Introduction to System Analysis AND design

Subject:System Analysis And Design
Prepared By: Apurva Mishra
Department: Computer Application

Fundamentals of System

In modern organizations, information systems play an important role in managing data, improving decision-making, and increasing efficiency. To build effective information systems, it is necessary to understand the concept of **System Analysis and Design (SAD)** and the **fundamentals of a system**.

A system is present everywhere in our daily life. Examples include the **education system, banking system, transportation system, and computer system**. These systems consist of multiple components that work together to achieve a specific objective.

In the field of information technology, understanding the basic structure and functioning of systems helps in designing efficient software and information systems.

Concept of a System

A **system** is a group of interconnected components that work together to achieve a common objective.

Each component of the system performs a specific function, and all components interact with each other to produce desired results.

Example

Consider a **library management system**.

- **Input**: Student details, book records
- **Process**: Issue books, return books, update records
- **Output:** Book availability report, due date notification

Thus, the system converts input into meaningful output through a defined process.

Definition of a System

Different scholars have defined a system in different ways.

Definition 1:
A system is an organized collection of interrelated components that work together to achieve a common goal.

Definition 2:
A system is a set of elements that interact with each other to transform inputs into outputs.

These definitions highlight three important elements:

- **Components**
- **Interaction**
- **Objective**

Components of a System

Every system consists of several basic components that allow it to function effectively.

1. Input

Input refers to the **data, resources, or signals that enter the system** for processing.

Inputs may come from internal or external sources.

Examples

- Student information in a university system
- Customer order in an online shopping system
- Login credentials in a computer system

Without input, a system cannot perform any operation.

Processing

Processing refers to the **activities or operations performed on input data to transform it into useful information**.

Processing may include calculations, comparisons, sorting, and analysis.

Examples

- Calculating student grades
- Processing bank transactions
- Generating sales reports

Processing is the central part of any system.

Output

Output is the **result or information produced by the system after processing**.

Outputs provide useful information to users and help in decision-making.

Examples

- **Student result sheets**
- **Financial reports**
- **Sales invoices**

Outputs should be accurate, relevant, and timely.

FEEDBACK

Feedback is the **information returned to the system to evaluate its performance and improve its functioning**.

Feedback helps in correcting errors and improving efficiency.

Examples

- Error messages in software
- Customer feedback in a business system
- Performance reports

Control

Control refers to **mechanisms that ensure the system operates according to predefined standards and objectives**.

Control helps maintain system stability and accuracy.

Examples

- **Password authentication**
- **Data validation rules**
- **Access permissions**

Characteristics of a System

A system has several important characteristics that define its structure and functioning.

1.ORGANIZATION

A system has a **structured arrangement of components**. Each component has a specific role.

Example:
In a university system, departments such as administration, examination, and accounts are organized to perform different functions.

2. Interaction

Components of a system **interact with each other to perform tasks**.

Example:
The admission department interacts with the examination department to update student records.

3. Interdependence

The components of a system **depend on each other for proper functioning**.

Example:
If input data is incorrect, the output will also be incorrect.

4. Integration

Integration means **combining different components into a unified whole**.

All parts of the system work together to achieve the overall objective.

Example:
A hospital management system integrates patient records, billing, and pharmacy systems.

5. Central Objective

Every system has a **specific goal or purpose**.

Example:
The goal of a banking system is to manage financial transactions efficiently.

6. Types of Systems

Systems can be classified into different types based on their structure and interaction with the environment.

1. Physical System

A **physical system** consists of tangible components that can be seen and touched.

Examples

- Computer hardware system
- Manufacturing plant
- Transportation system

2. Abstract System

An **abstract system** consists of concepts, ideas, or models.

Examples

- Mathematical models
- Algorithms
- Software programs

4. Closed System

A **closed system does not interact with its external environment**.

It operates independently and does not exchange information with outside elements.

Example

A chemical reaction in a sealed container.

Closed systems are rare in real life.

5. Deterministic System

In a **deterministic system**, the output can be predicted with certainty if the input is known.

Examples

- Mathematical calculations
- Computer algorithms

6. Probabilistic System

In a **probabilistic system**, the output cannot be predicted exactly.

It depends on probability and uncertain factors.

Examples

- Weather forecasting
- Stock market system

7. Elements of a System

Certain elements define the structure and environment of a system.

1.BOUNDARY

The boundary defines the **limit of the system and separates it from the external environment**.

Example:
The boundary of a banking system separates internal operations from customers and regulatory bodies.

2. Environment

The environment includes **all external factors that influence the system**.

Example:

- **Government regulations**
- **Market conditions**
- **Customer behavior**

3. Interface

The interface is the **point where two systems interact or communicate with each other**.

Example:

- User interface in software
- Data exchange between two departments

8. System in Information Technology

In the field of information technology, a system consists of several components working together to manage information.

These components include:

1. **Hardware**
2. **Software**
3. **Data**
4. **People**
5. **Procedures**

9. Importance of System Concept in System Analysis and Design

Understanding the fundamentals of systems is important for system analysts and developers.

It helps in:

- **Identifying problems in existing systems**
- **Understanding business processes**
- **Designing efficient information systems**
- **Improving organizational performance**
- **Reducing errors and operational costs**

System analysis and design uses system concepts to build reliable and efficient software solutions.