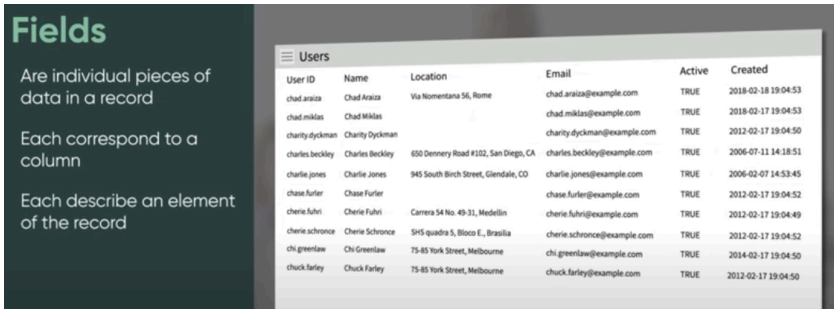
FUNDAMENTALS OF INFORMATION SYSTEMS

IS101 LESSON 6

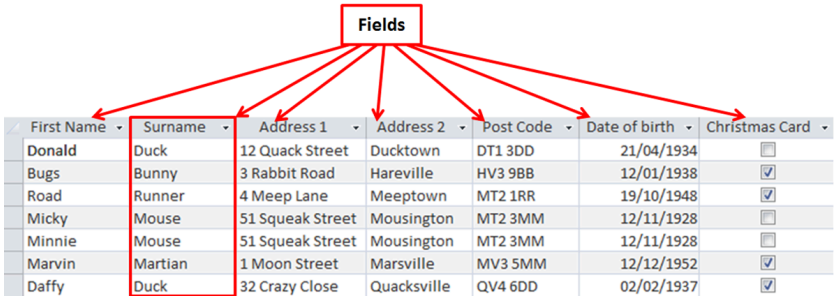
DATABASE MANAGEMENT

➔ involves the systematic processes of creating, retrieving, updating, and securing data using a Database Management System (DBMS).

Field



➔ a single piece of information or attribute that defines a specific characteristic of the data stored in a table.



Records

➔ Employee identification number (a whole number)
➔ Name (a string of characters)
➔ Address (a string of characters)
➔ Hourly pay rate (a number with a decimal point)
➔ Year-to-date earnings (a number with a decimal point)
➔ Amount of taxes withheld (a number with a decimal point

First Name	Last Name	Address	City	Age
Mickey	Mouse	123 Fantasy Way	Anaheim	73
Bat	Man	321 Cavern Ave	Gotham	54
Wonder	Woman	987 Truth Way	Paradise	39
Donald	Duck	555 Quack Street	Mallard	65
Bugs	Bunny	567 Carrot Street	Rascal	58
Wiley	Coyote	999 Acme Way	Canyon	61
Cat	Woman	234 Purrfect Street	Hairball	32
Tweety	Bird	543	Itotitaw	28

Records

➔ A **record** is a single, structured entry in a table, often referred to as a **row** or **tuple**.

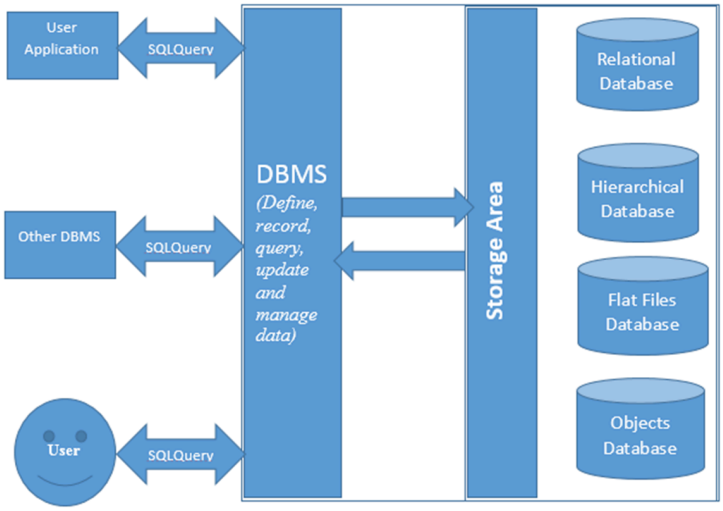
File

➔ a folder or box for holding loose papers that are typically arranged in a particular order for easy reference.

Database

➔ a structured set of data held in a computer, especially one that is accessible in various ways.

DBMS



➔ A **Database Management System (DBMS)** is software that enables users to define, create, maintain, and control access to a database.

