

# Chapter 5: Parts of Information System

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# Database management system (1)

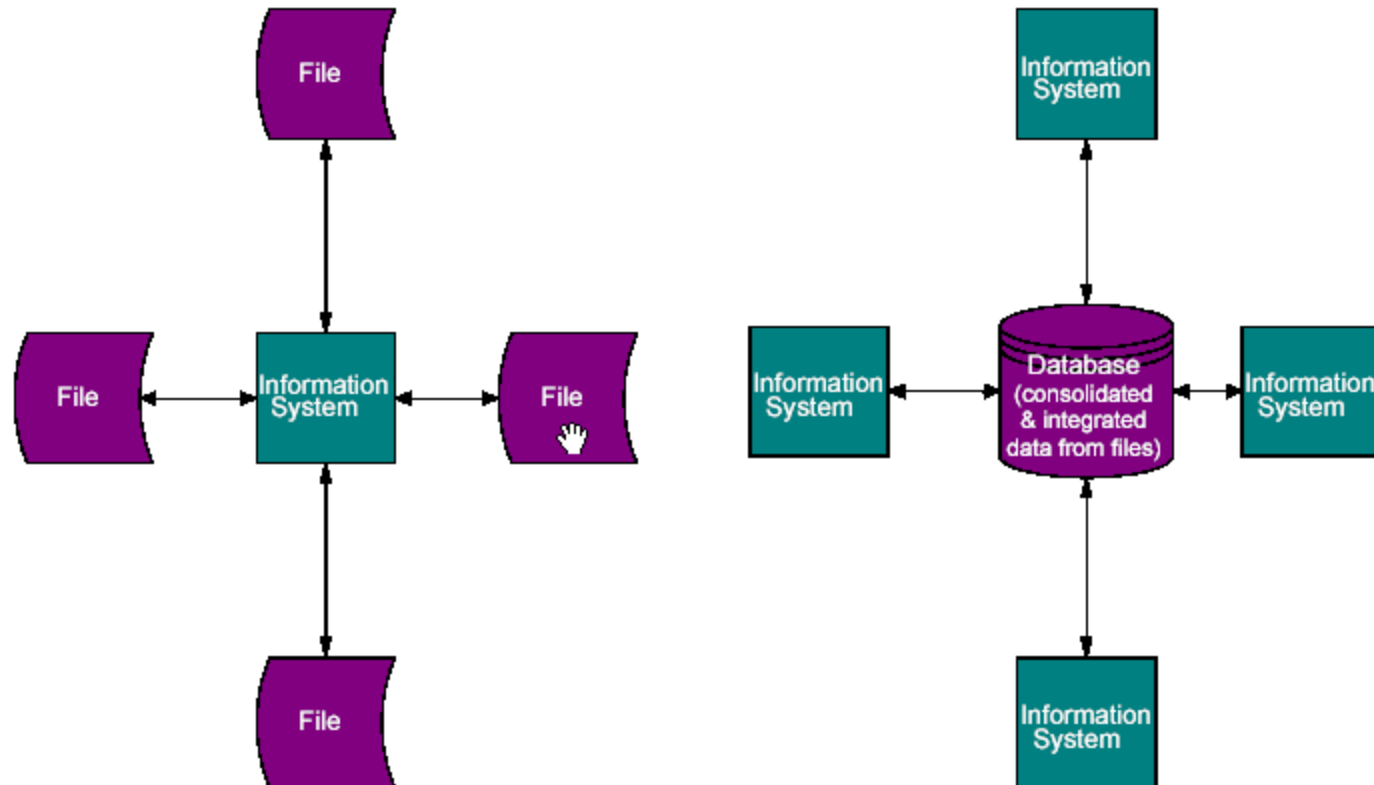


Fig: File vs Database

# Database management system (2)

File	Database
A file is a collection of similar records.	Database is a collection of interrelated files /tables
Files are unrelated to each other except in a code of an application program.	Records of one file/table are physically related to the records in another file/table
Data storage is build around the application that uses the files.	Applications are built around the integrated database.

- Pros and cons of file

Pros	Cons
Easy to design because of their single-application focus	Harder to adapt to sharing across Applications
Excellent performance due to optimized organization for a single application.	Harder to adapt to new requirements
	Need to duplicate attributes in several files.



