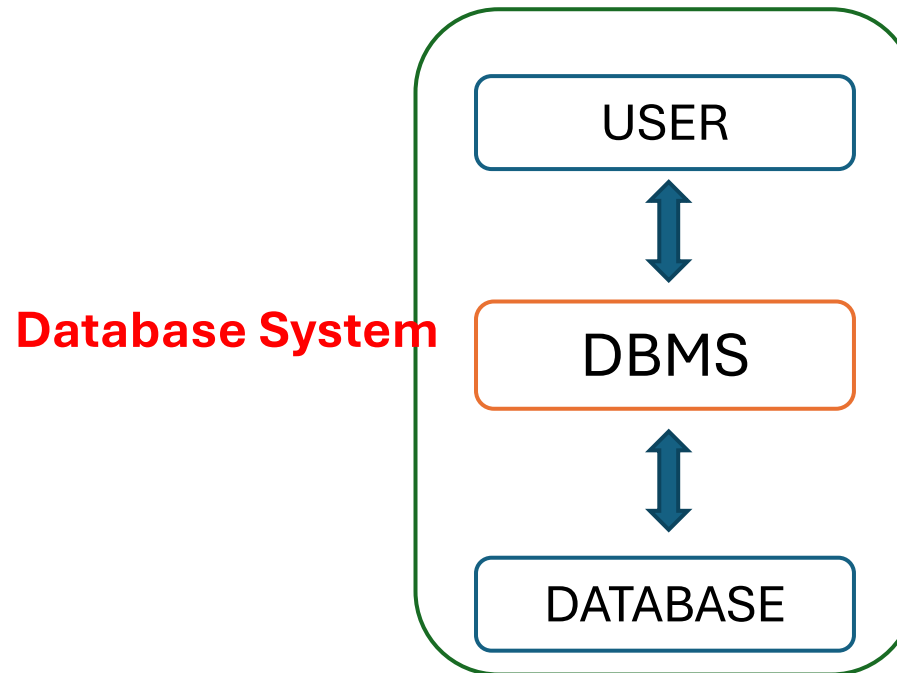
- Collection of related data
- *Example: Employee Information*

EMPLOYEE

Fname	Minit	Lname	<u>Ssn</u>	Bdate	Address	Sex	Salary	Super_ssn	Dno
John	B	Smith	123456789	1965-01-09	731 Fondren, Houston, TX	M	30000	333445555	5
Franklin	T	Wong	333445555	1955-12-08	638 Voss, Houston, TX	M	40000	888665555	5
Alicia	J	Zelaya	999887777	1968-01-19	3321 Castle, Spring, TX	F	25000	987654321	4
Jennifer	S	Wallace	987654321	1941-06-20	291 Berry, Bellaire, TX	F	43000	888665555	4
Ramesh	K	Narayan	666884444	1962-09-15	975 Fire Oak, Humble, TX	M	38000	333445555	5
Joyce	A	English	453453453	1972-07-31	5631 Rice, Houston, TX	F	25000	333445555	5
Ahmad	V	Jabbar	987987987	1969-03-29	980 Dallas, Houston, TX	M	25000	987654321	4
James	E	Borg	888665555	1937-11-10	450 Stone, Houston, TX	M	55000	NULL	1

Database Management Systems

- Database System contains information about a particular enterprise
 - Collection of interrelated data
 - Set of programs to create and maintain a database
 - An environment that is both *convenient* and *efficient* to use



User does not interact directly with the database. DBMS acts as an interface between the user and the DB.

Levels of Abstraction

- **External Level:** application programs hide details of data types. Views can also hide information (such as an employee's salary) for security purposes.

EMPLOYEE

Fname	Minit	Lname	<u>Ssn</u>	Bdate	Address	Sex	Salary	Super_ssn	Dno
John	B	Smith	123456789	1965-01-09	731 Fondren, Houston, TX	M	30000	333445555	5
Franklin	T	Wong	333445555	1955-12-08	638 Voss, Houston, TX	M	40000	888665555	5
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James	E	Borg	888665555	1937-11-10	450 Stone, Houston, TX	M	55000	NULL	1

Accounts
View



Fname	Lname	Ssn
John	Smith	333445555
Franklin	Wong	888665555
...

Manager
View



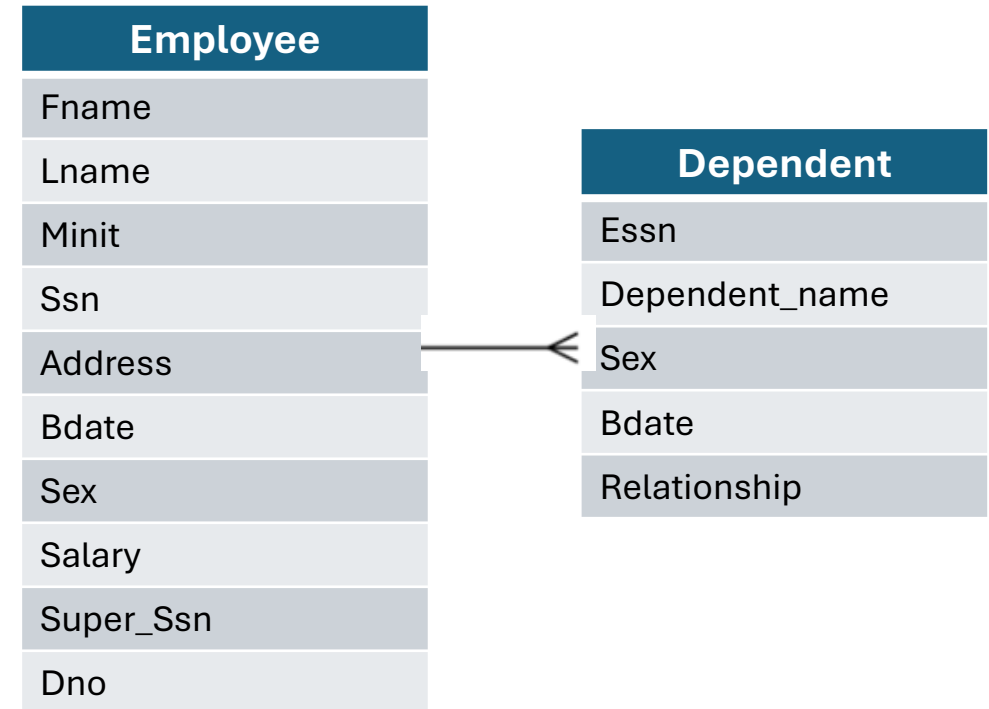
Fname	Lname	Dno
John	Smith	5
Franklin	Wong	5
...