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FILE SURROUNDINGS AND ITS LIMITATIONS

There are three alternative ways of document association:

1. Progressive association
2. Listed consecutive association
3. Coordinate association

Consecutive Organization

NO	ID	QTY
1	A1	5
4	A1	4
5	A1	3
6	A1	1
7	A1	0
9	A1	5
12	A1	3
1	A2	2
2	A2	4
3	A2	5
4	A2	1
7	A2	4
9	A2	5
1	A3	0
3	A3	2
4	A3	3
5	A3	4
6	A3	2

```
select * from [dbo].[tblSensorData];
```

100 % — Results | Messages

	pkID	DataValue
1	1	1.00
2	2	7.10
3	3	2.20
4	4	3.30
5	5	4.40
6	6	5.50
7	7	6.60
8	8	7.70
9	9	1.80
10	10	1.90

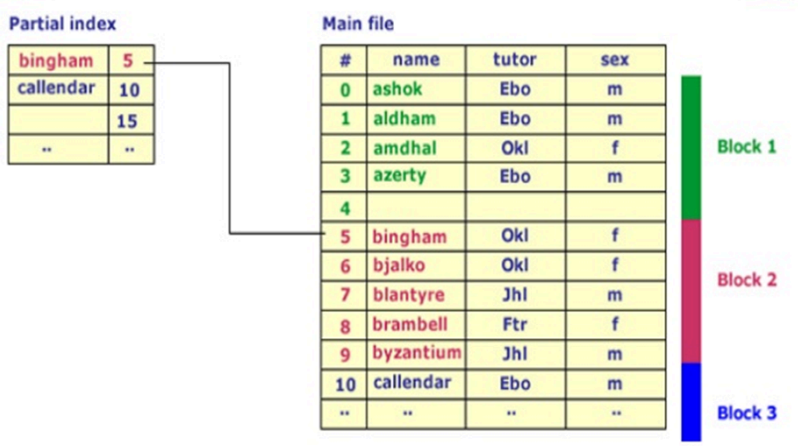
Favorable circumstances of consecutive access:

1. Brisk and sensible in method learning in large volume

Drawbacks of progressive access:

1. The knowledge ought to be in right grouping for progressive about to traditional organization
2. Management of documents may end up in confusion

Indexed-Sequential Organization

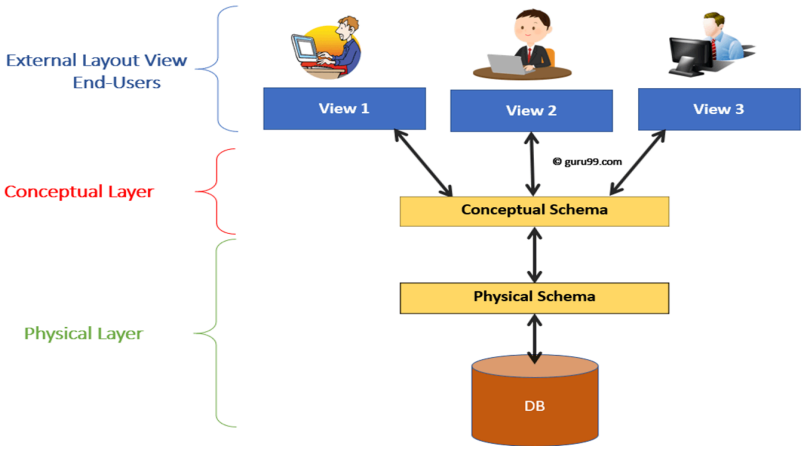


➔ is a DBMS file structure storing records in sorted order by key, while maintaining a separate index for rapid, direct access

DATABASE MANAGEMENT SYSTEMS WITHIN AN ORGANIZATION

- ➔ Improved Data Sharing to Others
- ➔ Data Security Development
- ➔ Successful Data Integration
- ➔ Data Inconsistency is Reduced
- ➔ Enhance the Productivity of the End User
- ➔ Effective Decision Making

