## System Development Meaning

Systems development is systematic process which includes phases such as planning, analysis, design, deployment, and maintenance. Here, in this tutorial, we will primarily focus on −

- Systems analysis
- Systems design

# System Analysis

### System

The term system is derived from Greek word systema. The meaning of systema is organized relationship among components. The system is an organization build from many components to obtain desired goals or output. All the components of system are dedicated for system output. In broad sense, there are only two systems: (a) Natural System and (b) Fabricated System

**(a) Natural System**: Our universe is a system. Then all galaxies are sub-systems. There are many systems in nature such as water system, wind system, ecosystem etc. Our body is also build from 9 systems.

**(b) Fabricated or Artificial System**: Manmade system is called fabricated system. In this system, man and machine assemble the entire component to obtain objective. There are many examples of this type of systems. All the system is artificial except natural systems.

### Analysis

An analysis is a detailed inquiry about a particular problem. It enquires about the answers to all possible questions like what, why, when, how? An analysis is a detailed inquiry about a particular problem. It enquires about the answers to all possible questions like what, why, when, how?

For example - if we have a problem and want to solve systematically than we will start from the point-like what is the problem?

Is there any existing solution?

What will be a feasible solution?

How the problem will be solved efficiently?

An analysis is a systematic study/evaluation of data or information by splitting it into its parts to reveal its interrelations. The person who did analysis is known as an analyst. The analyst is an experienced and expert candidate who did the analysis.

**Systems Analysis Meaning**

It is a process of collecting and interpreting facts, identifying the problems, and decomposition of a system into its components.

System analysis is conducted for the purpose of studying a system or its parts in order to identify its objectives. It is a problem solving technique that improves the system and ensures that all the components of the system work efficiently to accomplish their purpose.

Analysis specifies what the system should do.

## Properties of a System

A system has the following properties −

**1. Organization**

Organization implies structure and order. It is the arrangement of components that helps to achieve predetermined objectives.

**2. Interaction**

It is defined by the manner in which the components operate with each other.

For example, in an organization, purchasing department must interact with production department and payroll with personnel department.

### 3. Interdependence

Interdependence means how the components of a system depend on one another. For proper functioning, the components are coordinated and linked together according to a specified plan. The output of one subsystem is the required by other subsystem as input.

### 4. Integration

Integration is concerned with how a system component is connected together. It means that the parts of the system work together within the system even if each part performs a unique function.

### 5. Central Objective

The objective of system must be central. It may be real or stated. It is not uncommon for an organization to state an objective and operate to achieve another.

The users must know the main objective of a computer application early in the analysis for a successful design and conversion.

## Types of System

Different kinds of system may be understood as

### 1. Abstract and physical systems

An abstract or conceptual system is an orderly arrangement of interdependent ideas or constructs, which may or may not have any counterpart in the real world.

On the other hand, physical systems are generally concrete operational systems made up of people, materials, machines, energy and other physical things; Physical systems are more than conceptual constructs.

### 2. Deterministic and Probabilistic Systems

A deterministic system is one in which the occurrence of all events is known with certainty. A probabilistic system is one in which the occurrence of events cannot be perfectly predicted.

Though the behavior of such a system can be described in terms of probability, a certain degree of error is always attached to the prediction of the behavior of the system.

### 3. Open and Closed Systems

An open system is one that interacts with its environment and thus exchanges information, material, or energy with the environment, including random and undefined inputs. Open systems are adaptive in nature, as they tend to react with the environment in such a way, so as to favor their continued existence. Such systems are ‘self organizing’, in the sense that they change their organization in response to changing conditions.

A closed system is one, which does not interact with its environment. Such systems in business world are rare, but relatively closed systems are common. Thus, the systems that are relatively isolated from the environment but not completely closed are termed closed system.

### 4. User Machine Systems

Most of the physical systems are user-machine (or human –machines) systems It is difficult to think of a system composed only of people who do not utilize equipment of some kind to achieve their goals. In user-machine systems, both, i.e. human as well as machine perform some activities in the accomplishment of a goal (e.g. decision-making). The machine elements (may be computer hardware and software) are relatively closed and deterministic, whereas the human elements of the system are open and probabilistic.

