COMPONENTS
in a database environment

- **DATA**

  **data is integrated and shared by many users.
  a database is a representation of a collection of
  related data.
  underlying principles: hierarchical, network,
  relational or semantic.**

- **SOFTWARE**

  **the components of a database management
  system: data definition and data manipulation.**

- **USERS**

  **application programmers, non-computer science
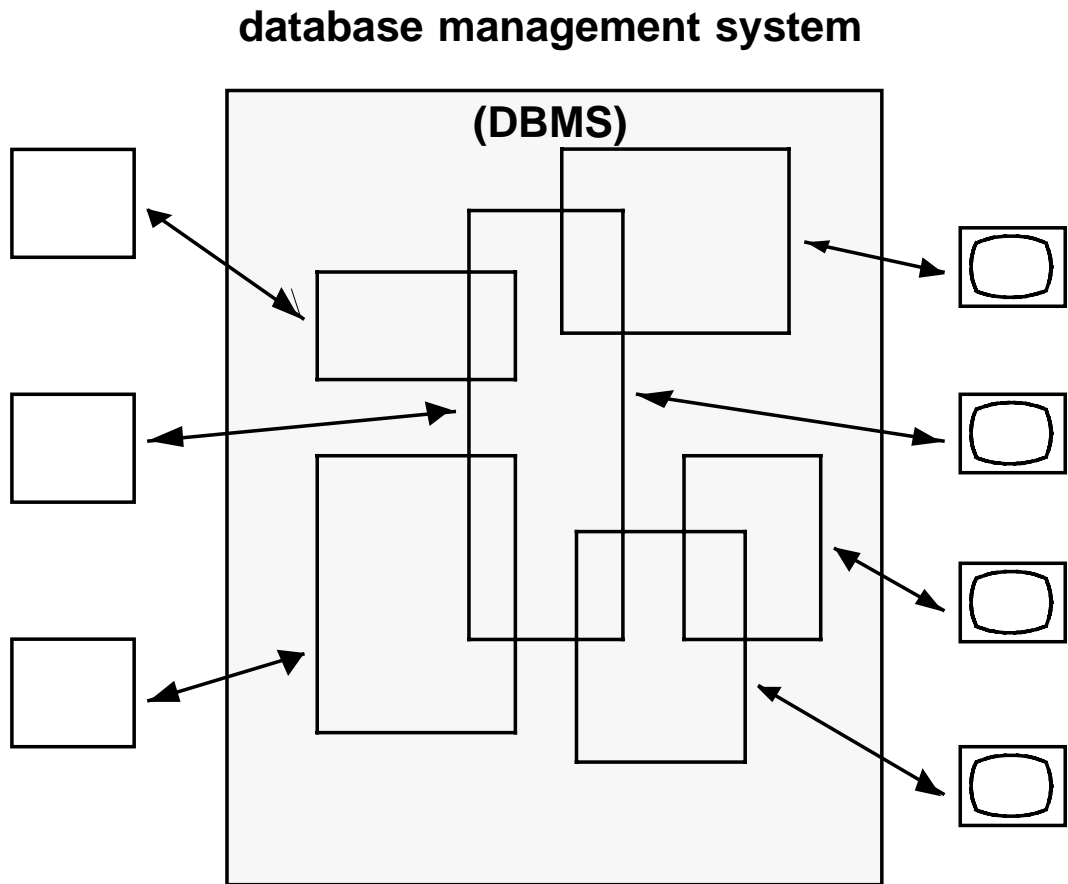 expert and experienced user.**

- **HARDWARE**

  **consequences for the architecture of a database
  system.
  developments: time sharing, file server,
  client/server.**

