Lecture notes on

Data Flow Diagram(DFD)

for 2nd semester

(BCA-1205)

by

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3.4 DATA FLOW DIAGRAMS

The Data Flow Diagrams (DFD) is also known as a Data Flow Graph or a Bubble Chart. A DFD serves the purpose of clarifying system requirements and identifying major transformations. DFDs show the flow of data through a system. It is an important modelling tool that allows us to picture a system as a network of functional processes.

Data flow diagrams (DFDs) are a well-known and widely used notation for specifying the functions of an information system. They describe systems as collections of data that are manipulated by functions. Data can be organized in several ways: they can be stored in data repositories, they can flow in data flows, and they can be transferred to or from the external environment.

One of the reasons for the success of DFD is that they can be expressed by means of an attractive graphical notation that makes them easy to use.

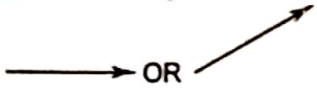
3.4.1 Symbols Used for Constructing DFDs

There are different types of symbols used to construct DFDs. The meaning of each symbol is explained below:

1. ***Function symbol.*** A function is represented using a circle. This symbol is called a process or a bubble or performs some processing of input data

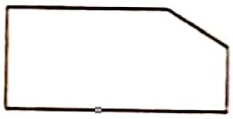
2. ***External entity.*** A square defines a source of destination of system data. External entities represent any entity that supplies or receives information from the system but is not a part of the system.

3. ***Data flow symbol.*** A directed arc or arrow is used as a data flow symbol. A data flow symbol represents the data flow occurring between two processes or between an external entity and a process in the direction of the data flow arrow



4. ***Data store symbol.*** A data store symbol is represented using two parallel lines. A logical file can represent either a data store symbol, which can represent either a data structure, or a physical file on disk. Each data store is connected to a process by means of a data flow symbol. The direction of the data flow arrow shows whether data is being read from or written into a data store.

5. ***Output Symbol.*** It is used to represent data acquisition and production during human computer-interaction.



3.4.2 Example of DFD

Example 3.1. Figure 3.6 shows how the symbols can be composed to form a DFD. The DFD describes the arithmetic expression

$$(a + b) * (c + a * d)$$

Assuming that the data a, b, c and d are read from a terminal and the result in printed. The figure shows that arrow can be "forked" to represent the fact that the same datum is used in different places.

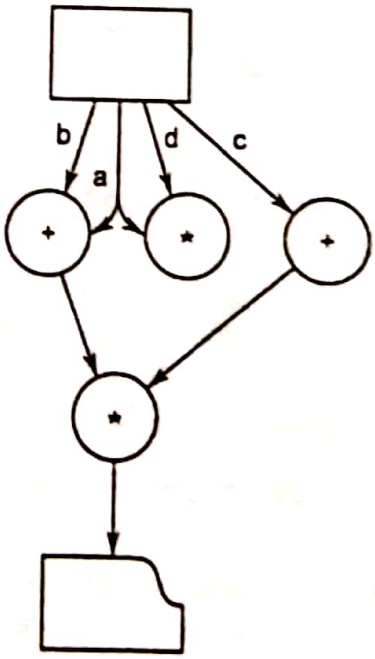


Figure. 3.6 ■ *A DFD For Specifying the Arirhmetic Expression (a + b)*(c + a*d)*

Example 3.2. Figure 3.7 describes a simplified information system for a public library. The data and functions shown are not necessarily computer data and computer functions. The DFD describes physical objects, such as books and shelves, together with data stores that are likely to be, but are not necessarily, realized as computer files. Getting a book from the shelf can be done either automatically-by a robot-or manually. In both cases, the action of getting a book is represented by a function depicted by a bubble. The figure could even represent the organization of a library with no computerized procedures.