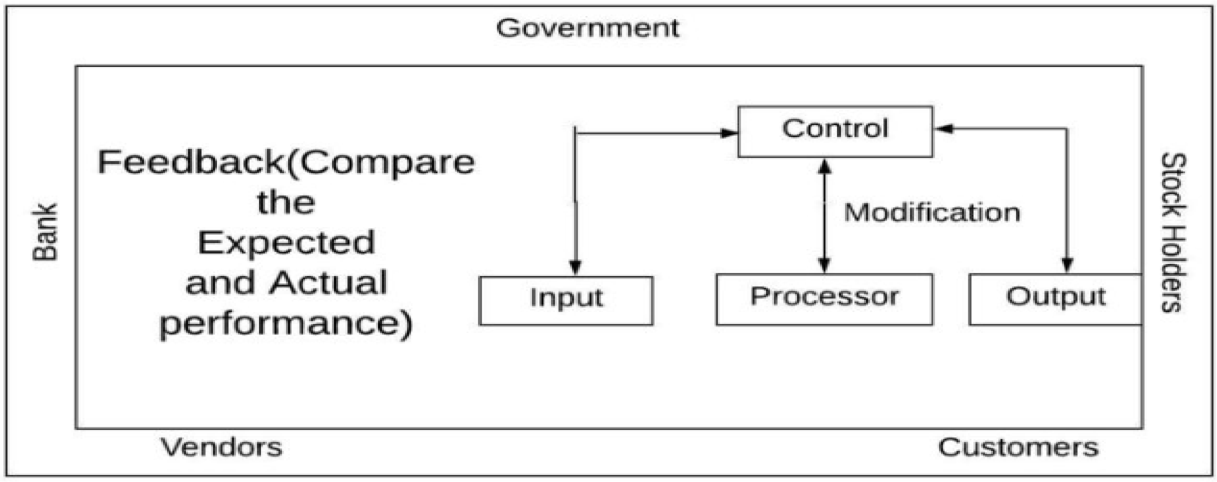
## Elements of a System

**The basic three elements of a system are:**

**1.** Input

**2.** Processing

**3.** Output



**In addition of this, four more elements play an important role. These are:**

**1.** Control

**2.** Feedback

**3.** Environment

**4.** Boundaries & Interface

**Therefore the key elements of a system are:**

- **Output**

First of all, we must determine what the objectives or goals are, what we intend to achieve. Once we know our aim, we can try to achieve it in the best possible way.

- **Input**

Once we know the output, we can easily determine what the input should be.

- **Processes**

Here we come to the details of how the inputs & files are converted into outputs. Processes may modify the input totally or partially depending on the specifications of the output.

- **Control**

Control of the system is the decision-maker that controls the activities of accepting input processing and producing output.

**For Eg.**

In an organizational context, management as a decision making body controls the inflow, handling, and outflow of activities that affect the welfare of the business.

- **Feedback**

The feedback of the output allows it to be measured against some standards& making adjustments in the processing accordingly.

- **Environment**

The environment is the source of external elements that have an effect on the system. In fact, it determines how a system must function.

- **Boundaries & Interfaces**

A system should be defined by its boundaries- the limits that identify its components, processes & interrelationships when interfaces with another system.