# Database management system (3)

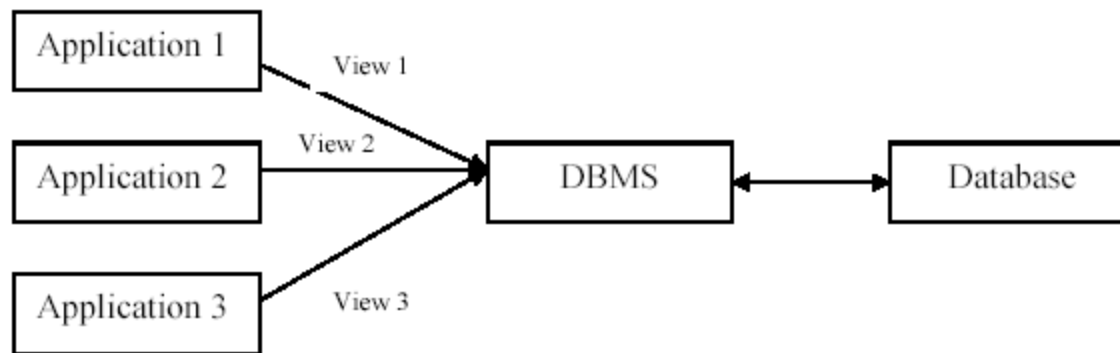
- Pros and cons of database

Pros	Cons
Ability to share data across applications	Harder to adapt to sharing across applications
Less, and controlled redundancy (total non-redundancy is not achievable)	Harder to adapt to new requirements
Data independence from applications increases adaptability	Need to duplicate attributes in several files
Superior scalability	Somewhat slower performance
	Higher development costs
	Greater data vulnerability



# Database and DBMS (1)

- A database is a collection of related data necessary to manage an organization
- A database models the data resource of an organization using the relationship between different data items.
- The **data model** is independent of any application programs.
- Parts of database used by different application programs
- Application program may require different "**views**" of portions of data from a database
- A DBMS is a set of procedures that manage the database and provide the access to the database in a form required by any application program

