RDBM : AN OVERVIEW

DBMS Concepts
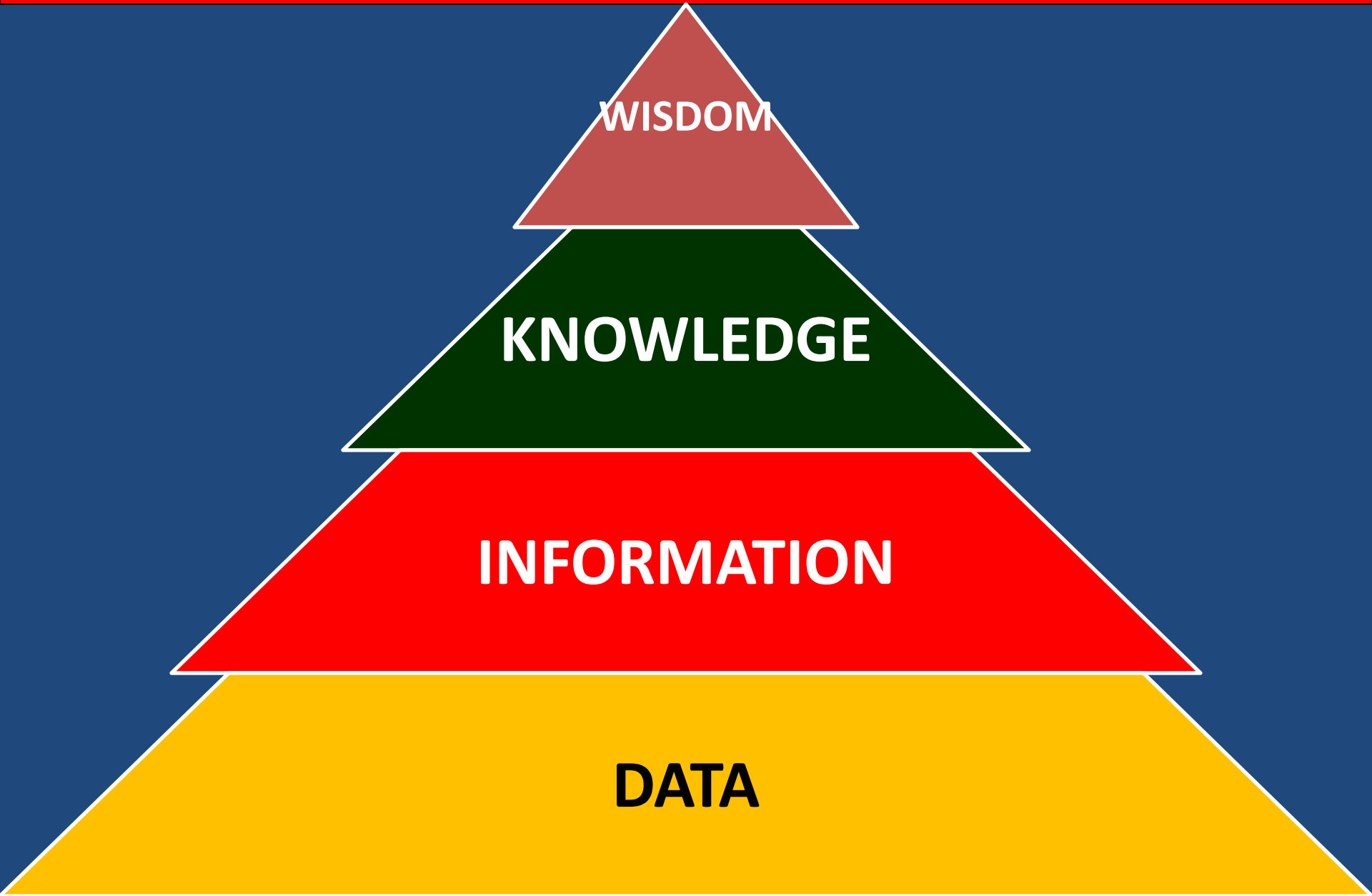
DIKW : EXAMPLE

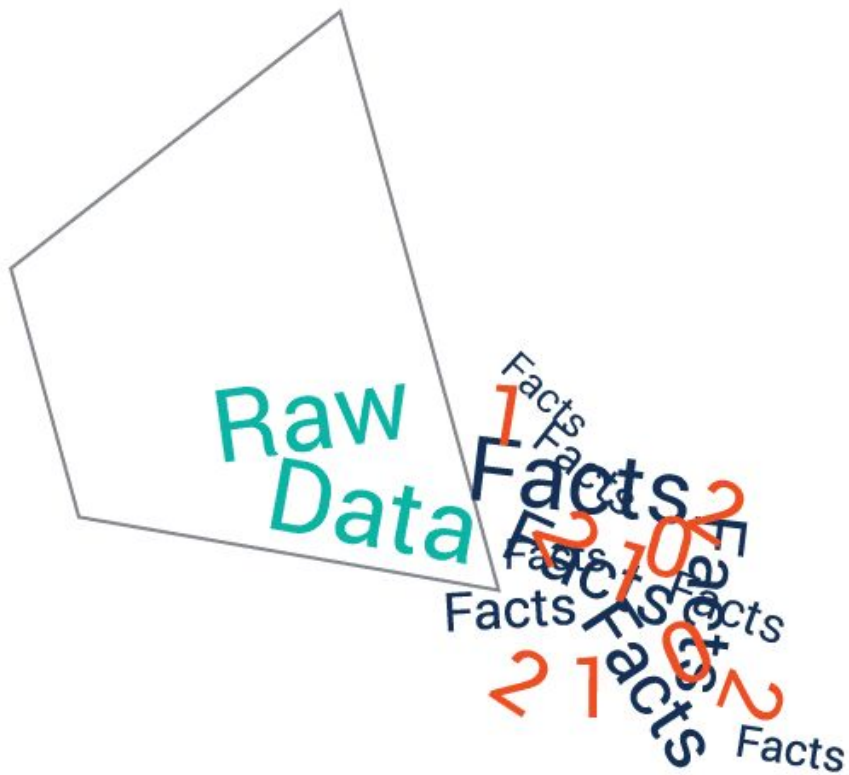|	
DATA	• Vital signs of an indl – heart rate, BP, temp.
INFO	• Set of obsns taken and used for comparison.
KNOWLEDGE	• Recognition of pattern and iden of intervention reqd.
WISDOM	• Selection of most appropriate intervention.

Raw
Data

Facts
1 Facts 2
Facts
2 1 0 2
Facts Facts
Facts 2 1 0 2 Facts
2 1 Facts Facts

