SYSTEM DESIGN

The design of an information system produces the details that clearly describe how a system will meet the requirements identified during systems analysis. Systems specialities often refer to this stage as logical design, in contrast to the process of developing program software, which is referred to as physical design. Systems analyst begins the design process by identifying reports and other outputs system will produce. Then the specific data on each are pinpointed. The systems design also described the data to be input, calculated or stored. Individual data items and calculation procedures are written in detail. Designers select file structures and storage devices, such as magnetic disk, magnetic tape or even paper files. Procedures they write tell how to process that data and produce the output. The documents containing the design specifications portray the design in many different ways – charts, tables, and special symbols. The detailed design information is passed on to the programming staff for the purpose of software development. Designers are responsible for providing programmers with complete and clearly outlined software specifications.

SYSTEM DESIGN CONSIDERATION

The system design process is not a step adherence of clear procedures and guidelines. Though, certain clear procedures and guidelines have emerged in recent days, but still much of design work depends on knowledge and experience of the designer. When designer starts working on system design, he will face different type of problems. Many of these will be due to constrains imposed by the user or limitations of the hardware and software available in the market. Sometimes, it is difficult to enumerate the complexity of the problems and solutions therefore since the variety of likely problems is so great and no solutions are exactly similar. However, following considerations should be kept in mind during the system designing phase

DESIGN OBJECTIVES

The primary objective of the design, of course, is to deliver the requirements as specified to the feasibility report. In general, the following design objectives should be kept in mind:

(a) PRACTICALITY

(b) The system must be stable and can be opened by people with average intelligence.

(b) **EFFICIENCY**

this involves accuracy, timeliness and comprehensiveness of the system output.

(c) **COST**

It is desirable to aim for a system with a minimum cost subject to the condition that it must satisfy all the requirements.

(d) **FLEXIBILITY**

The system should be modifiable depending on the changing needs of the user. Such modifications should not entail extensive reconstructing or recreation of software. It should also be portable to different computer systems.

(E) SECURITY

This is very important aspect of the design and should cover areas of hardware reliability, fall back procedures, physical security of data and provision for decision of fraud and abuse. System design involves first logical design and then physical consideration of the system. The logical design describes the structure and characteristics of features, like the outputs, inputs, files, databases and procedures. The physical construction, which follows the logical design, produces actual program software, files and a working system.

CONSTRAINTS

The designer normally will work under the following constraints:

Hardware:	The existing hardware will obviously affect the system design.
Software:	The available software (operating system, utilities, language etc.) in the market will constrain the design.
Budget:	The budget allocated for the project will affect the scope and depth of design.
Time scale:	The new system may be required by a particular time (e.g. the start of a financial year). This may put a constraint on the designer to find the best design.
Interface with other systems:	The new system may require some data from another computerized system or may provide data to another system in which case the files must be compatible in format and the system must operate with a certain processing cycle.

PROCESSING TECHNIQUES

The processing options available to the designers are:

- Batch processing
- Real-time processing
- Online processing
- A combination of all the above.

You are already aware of these techniques. It is quite interesting to note, however, that a combination of these is often found to be ideal in traditional data processing applications. This increases through-put of the system as also brings down the response time of online activities. In most of the business applications, 24-hour data is acceptable enough and hence it is possible to update voluminous data after office-hours in batch mode.

OPERATION

Typically, the flow of data through a system has been shown in Figure 3.1. Throughout the design process as described in the next section, the system designer must consider and specify the requirements of each of these operational areas.

Figure 3.1: Data Flow

DESIGN METHODOLOGIES

The scope of the systems design is guided by the framework for the new system developed during analysis. More clearly defined logical method for developing system that meets user requirements has led to new methodologies that fundamentally attempt to do the following:

- improve productivity of analysis and programmers
- improve documentation and subsequent maintenance and enhancement
- cut down drastically on cost overruns and delays
- improve communication among the user, analyst, designer, and programmer
- standardize the approach to analysis and design
- simplify design by segmentation.

STRUCTURES DESIGN

Structured design is a data flow based methodology. The approach begins with a system specification that identifies inputs and outputs and describes the functional aspects of the system. The specifications, then are used as a basis for the graphic representation. The next step is the definition of the modules and their relationships to one another in a form called a structure chart, using a data dictionary and other structured tools. Logical design proceeds from the top down. General features, such as reports and inputs are identified first. Then each is studied individually and in more detail. Hence, the structured design partitions a program into small, independent modules. They are arranged in a hierarchy that approximates a model of the business area and is organized in a topdown manner. Thus, structured design is an attempt to minimize the complexity and make a problem manageable by subdividing it into

smaller segments which is called Modularization or decomposition. In this way, structuring minimizes initiative reasoning and promotes maintainable provable systems.