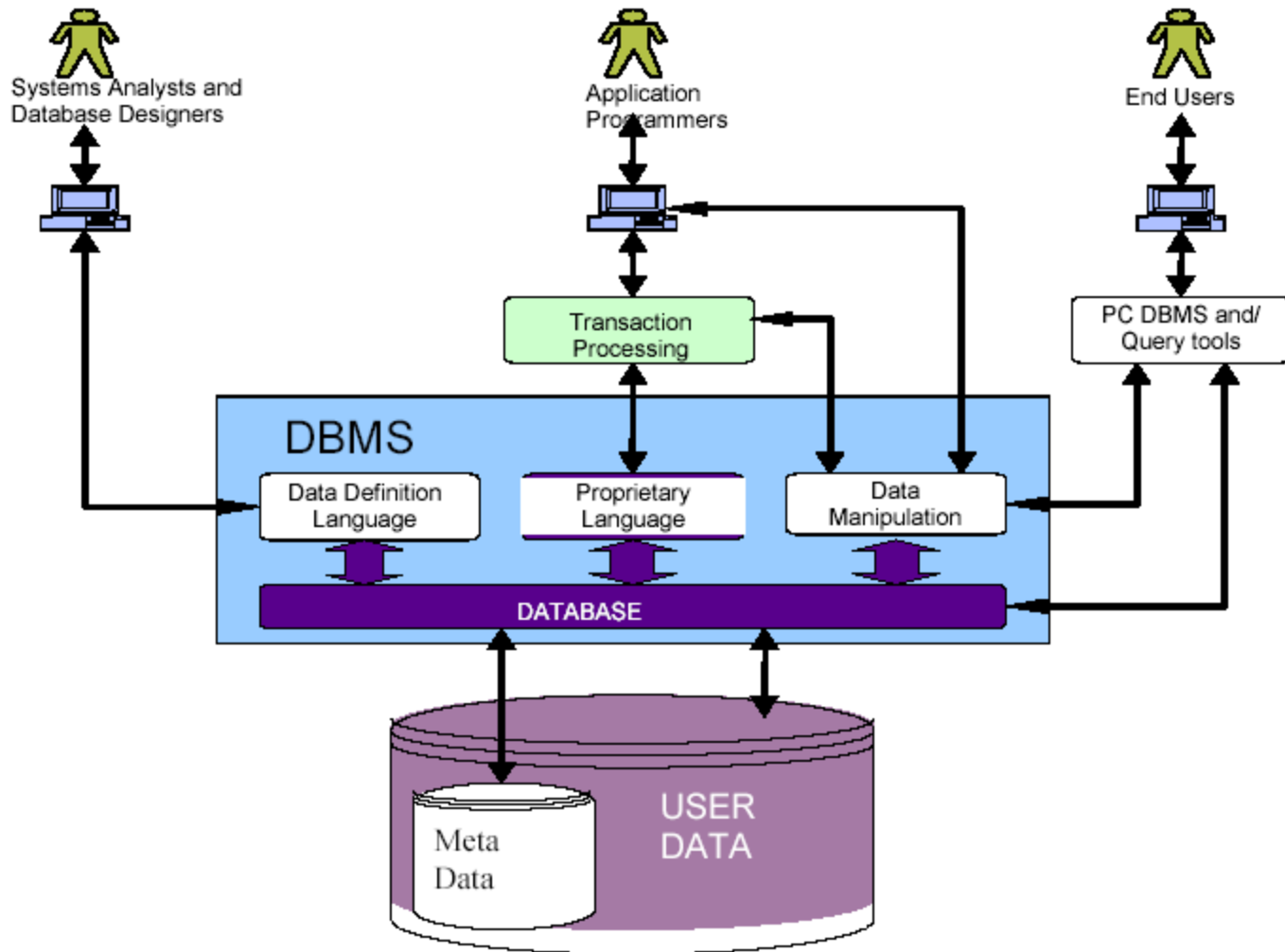


# Database and DBMS (2)

- **Database architecture** refers to the database technology including the database engine, database utilities, CASE tools, and database development tools.
- A **database management system (DBMS)** is specialized software that is used to create, access, control, and manage the database. The core of the DBMS is a **database engine**.
- **Data Definition Language (DDL)** and **Data Manipulation Language (DML)**



# Database and DBMS (3)



# Database and DBMS (4)

- Objectives of database management
  - A database should provide for efficient storage, update, and retrieval of data.
  - A database should be reliable—the stored data should have high integrity and promote user trust in that data.
  - A database should be adaptable and scalable to new and unforeseen requirements and applications.
  - A database should identify the existence of common data and avoid duplicate recording. Selective redundancy is sometimes allowed to improve performance or for better reliability.
- Database design
  - A good database system should:
    - Satisfy current and future application needs of an organization.
    - Cater to unanticipated user requirements in the best possible way.
    - Be expandable with growth and changes in an organizational.
    - Be easy to modify with changes in hardware and software environment.
    - Validate data before storage.
    - Allow only authorized persons to have access to the data stored in the database.





