SYSTEM CONCEPT

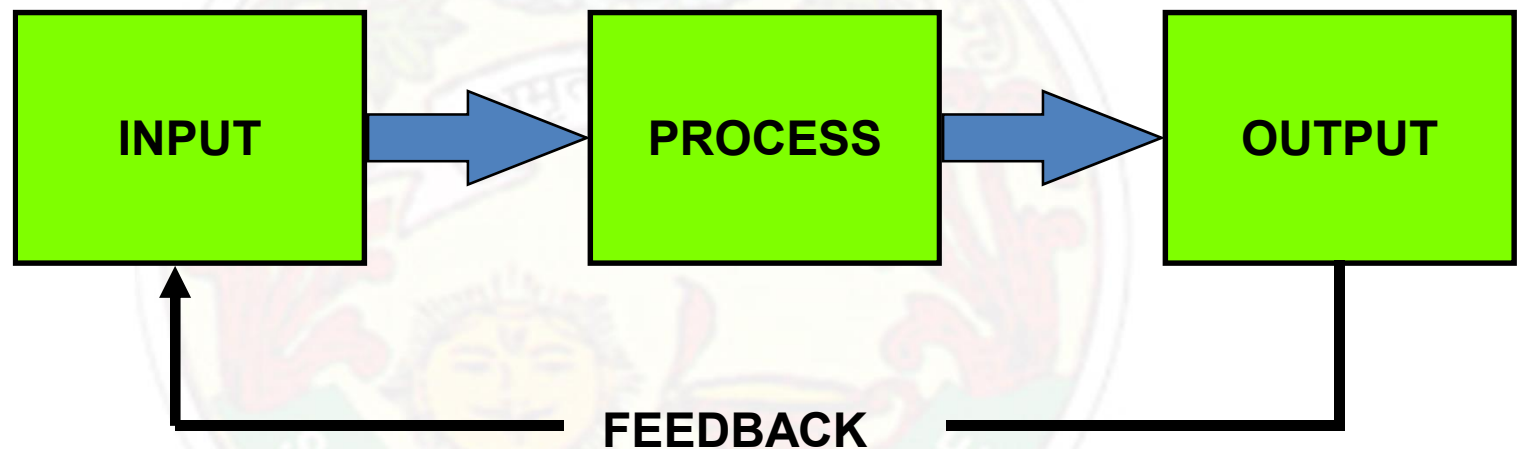# What is a System?

- A collection of parts that work together to achieve a goal/task
  - Examples
    - Solar system
    - Digestive systems
    - Public transport system
    - Central heating system
    - Computer system
    - Information system