DATA: INTEGRATED AND SHARED

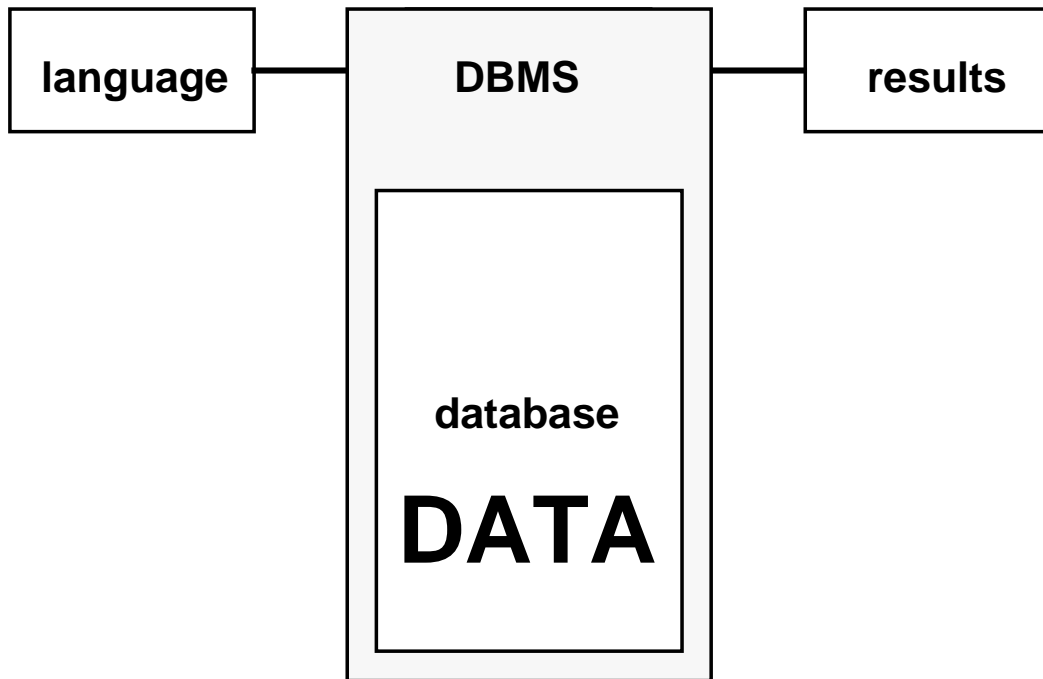**database management system**

(DBMS)

A P P L I C A T I O N S

**BATCH
PROGRAMS**

**INTERACTIVE
END-USERS**

SOFTWARE:
database management system

ALL COMMUNICATION THROUGH DATA LANGUAGE STATEMENTS:

- **DEFINITION PART: DDL**

  commands to define database structures.

- **MANIPULATION PART: DML**

  command driven (query language statements),

  forms driven (application generator).
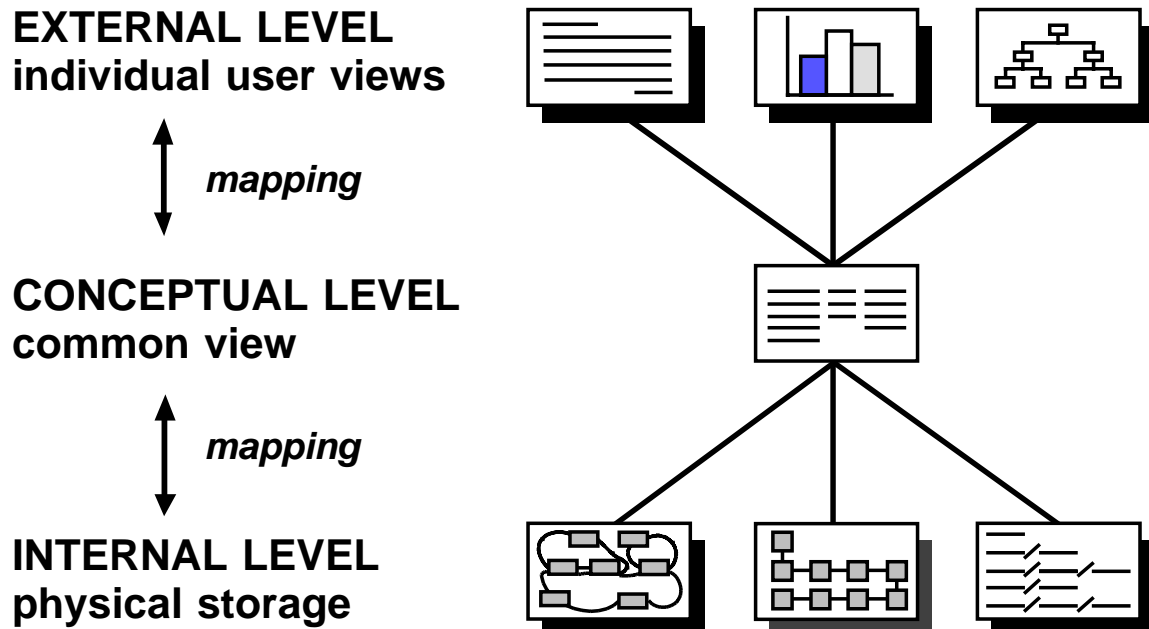
WHY DATABASES?
centralized control of operational data

