

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

Fields

Are individual pieces of data in a record

Each correspond to a column

Each describe an element of the record

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

Fields

First Name	Surname	Address 1	Address 2	Post Code	Date of birth	Christmas Card
Donald	Duck	12 Quack Street	Ducktown	DT1 3DD	21/04/1934	<input type="checkbox"/>
Bugs	Bunny	3 Rabbit Road	Hareville	HV3 9BB	12/01/1938	<input checked="" type="checkbox"/>
Road	Runner	4 Meep Lane	Meepstown	MT2 1RR	19/10/1948	<input checked="" type="checkbox"/>
Micky	Mouse	51 Squeak Street	Mousington	MT2 3MM	12/11/1928	<input type="checkbox"/>
Minnie	Mouse	51 Squeak Street	Mousington	MT2 3MM	12/11/1928	<input type="checkbox"/>
Marvin	Martian	1 Moon Street	Marsville	MV3 5MM	12/12/1952	<input checked="" type="checkbox"/>
Daffy	Duck	32 Crazy Close	Quacksville	QV4 6DD	02/02/1937	<input checked="" type="checkbox"/>

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.

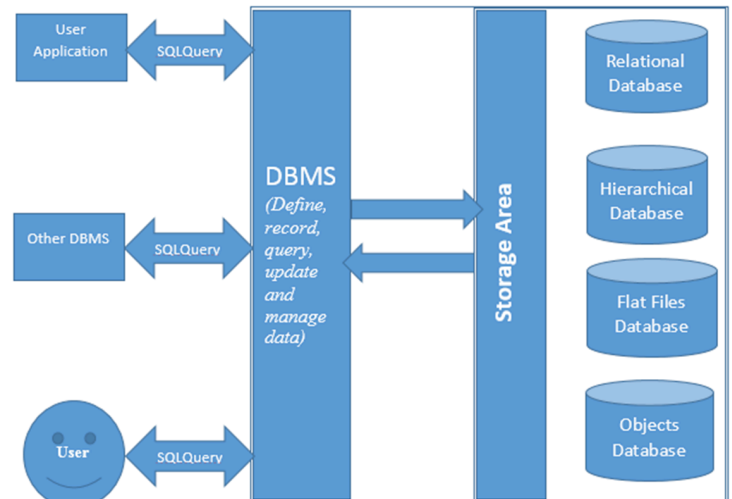
File

→ 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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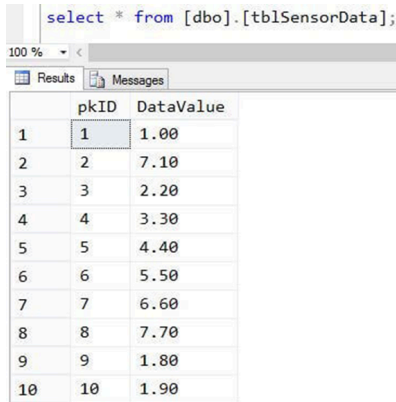
FILE SURROUNDINGS AND ITS LIMITATIONS

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



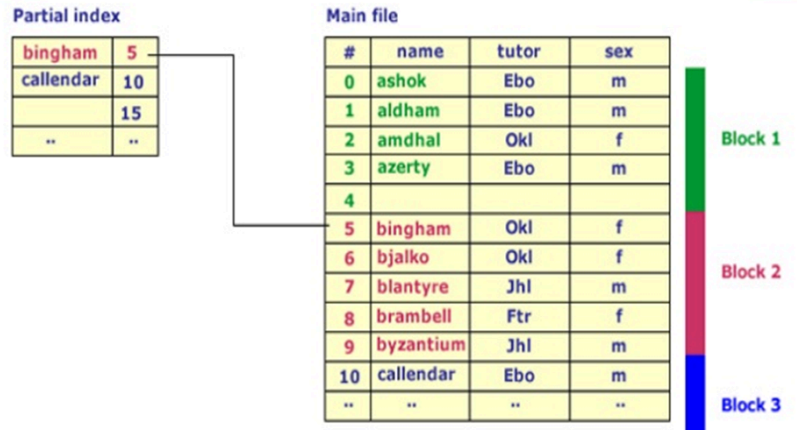
Favorable circumstances of consecutive access:

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

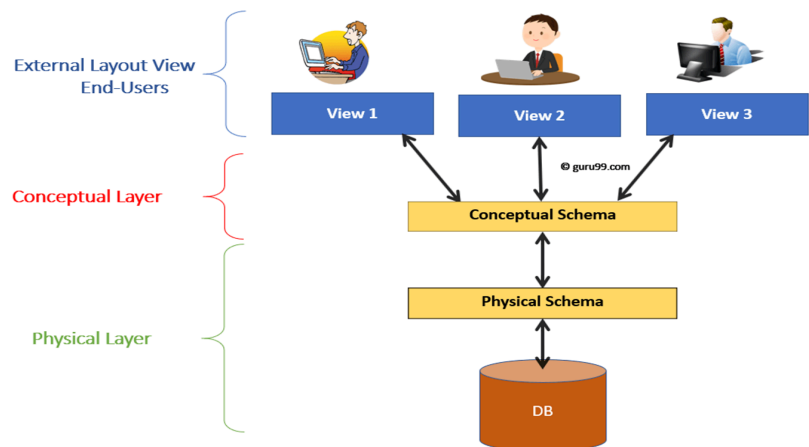


→ is a **DBMS** file structure storing records in sorted order by key, while maintaining a separate index for rapid, direct access

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

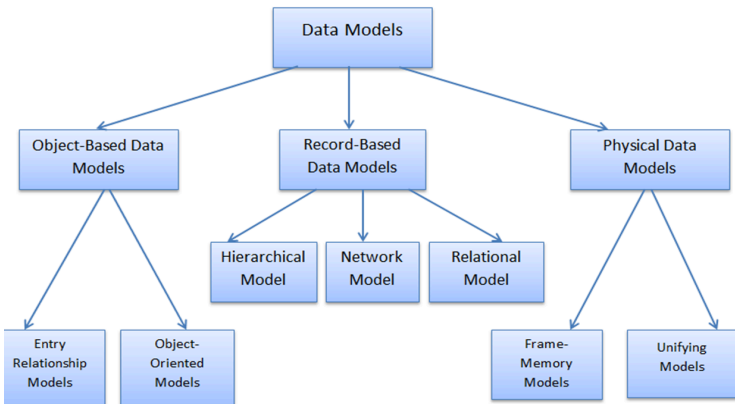


External Layout View End Users
 Conceptual Layer
 Physical Layer

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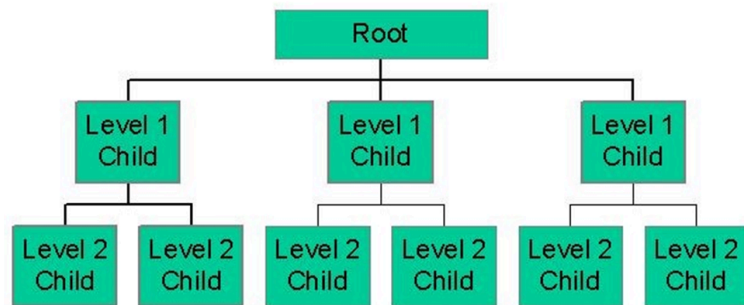
Data Models