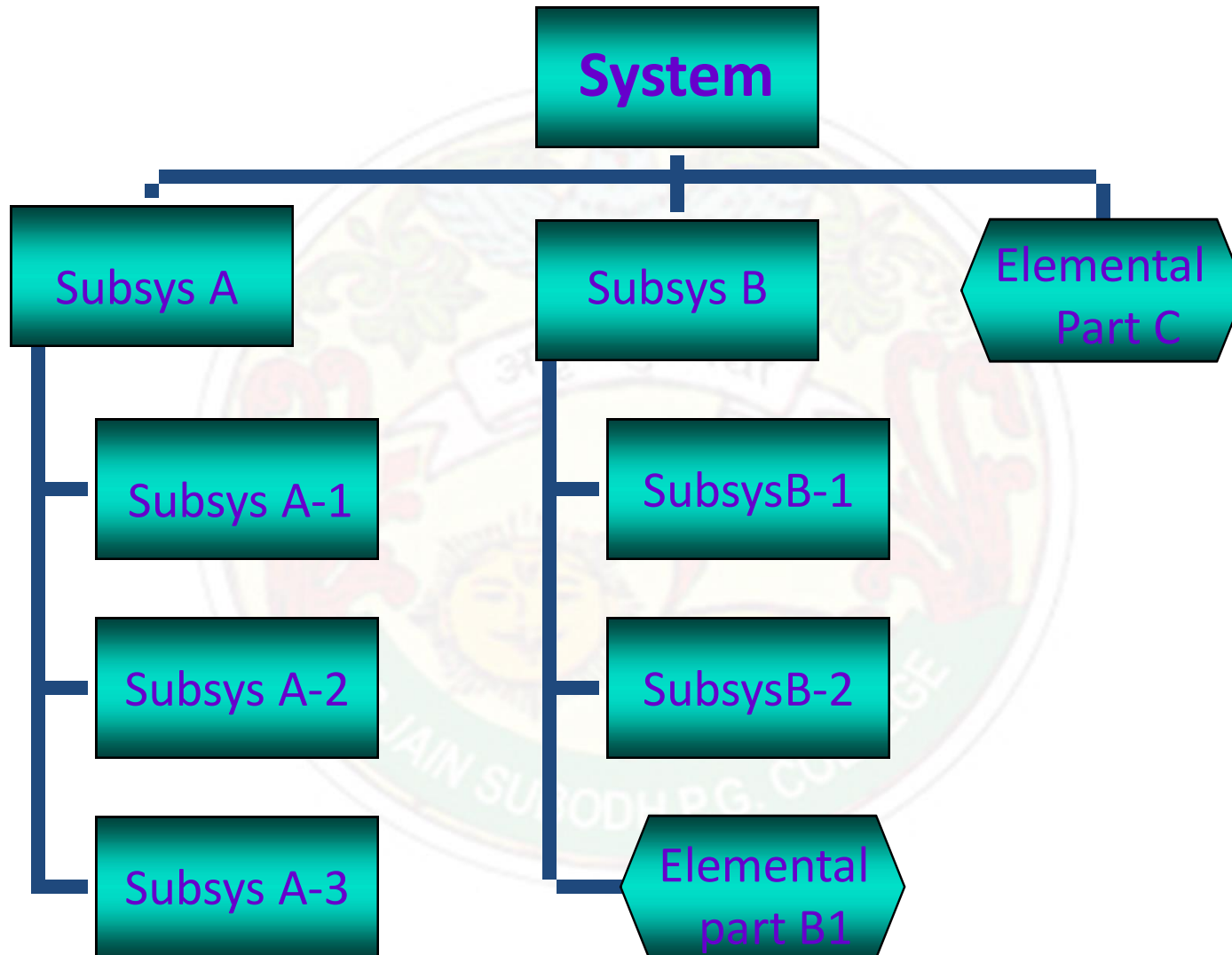- A set of objects and relationships among the objects viewed as a whole and designed to achieve a purpose

System Elements

```
┌──────────┐        ┌──────────┐        ┌──────────┐
│          │   ▶    │          │   ▶    │          │
│  INPUT   │        │ PROCESS  │        │  OUTPUT  │
│          │        │          │        │          │
└──────────┘        └──────────┘        └──────────┘
      ▲                                        │
      └──────────────── FEEDBACK ──────────────┘
```

Systems

Can Be Composed of Subsystems

```
                        System
        ┌──────────────────┼──────────────────┐
   Subsys A            Subsys B          Elemental
     │                   │                Part C
     ├── Subsys A-1       ├── SubsysB-1
     │                    │
     ├── Subsys A-2       ├── SubsysB-2
     │                    │
     └── Subsys A-3       └── Elemental
                             part B1
```

What is subsystem?