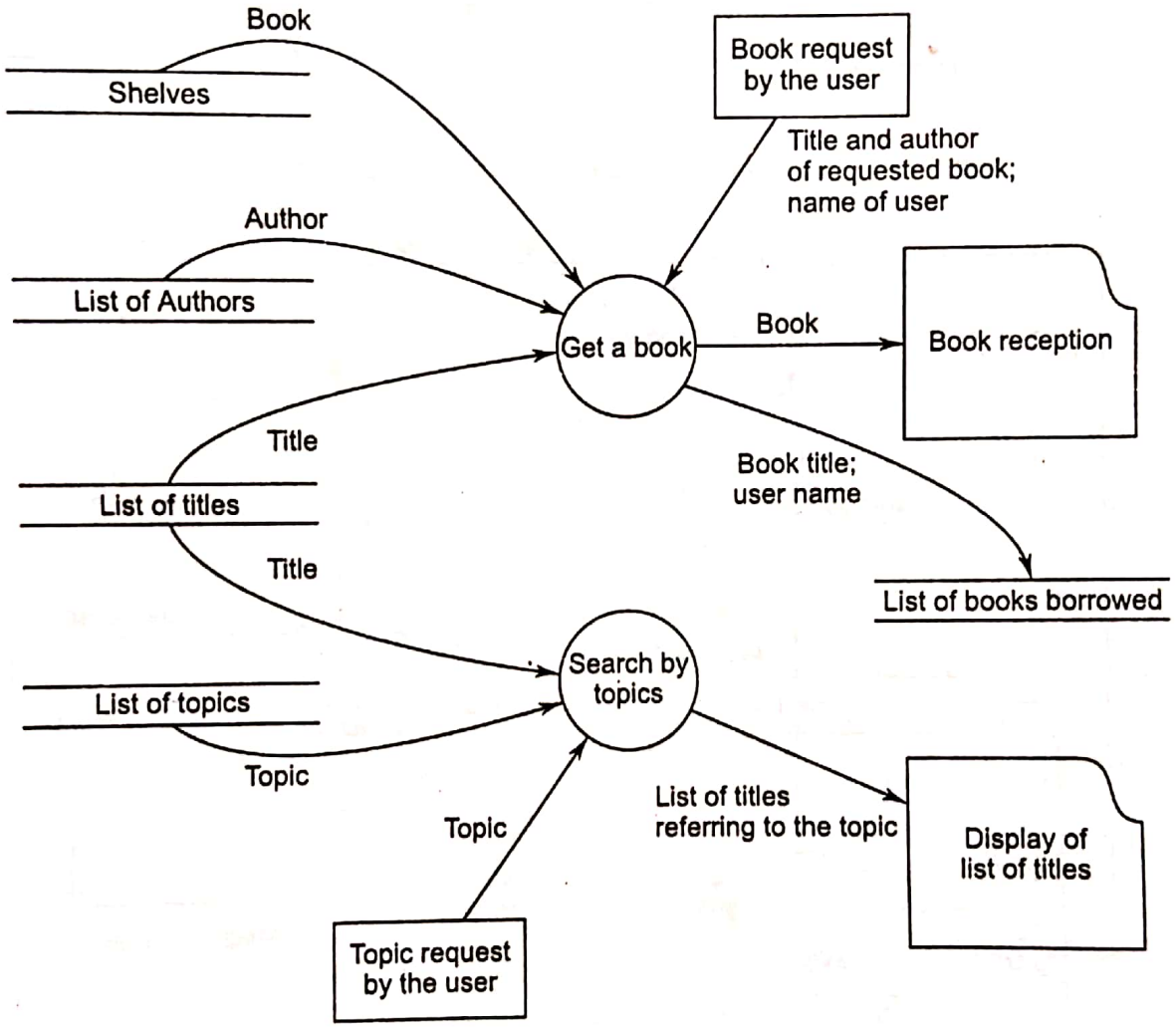


Figure. 3.7 ■ *A DFD Describing a Simplified Library Information System*

Figure 3.7 also describes the fact that, in order to obtain a book, the following are necessary: an explicit user request consisting of the title and the name of the author of the book and the user's name; access to the shelves that contain the books; a list of authors; and a list of titles. These provide the information necessary to find the book.

3.4.3 Levels of DFD

There are different levels of data flow diagram. The initial level is called context level or fundamental system model or a 0 level DFD. If two break or expand the 0 levels processes then we get the Ist level DFD and if we further expand the Ist level processes then we get the 2nd level DFD and so on.

Example 3.3. The 0^{th} and 1^{st} levels of DFD of Production Management System are shown in figure 3.8 (*a*) and (*b*)