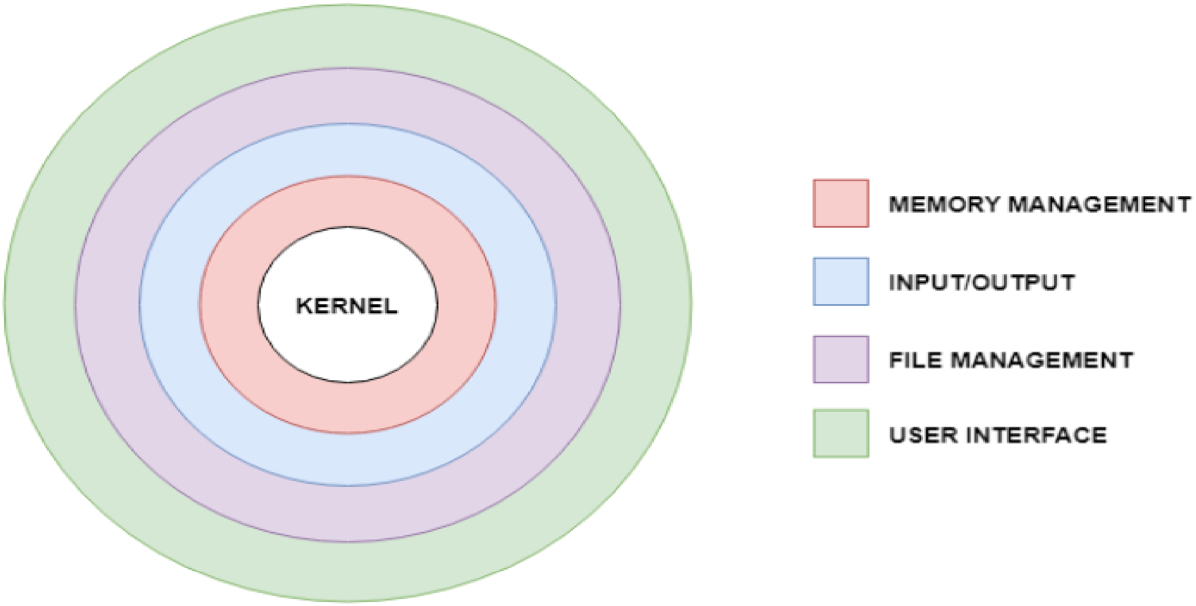
**For Eg.**

A teller system in a commercial bank is restricted to the deposits, withdrawals & related activities of customers checking and savings accounts.

## System Design and Implementation

An operating system is a construct that allows the user application programs to interact with the system hardware. Operating system by itself does not provide any function but it provides an atmosphere in which different applications and programs can do useful work.

There are many problems that can occur while designing and implementing an operating system. These are covered in operating system design and implementation.



Layered Operating System Design

## Operating System Design Goals

It is quite complicated to define all the goals and specifications of the operating system while designing it. The design changes depending on the type of the operating system i.e if it is batch system, time shared system, single user system, multi user system, distributed system etc.

There are basically two types of goals while designing an operating system. These are:

- **User Goals**

The operating system should be convenient, easy to use, reliable, safe and fast according to the users. However, these specifications are not very useful as there is no set method to achieve these goals.

- **System Goals**

The operating system should be easy to design, implement and maintain. These are specifications required by those who create, maintain and operate the operating system. But there is not specific method to achieve these goals as well.

### Operating System Mechanisms and Policies

There is no specific way to design an operating system as it is a highly creative task. However, there are general software principles that are applicable to all operating systems.

A subtle difference between mechanism and policy is that mechanism shows how to do something and policy shows what to do. Policies may change over time and this would lead to changes in mechanism. So, it is better to have a general mechanism that would require few changes even when a policy change occurs.

For example – If the mechanism and policy are independent, then few changes are required in mechanism if policy changes. If a policy favors I/O intensive processes over CPU intensive processes, then a policy change to preference of CPU intensive processes will not change the mechanism.

Implementation is a process of ensuring that the information system is operational. It involves −

- Constructing a new system from scratch
- Constructing a new system from the existing one.

Implementation allows the users to take over its operation for use and evaluation. It involves training the users to handle the system and plan for a smooth conversion.

### Advantages of Higher Level Language

There are multiple advantages to implementing an operating system using a higher level language such as: the code is written faster, it is compact and also easier to debug and understand. Also, the operating system can be easily moved from one hardware to another if it is written in a high level language.

### Disadvantages of Higher Level Language

Using high level language for implementing an operating system leads to a loss in speed and increase in storage requirements. However in modern systems only a small amount of code is needed for high performance, such as the CPU scheduler and memory manager. Also, the bottleneck routines in the system can be replaced by assembly language equivalents if required.