- A subsystem is simply a system within a system.
  - Automobile is a system composed of subsystems:
    - Engine system
    - Body system
    - Frame system
  - Each of these subsystem is composed of sub-sub --systems.
    - Engine system: carburetor system, generator system, fuel system, and so son

Bad Systems

- Fail to meet requirements
- Poor performance
- Poor reliability
- Lack of usability
- Example difficulties:
  - Not to schedule
  - Not to budget
  - Runaway = 100% over budget or schedule
- Some problems are simply "wicked" problems

Reasons for Failure

- Complexity
  - Shifting requirements
  - Bad estimation
  - Bad management
  - New technology
- Must tackle complexity by, for example:
  - Structure partitioning of problem
  - Organized interaction of parts
  - Ensure you achieve the task
- Systems are subject to the need for continuing change

Important System Concepts

- Decomposition
  - The process of breaking down a system into smaller components
  - Allows the systems analyst to:
    - Break a system into small, manageable subsystems
    - Focus on one area at a time
    - Concentrate on component pertinent to one group of users
    - Build different components at independent times

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Important System Concepts

- ## Modularity
  - Process of dividing a system into modules of a relatively uniform size
  - Modules simplify system design
- ## Coupling
  - Subsystems that are dependent upon each other are coupled
- ## Cohesion
  - Extent to which a subsystem performs a single function

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Computer-based Information Systems (CBIS) vs Manual Systems
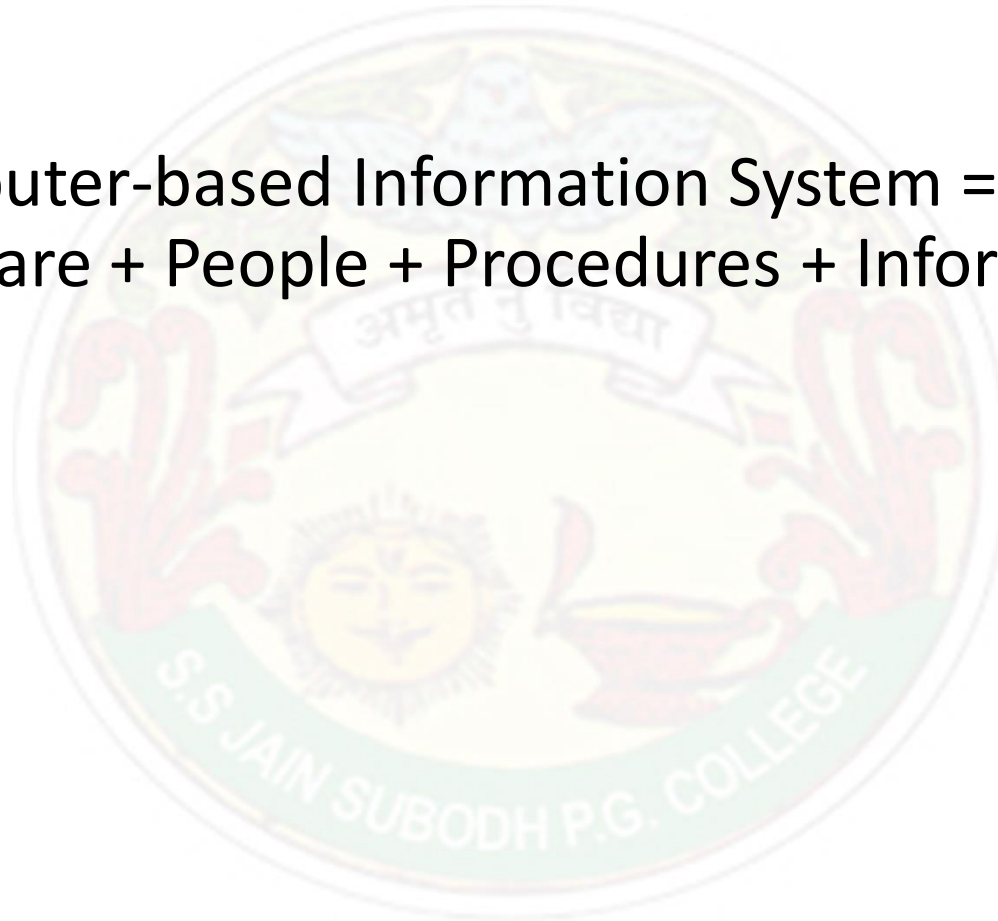
- CBIS
  - Information system that rely on computer hardware and software for processing and disseminating information

- Manual systems
  - Use paper + pencil technology

CBIS Components

- A Computer-based Information System = Hardware + Software + People + Procedures + Information

Data and Information

- Data are raw facts about the organization and its business transactions. Most data items have little meaning and use by themselves.