ADVANTAGES:

- **reduction of redundancy:
  no conflicting data for the same object.**

- **stimulation of common usage:
  data can be used for more than one application.**

- **standardization:
  standards stimulate exchange of data.**

- **for security reasons:
  administration of data results in better
  management.**

- **for integrity reasons:
  integrity of data is independent of several
  applications.**

- **availability enhancements:
  data can be used directly.**

ARCHITECTURE OF A DBMS

EXTERNAL LEVEL
individual user views

mapping

CONCEPTUAL LEVEL
common view

mapping

INTERNAL LEVEL
physical storage

THE TWO MAPPINGS GUARANTEE:

- **VIEW INDEPENDENCE**
  the conceptual model is independent of one single view.

- **DATA INDEPENDENCE**
  the conceptual model is independent of one single implementation.

SYSTEM CONFIGURATIONS
an overview

- ## TIME SHARING MODEL

  mainframe and terminals.

- ## FILE SERVER MODEL

  server and personal computers.

- ## CLIENT/SERVER MODEL

  servers and personal computers in network.

# TIME SHARING MODEL
(ENVIRONMENT: mainframe or minicomputer)

components: operating system, DBMS and applications are running on a single computer.

interaction: through terminals, user interface is generated by mainframe or minicomputer.

processing: by one or more cooperating processors.

integrity: centralized control of data and users.

DISADVANTAGE:
computer cannot be optimized for all tasks.

| client	client	client	client	client
DBMS				
OPERATING SYSTEM				
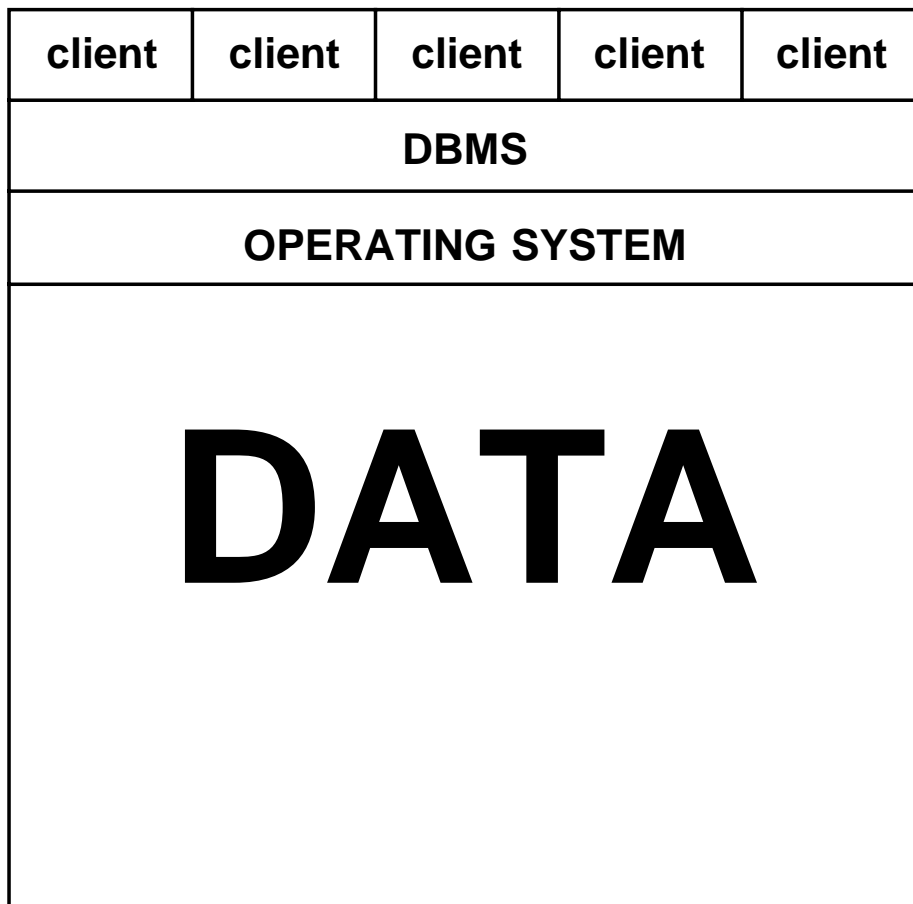
DATA

