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

APPLICATIONS

BATCH PROGRAMS

INTERACTIVE END-USERS

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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

CONCEPTUAL LEVEL
common view

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.

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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/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

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