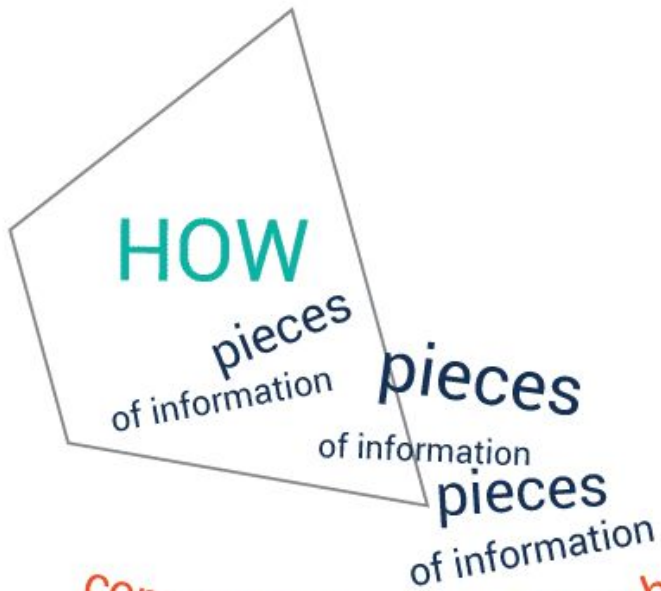$=$ a collection of facts in a raw or unorganized form

Base building block - Raw **Data**

who what when where = easier to measure, visualize and analyze data for a specific purpose

Second building block - Derived Information

HOW

pieces
of information

pieces
of information

pieces
of information

connected to other pieces help us understand how to apply information to achieve our goal

Third building block - Relevant **Knowledge**

why
do
something?

what is best?