# Database and DBMS (5)

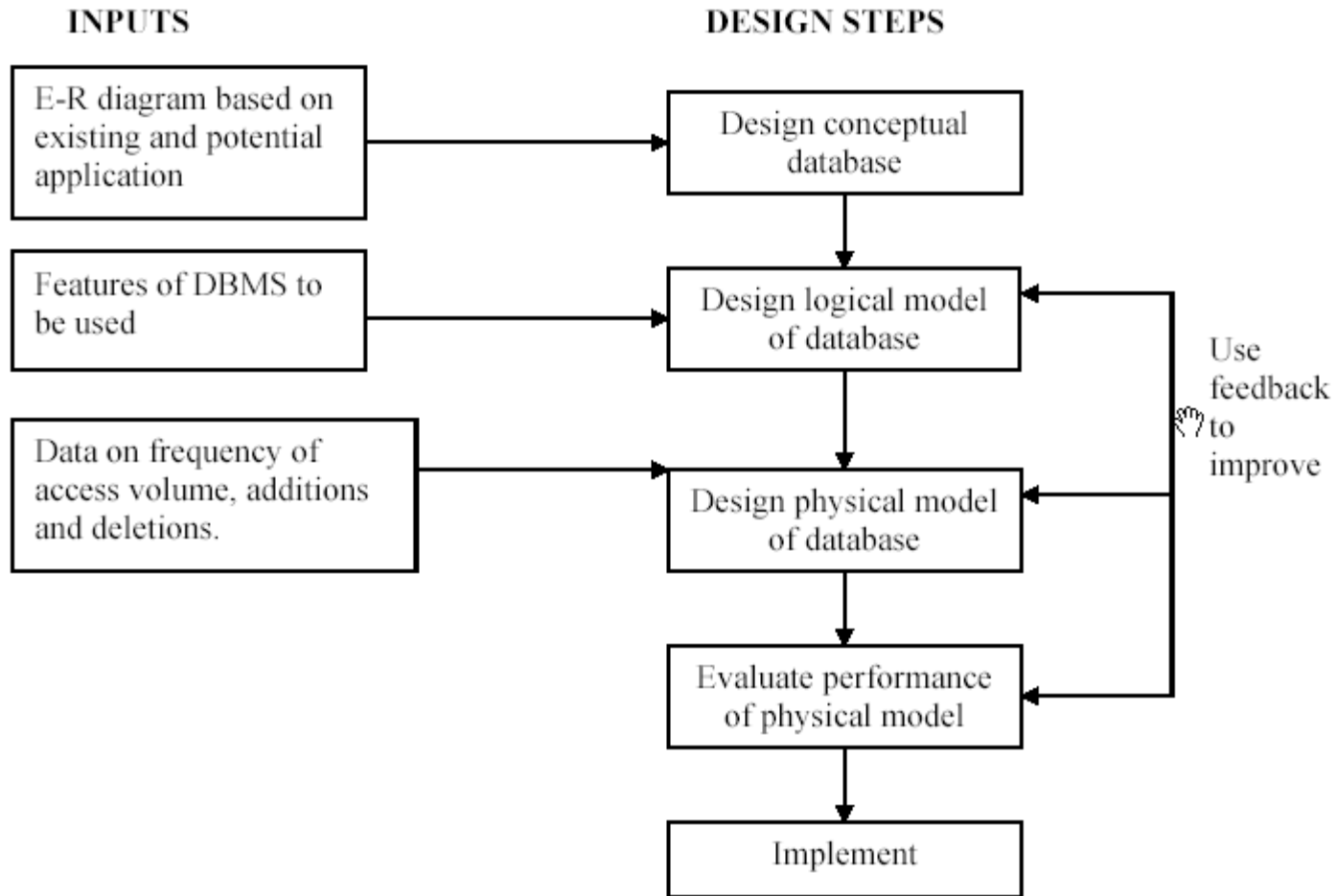


Fig: Steps in design of database system

# Database and DBMS (6)

- Data Dictionary

- A Central tool for defining data in a DBMS is a repository called a data dictionary. For each data-item, data dictionary includes
  - Name of data item
  - Definition of data item
  - Name of the file/table in which data item is stored
  - Abbreviation that can be used as the column heading for reports.
  - A typical format for output
  - The range of reasonable values.
  - The identification of data flow diagrams where it appears in system
  - documentation
  - The identification of user input screens and output screens where it appears.
- A data dictionary defines the data in the system and therefore consists of Meta data, data that defines data in the database.



# Automation process(1)

- An assembly of computer hardware, software, firmware, or any combination of these, configured to accomplish specific information-handling operations, such as communication, computation, dissemination, processing, and storage of information.
- Benefits:
  - Faster cycle times
  - Reduced costs
  - A smart scalable, knowledge based automation infrastructure
  - Increased competitiveness



# Automation process (2)

- Automated office
  - For the office, the computer information system can do routine supervision and continuous monitor in, so that extensive checking by the employee is not required.
  - So that all level managers communicate with the other levels with out much effort.
  - Computer based information system monitors every financial and other major transactions so there is just no need for extensive checking, there by eliminating unnecessary, non-value adding positions of middle management.
  - Work flow automation captures the formal organization structure faithfully and incorporates them in to the design of ISs.



# Automation process (3)

- Software life cycle automation
  - Software lifecycle automation results the automation of the back end of the software lifecycle.
  - There can be more than 200 automated processes included in the back end of the software lifecycle- which we don't have to understand, manage or worry about.
  - Replaces expensive labor with inexpensive automation- this gives sustainable increment in productivity, efficiency and competitiveness.



# Automation process (4)

- Software lifecycle automation (contd..)
  - Process Automation for software life cycle
    - For the automation process, the system takes into account of:
      - Information specified in the invocation command line
      - Information stored in a center knowledge base of process knowledge
      - Files that are involved in the process
      - Dynamic conditions in the surrounding computing environment.



# Automation process (5)

- Software lifecycle automation (contd..)
  - Automated processes of Software life cycle are:
    - Code development processes
    - Change management processes
    - Software built processes
    - Software test processes
    - Software release processes
    - Software documentation, maintenance processes
    - Software deployment, database management, administrative tasks



# Automation process (6)

- Software lifecycle automation (contd..)
  - Benefits:
    - Fast, seamless, scalable, general-purpose automation is possible
    - Reduced costs, efforts, time, more accuracy, more efficiency, reduced risks, more productivity.
    - Drastically simplifies the easy, repeated, effortless use of software processes
    - Drastically simplifies the creation and management of automated process knowledge
    - Seamlessly automate the whole back end processing





# Automation process (7)

- Automation Tools
  - CAD/CAM tools: used for design products such as vehicles, machines.
  - CASE tools- Microsoft VISIO, PROJECT
  - Software life cycle automation tools: explained earlier
  - Process and project managers:
    - They help us manage the system development methodology and projects



# Geographical Information System (1)

- A systematic integration of Computer Hardware, Software and Spatial Data, for capturing, storing, displaying, updating manipulating and analyzing, in order to solve complex management problems.