LEVELS OF DATA DEFINITION IN DATABASES



External Layout View End Users
Conceptual Layer
Physical Layer

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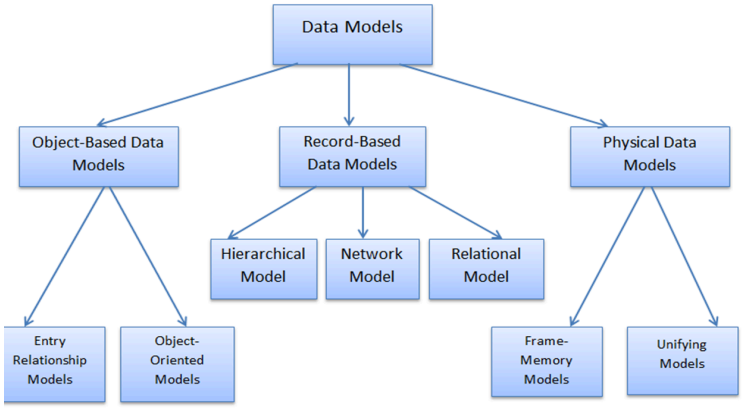
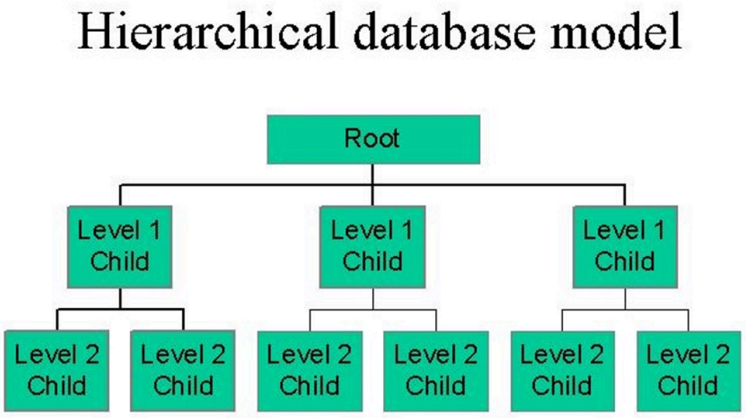
Data Models



➔ a visual representation or blueprint that defines how data is structured, stored, organized, and related within an information system or database

Structural Hierarchy

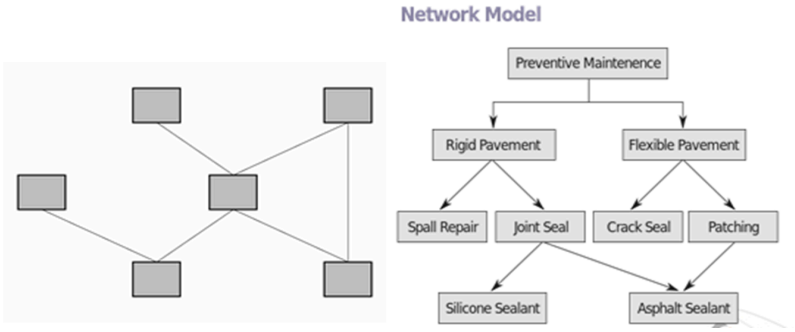


➔ a top-down, pyramid-shaped system that organizes entities—such as employees, data, or components—by levels of authority, power, or complexity.

Structural-Network

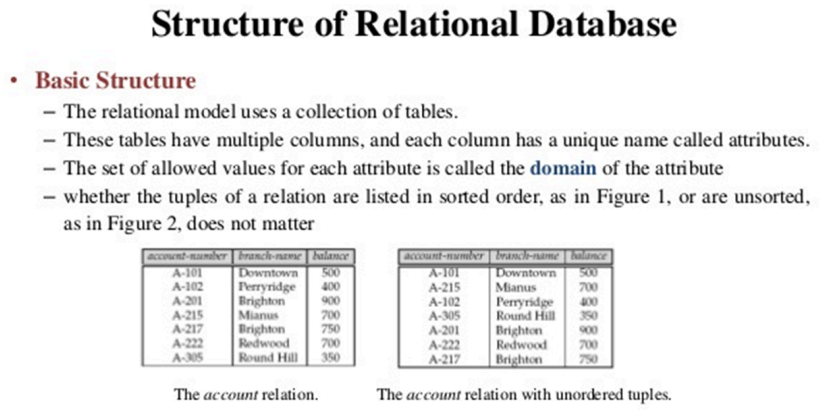
Network model:

This model organizes data using two fundamental constructs, called **records** and **sets**. Records contain fields, and sets define one-to-many relationships between records: one owner, many members.



➔ the underlying, organized framework or architecture that connects various components within a system, defining their relationships and dependencies

Structural-Relation



➔ the **static coherence** and organization of components within a system, mapping out how different elements are linked, composed, or assigned to one another.

FUNDAMENTALS OF INFORMATION SYSTEMS

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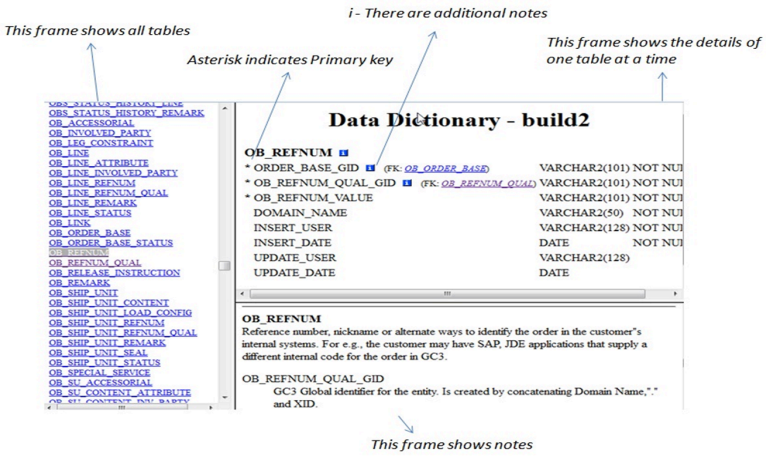
The Data Dictionary



- a centralized repository or document that acts as a "reference manual" for data, detailing the definition, structure, format, relationships, and origin of data elements within a system.