Levels of Abstraction

- **Logical level:** describes data stored in database, and the relationships among the data.
- **Physical level:** describes how a record (e.g., customer) is stored.

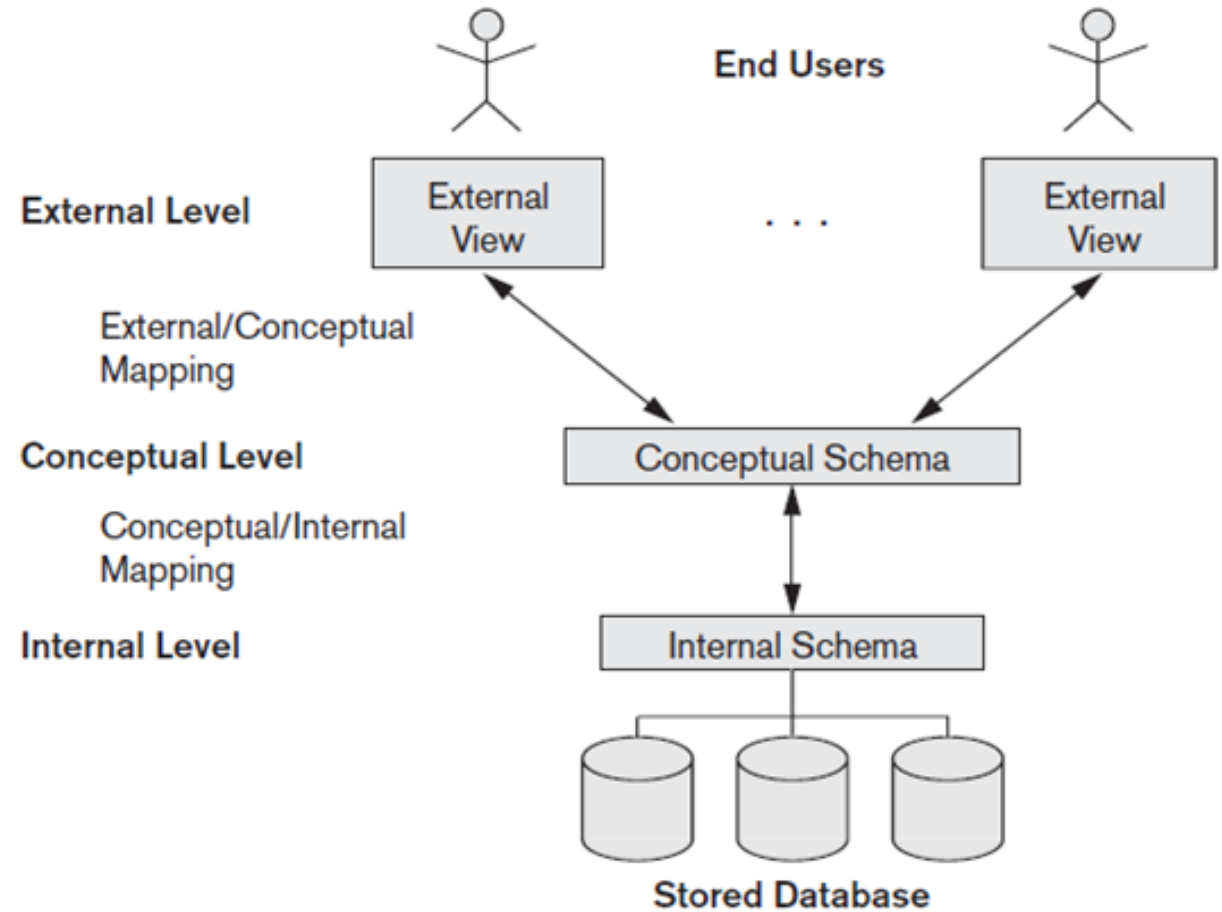
type *Employee = record*

Fname : string;
Lname : string;
Address : string;
Ssn : integer;
Bdate: date;
Sex: char
end;



Three Schema Architecture

- **External/view Level** → number of external user views. Each external schema describes the part of the database that a particular user group is interested in.
- **Conceptual Level Schema** → structure (entities, data types, relationships, user operations, constraints) of whole database for a community of users.
- **Internal Level Schema** → physical storage structure of database i.e. complete details of data storage and access paths for the database.



Thanks!!