# Geographical Information System (2)

- Geographic data types
  - Geographic data are organized in a geographic database.
  - This database can be considered as a collection of spatially referenced data that acts as a model of reality

## 1. Attribute Data

- They are often referred to as non-spatial data since they do not in themselves represent location information

District	Name Area	Population
Noida	395 sq. Km.	6,75,34
Ghaziabad	385 sq. Km.	2,57,086



# Geographical Information System (3)

- Geographic data types (contd..)

- 2. Spatial data

- To specify the position in an absolute way a coordinate system is used .
    - For small areas, the simplest coordinate system is the regular square grid.
    - For larger areas, certain approved cartographic projections are commonly used('graticule')

- 3. Point Data

- Points are the simplest type of spatial data
    - They are-zero dimensional objects with only a position in space but no length.



# Geographical Information System (4)

- Geographic data types (contd..)

- 4. Line Data

- Lines (also termed segments or arcs) are one-dimensional spatial objects. Besides having a
    - position in space, they also have a length.

- 5. Area Data

- Areas (also termed polygons) are two-dimensional spatial objects with not only a position in space and a length but also a width (in other words they have an area).



# Geographical Information System (5)

- More definitions on GIS

- *"A GIS is an information system that is designed to work with data referenced by spatial or geographic coordinates. In other words, a GIS is both a database system with specific capabilities for spatially-reference data, as well as a set of operations for working with data . . . In a sense, a GIS may be thought of as a higher-order map."*
- *A GIS is "an organized collection of computer hardware, software, geographic data, and personnel designed to efficiently capture, store, update, manipulate, analyze, and display all forms of geographically referenced information."*



# Geographical Information System (6)

- More definitions on GIS (contd..)
  - GIS can be used by any business that utilizes geographical information. For example:
    - exploration and mining companies use GIS information to find out prospective areas for exploration and mining and also to analyze the ore body.
    - power companies use GIS to monitor and analyze the electricity load on the grid network for a particular area
    - transportation companies use GIS to help determine the best route for delivering there goods at less time.
    - Retail (put on market) using GIS to determine the best location for a new outlet.
    - Nowadays, GIS data is also used on the Internet for giving a graphical representation of the users querying.



# Geographical Information System (7)

- Components of GIS
  - Hardware
  - Software
  - Data
  - People
  - Methods

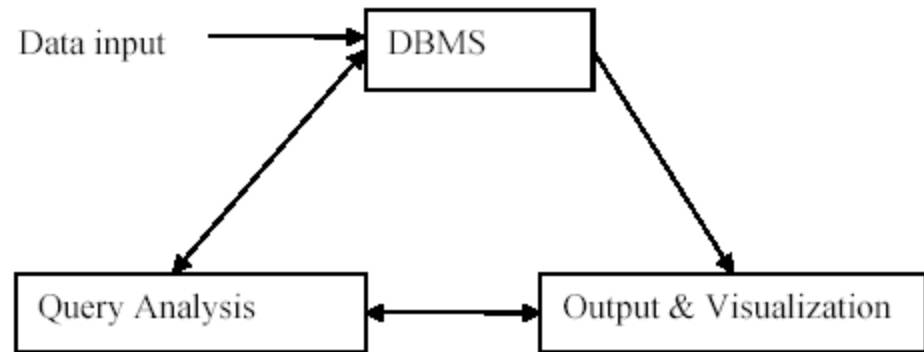


Fig: Functional components of GIS



# Geographical Information System (8)

- GIS Tasks
  - Keep inventories of what is where
  - Create high quality maps quickly Manage properties, Facilities
  - Judge the suitability of areas for different purposes
  - Help users make planning decisions
  - Make predictions about the future (modeling)
  - Track changes in land use over time



# Geographical Information System (9)

- Power of GIS
  - Based on geographic location and proximity, GIS makes connections between activities and phenomena
  - Looking at data geographically can often suggest new insights and explanations
  - These connections are often unrecognized without GIS, but can be vital to understanding and managing activities and resources
  - For example, we can link pollution sources with disease patterns



# Geographical Information System (9)

- Applications of GIS
  - Agriculture , Forestry, Land use planning
  - Business
  - Electric / Gas utilities, Environment
  - Geology
  - Hydrology
  - Military
  - Transportation