Wisdom is knowledge applied in action

The top of the DIKW hierarchy - Guiding **Wisdom**

What Is A Database ?

- A database is a collection of info , preferably, related and org.
- A database is a structured Obj.
- Consists of Data and metadata.
- Metadata is the table definitions and data is the actual info stored in tables

<u>What is DBMS ?</u>

- DBMS is a collection of programs that enables you to store, modify and retrieve info from a database.

Why do we need DBMS

- From wordprocessing to computing.
- From computing to intelligent org of data.
- Involves
  - Data input
  - Data storage
  - Data query / manipulation
- Creating an application for a DBMS encompasses various aspects of CS, ie OS, langages, logic, web design and so on

Problems in a flat file System

- Data redundancy.

- Difficulty in accessing data.

- Data Isolation.

- Integrity Problem.

- Atomicity problem

- Concurrent access by multiple users.

- Security Problems

- Privacy problems.

Features in a good database

- Data Storage.

- Data Security- avoid corruption /loss

- Data Integrity.

- Data concurrency.

- Data Independence.

- Distributed database.

- Good performance.

- Minimise redundancy.

- Data Accuracy.

Data Independence

Ability to modify a schema at one level without affecting a schema at another level.

There are two levels of data independence based on three levels of abstraction. These are as follows −

- **Physical Data Independence**
- **Logical Data Independence**

Data Concurrency

Multiple users should be able to update the database at the same time.

Data Consistency

Data Consistency is the accuracy, completeness and correctness of data across all related systems , applications and databases, before and after a transaction.

Characteristics of Relational Database Model

- **Built in data integrity**
- **Data consistency and accuracy**
- **Easy data retrieval and data sharing**
- **How and where the tables of data stored make no difference**
- **You can access child table with out accessing parent table.**
- **Non-navigational in nature**
- **Find the data on the basis of the data values themselves.**
- **One point data administration**
- **Controlling redundancy**
- **Data abstraction**

Continue……..

- **Provide security**

- **Data entry , update and deletion should be efficient.**

- **Changes to the structure of the database should be self-documenting.**

- **Support multiple users**

Some definitions

- Table, Entity , relation.

- Attribute, Domain, Field, Column.

- Tuple, record, Row.

- Schema.

- Key, Index.

- Business Rules

- Data types.

- Views (or Queries)

Summary : Database Terms used

Common word	Textbook word	Alternate word	Object word
Table	Relation	File or Data set (old)	Object class
Column	Attribute	Field	Object field
Domain	Domain	Range of possible values	Datatype, subtype
Row	Tuple	Record	Object instance
Primary key	Primary key	Key of the record	Object identifier

Relational DBMS (1980's)

Student (ID char(30), Name char(30), DOB date
Address char(40), GPA number)

Relation/Table

Student

Attribute/column/field

ID	Name	DOB	Address	GPA
s1	Jose	2/3/67	Stone Mountain	3.7
s2	Alice	3/12/72	Buck Head	4.0
s3	Tom	10/2/78	Dunwoody	3.0
s4	Sue	4/6/45	Atlanta	2.9
s5	Steve	9/7/71	Stone Mountain	3.5

Tuples/Record/Row

Domain

Some Definitions

Structured Query Language (SQL) is a standard computer language for relational database management and data manipulation. SQL is used to query, insert, update and modify data.

Integrity, in the context of computer systems, refers to methods of ensuring that data is real, accurate and safeguarded from unauthorized user modification.

Some Definitions

A schema is the structure behind data organization. It is a visual representation of how different table relationships enable the schema's underlying mission business rules for which the database is created.

A legacy system, in the context of computing, refers to outdated computer systems, programming languages or application software that are used instead of available upgraded versions.

Some Definitions

Durability in databases is the property that ensures transactions are saved permanently and do not accidentally disappear or get erased, even during a database crash. This is usually achieved by saving all transactions to a non-volatile storage medium.

Durability is part of the ACID acronym, which stands for **atomicity**, **consistency**, **isolation** and **durability**. ACID is a set of properties guaranteeing the reliability of all database