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

Structural Hierarchy

Hierarchical database model

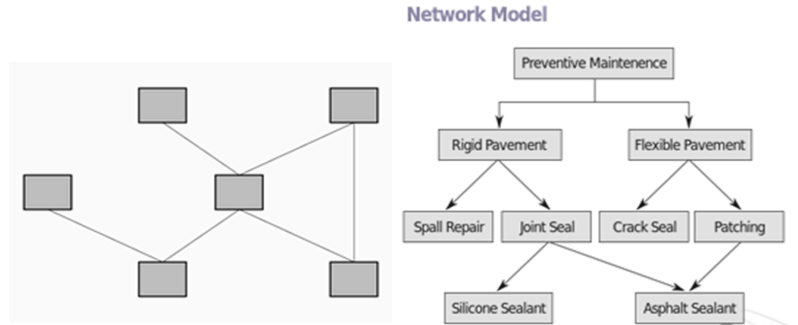


→ a **top-down, pyramid-shaped system** that organizes entities—such as employees, data, or components—by levels of authority, power, or complexity.

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

Structure of Relational Database

• Basic Structure

- The relational model uses a collection of tables.
- These tables have multiple columns, and each column has a unique name called attributes.
- The set of allowed values for each attribute is called the **domain** of the attribute
- whether the tuples of a relation are listed in sorted order, as in Figure 1, or are unsorted, as in Figure 2, does not matter

account-number	branch-name	balance
A-101	Downtown	500
A-102	Perryridge	400
A-201	Brighton	900
A-215	Mianus	700
A-217	Brighton	750
A-222	Redwood	700
A-305	Round Hill	350

The *account* relation.

account-number	branch-name	balance
A-101	Downtown	500
A-215	Mianus	700
A-102	Perryridge	400
A-305	Round Hill	350
A-201	Brighton	900
A-222	Redwood	700
A-217	Brighton	750

The *account* relation with unordered tuples.

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

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The Data Dictionary

This frame shows all tables

i- There are additional notes

Asterisk indicates Primary key

This frame shows the details of one table at a time

Data Dictionary - build2

OB_REFNUM

- * ORDER_BASE_GID (FK: OB_ORDER_BASE) VARCHAR2(101) NOT NUI
- * OB_REFNUM_QUAL_GID (FK: OB_REFNUM_QUAL) VARCHAR2(101) NOT NUI
- * OB_REFNUM_VALUE VARCHAR2(101) NOT NUI
- DOMAIN_NAME VARCHAR2(50) NOT NUI
- INSERT_USER VARCHAR2(128) NOT NUI
- INSERT_DATE DATE NOT NUI
- UPDATE_USER VARCHAR2(128)
- UPDATE_DATE DATE

OB_REFNUM
Reference number, nickname or alternate ways to identify the order in the customer's internal systems. For e.g., the customer may have SAP, JDE applications that supply a different internal code for the order in GC3.

OB_REFNUM_QUAL_GID
GC3 Global identifier for the entity. Is created by concatenating Domain Name, "*" and XID.

This frame shows notes

→ 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.

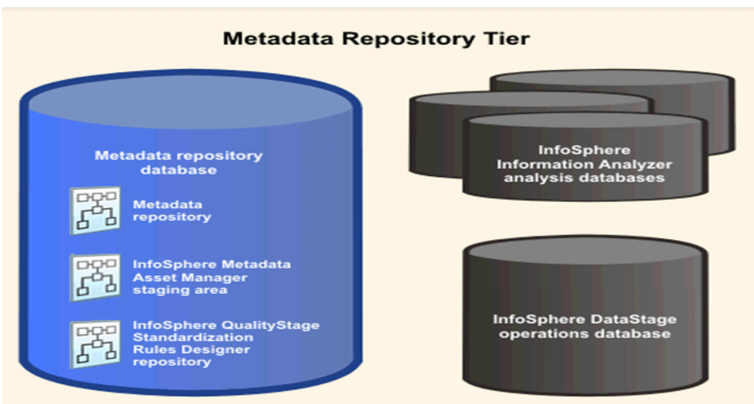
A document

→ 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

DATA ELEMENTS

Product description Product number

FIELD	FIELD
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DATA ITEMS

manila folder	M004884
pencil	P3883
rubber band	RB45
copy paper	CP2300
paper clip	PC21-8
envelope	E7600

→ 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.

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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