A design is said to be top-down if it consists of a hierarchy of modules, with each module having a single entry and a single exit subroutine. The primary advantages of this design are as follows:

Critical interfaces are tested first.

- Early versions of the designs, though incomplete, are useful enough to resemble the real system.
- Structuring the design, parse, provides control and improves morale.
- The procedural characteristics define the order that determines processing.

MAJOR SYSTEM DESIGN ACTIVITIES

Several development activities are carried out during structured design. They are database design, implementation planning, system test preparation, system interface specification, and user documentation.

Database design his activity with the design of the physical database. A key is to determine how the access paths are to be implemented.

(b) Program design In conjunction with database design is a decision on the programming language to be used and he flowcharting, coding and debugging procedure prior to conversion. The operating system limits the programming languages that will run on the system.

(c) System and program test preparation Each aspect of the system has a separate test requirement. System testing is done after all programming and testing are completed. The test cases cover every aspect of the proposed system, actual operations, user interface and so on. System and program test requirements become a part of design specifications – a pre-requisite to implementation

System Interface Specification This phase specifies for the user how information should enter and leave the system. The designer offers the user various options. By the end of the design, formats have to be agreed upon so that machine-machine and human-machine protocols are well defined prior to implementation. Before the system is ready for implementation, user documentation in the form of a operator‟s manual must be prepared. The manual provides instructions on how to install and operate the system, how to provide input, how to access, update, or retrieve information, how to display or print output, in what format, and so on.

AUDIT CONSIDERATION

A well designed system should have controls to ensure proper and routine auditing. A proposed system‟s failure often results from a lack of emphasis on data control. When designing the system, standards of accuracy, consistency, and maintainability must be specified to eliminate errors and control for fraud. A system design introduces new control elements and changes the control procedures. In a manual system, internal control depends on human judgement, personal care, and

division of labour. In a computer-based system, the number of persons involved is considerably reduced. A software packages is an effective substitute for human judgement in processing routines and error checks.

MODULARIZATION

In structure design (already explained in section 3.3) a program is segmented into small, independent modules. These are arranged in a hierarchy that approximates a model of the business area and is organized in a top-down manner with the details shown at the bottom. Thus, in structured design, we try to minimize the complexity of the problem and make it manageable by sub-dividing it into smaller segments which is called modularization or decomposition. This has been shown in Figure 3.2

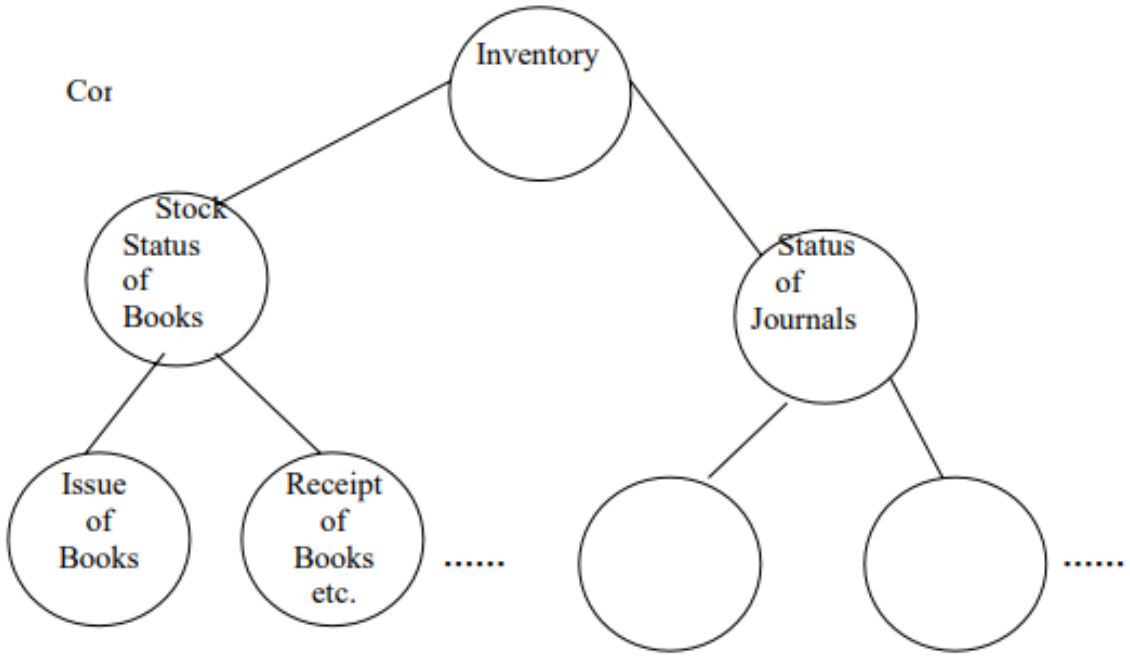

Figure 3.2: Decomposition – A Framework

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