- Alternative definition:

  - Data are a collection of items such as words, numbers, images, and sounds that are not organized and have little meaning individually

  - Data are raw facts about people, objects, and events in an organization

- information: Data that is organized

Data flow and processing logic

- Data flow:
  - Data in motion, moving from one place in a system to another

- Processing logic:
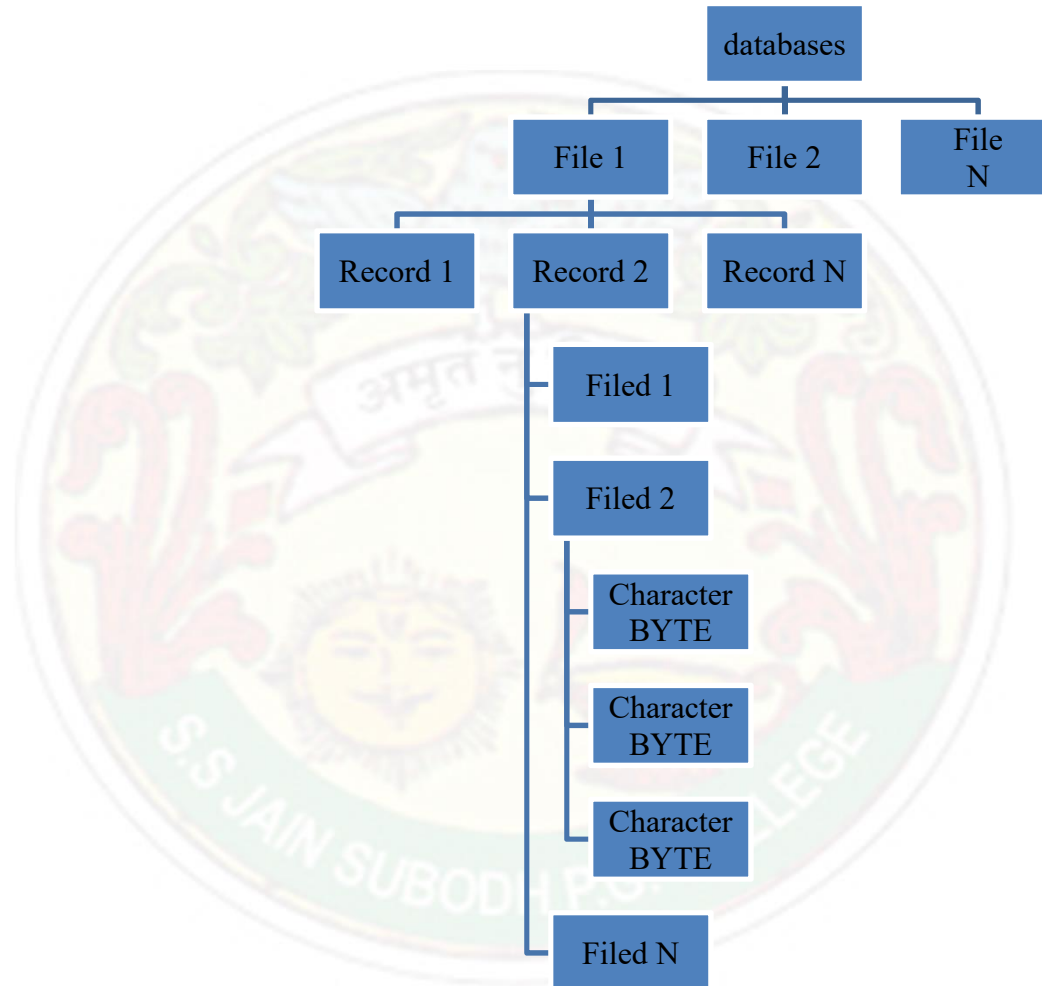 - The steps by which data are transformed or moved and a description of the events that trigger these steps