FILE SERVER MODEL
(ENVIRONMENT: file server and workstations)

components: DBMS and application program are separated from the database.
interaction: through workstations, screen layout is generated by workstations.
processing: all processing is carried out by one or more intelligent workstations.
integrity: decentralized control of data and users.

ADVANTAGE:
user interface can be optimized.

client	client	client	client	client
DBMS	**DBMS**	**DBMS**	**DBMS**	**DBMS**

OPERATING SYSTEM
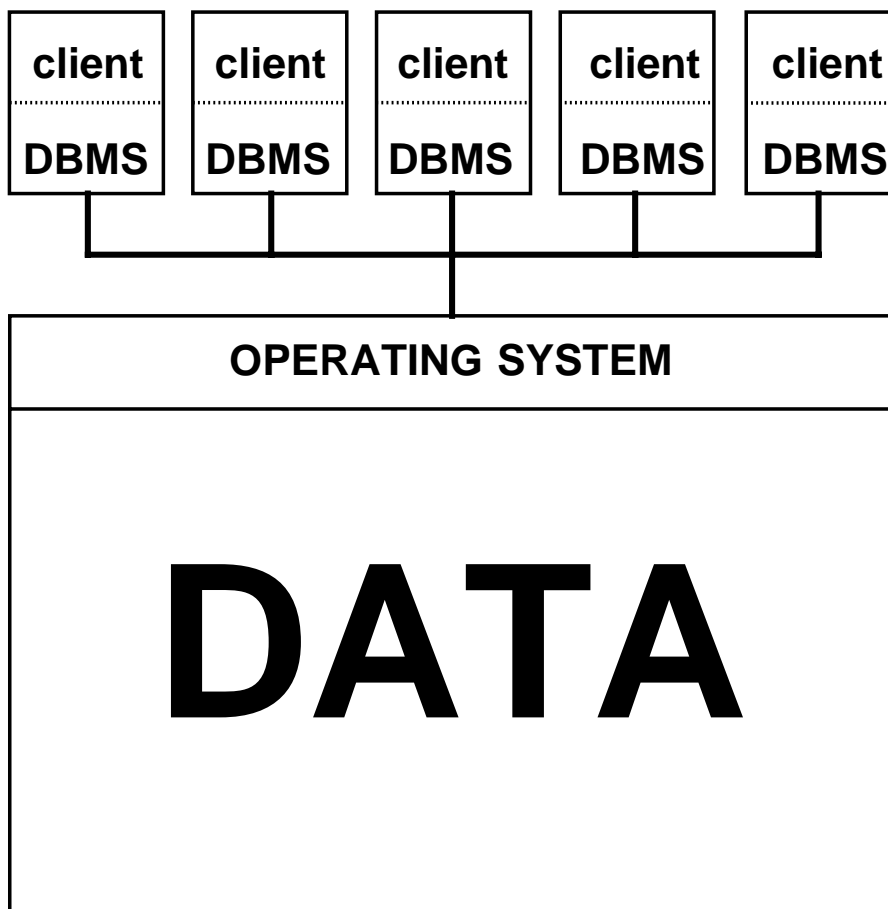
DATA

CLIENT/SERVER MODEL
(ENVIRONMENT: PC's and database servers)

components: application programs communicating via network with one or more dbms servers.
interaction: communication based on standard query language
processing: user interface and data access are separated.
integrity: decentralized control of data and users.

ADVANTAGE:
optimal user interface
optimal data access by database server

client	client	client	client	client

NETWORK

DBMS
OPERATING SYSTEM
DATA

DBMS
OPERATING SYSTEM
DATA