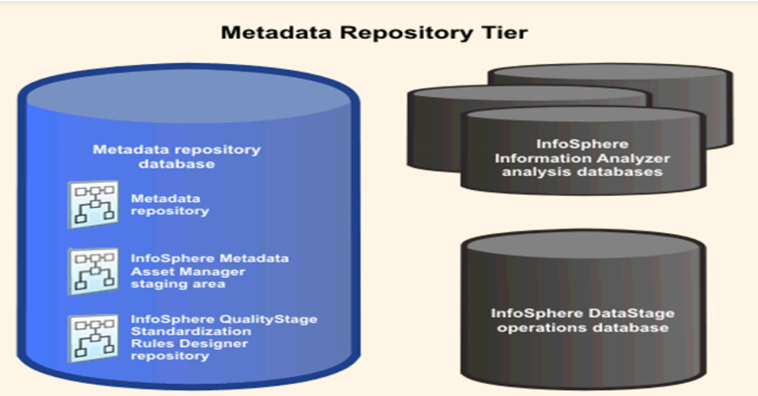
A document

- a document in a database is a self-contained, flexible, and structured record—typically in JSON, BSON, or XML format—that stores data for a specific object and its metadata.

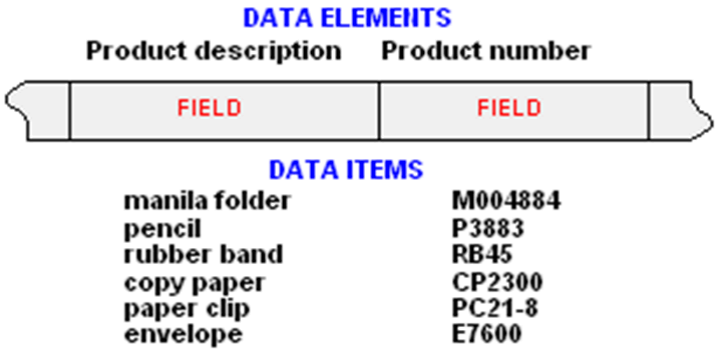
Metadata tables in database systems (DBMS)

- are specialized, read-only system tables—often called the data dictionary or system catalog—that store "data about data."

Independent (in relation to DBMS) metadata repository



Elements of Data Dictionary



- a centralized repository of metadata defining a database's structure, containing key elements for each data field: **name**, **description/definition**, **data type** (e.g., text, integer), **length**, **format**, **constraints** (e.g., NOT NULL, unique), **allowed values/domain**, and **data relationships** (e.g., foreign keys).

Data dictionary has TWO essential elements

1. List of tables (or entities)
2. List of columns (or columns, or attributes)

Minimum data dictionary:

Table	Column
employees	employee_id
employees	first_name
employees	last_name
employees	nin
employees	position
employees	department_id
employees	gender
employees	employment_start_date
employees	employment_end_date

- a standardized, agreed-upon set of core data elements, definitions, and validation rules used to ensure consistent, mandatory reporting across systems, commonly in health or social services.

FUNDAMENTALS OF INFORMATION SYSTEMS

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COMPONENTS OF INFORMATION RESOURCE MANAGEMENT

Fundamental Elements

1. Authoritative procedures
2. Empowering advances
3. Authoritative capacities

DATABASE ADMINISTRATION AND DATABASE ADMINISTRATION

Data Administrator (DA)

➔ a senior-level, business-oriented professional responsible for defining, planning, and controlling an organization's data assets.

Data Administrator (DBA)

➔ an IT professional responsible for installing, configuring, maintaining, and securing an organization's data systems.

Data Administration - Logical Design

1. Perform business prerequisites gathering
2. Analyze requirements
3. Demonstrate business dependent on prerequisites (calculated and consistent)
4. Characterize and uphold measures and traditions (definition, naming, and truncation)
5. Lead data definition sessions with clients
6. Manage and direct metadata archive and Data Administration CASE (displaying) apparatuses
7. Assist Database Administration in making physical tables from coherent models

Data Administration - Physical Design / Operational

1. Characterize required parameters for database definition
2. Analyze information volume and space necessities
3. Perform database tuning and parameter improvements
4. . Execute database backups and recuperations
5. Screen database space necessities
6. Confirm honesty of information in databases
7. Arrange the change of consistent structures to appropriately perform physical structures

DEVELOPMENTAL TRAITS IN DATABASE CONTROL

➔ Bridging with databases in SQL/NoSql
➔ Managing automated
➔ Cloud/platform as service in Database