Databases

- A shared collection of logically related data designed to meet the information needs of multiple users in organization.
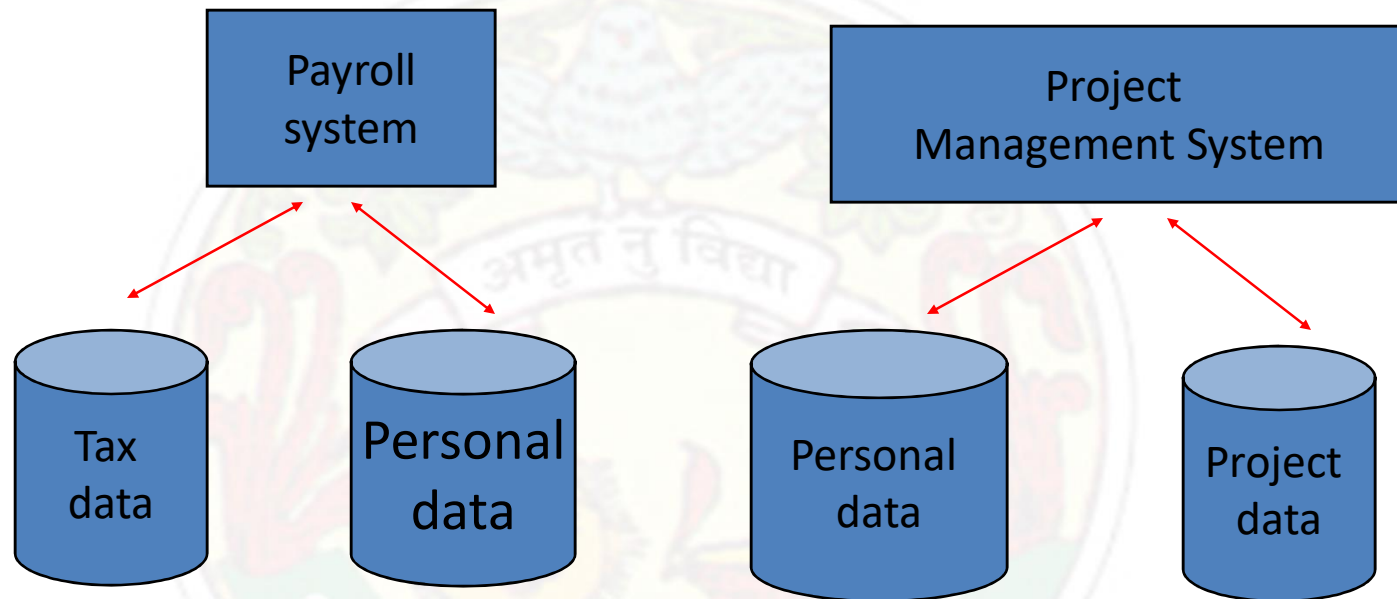
- Database – Files – Records -- Fields

Levels of data managements

```
                        databases
                            |
        +-------------------+-------------------+
        |                   |                   |
      File 1              File 2              File
                                                N
        |
    +-------------------+-------------------+
    |                   |                   |
  Record 1          Record 2            Record N
                        |
                     Filed 1
                        |
                     Filed 2
                        |
                   Character
                     BYTE
                        |
                   Character
                     BYTE
                        |
                   Character
                     BYTE
                        |
                     Filed N
```

Traditional vs database approach

- Traditional approach

Redundant data

Traditional vs database approach

- Database approach

THANKS