Let us discuss the data flow diagram of Production Management System

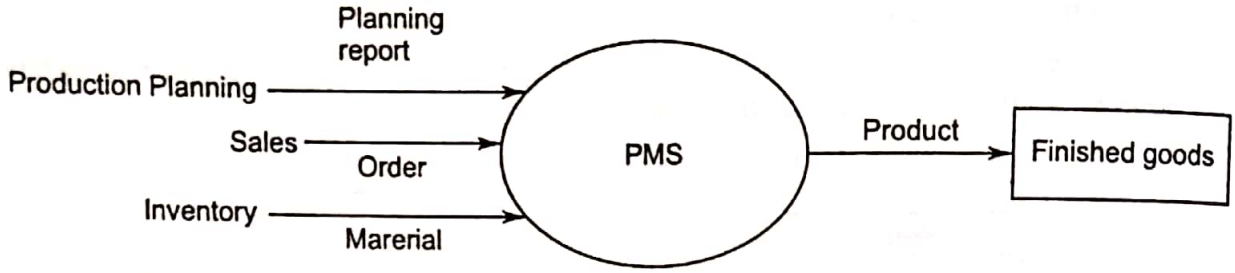


Figure 3.8 (a) *Level 0 DFD of PMS*

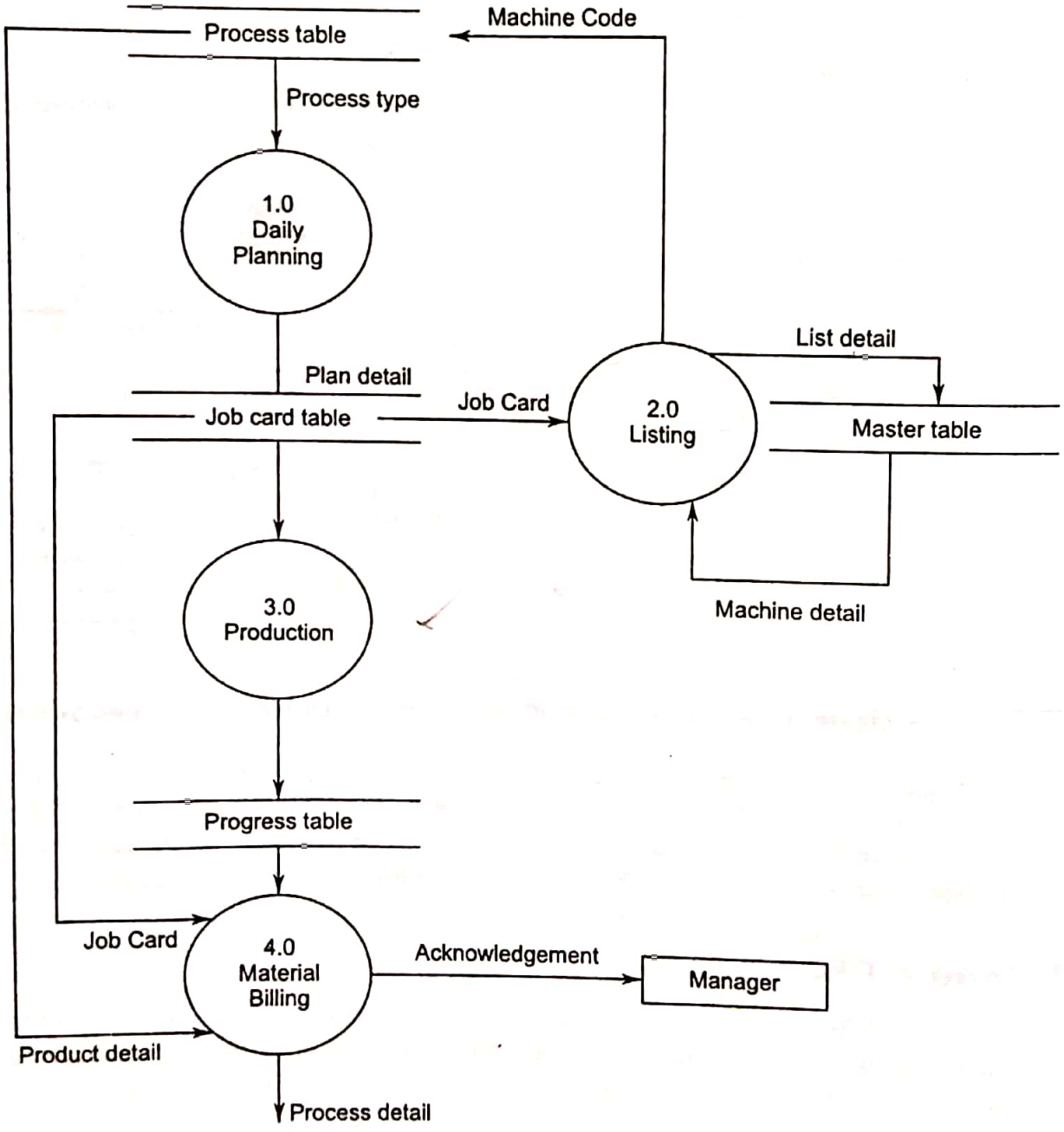


Figure 3.8 (b) *Level 1 DFD of PMS*

Data flow diagrams can be expressed using informal notation, as illustrated in Figure 3.9 (*a*), or special symbols can be used to denote processing nodes, data sources, data sinks, and data stores, as illustrated in Figure 3.9(*b*).

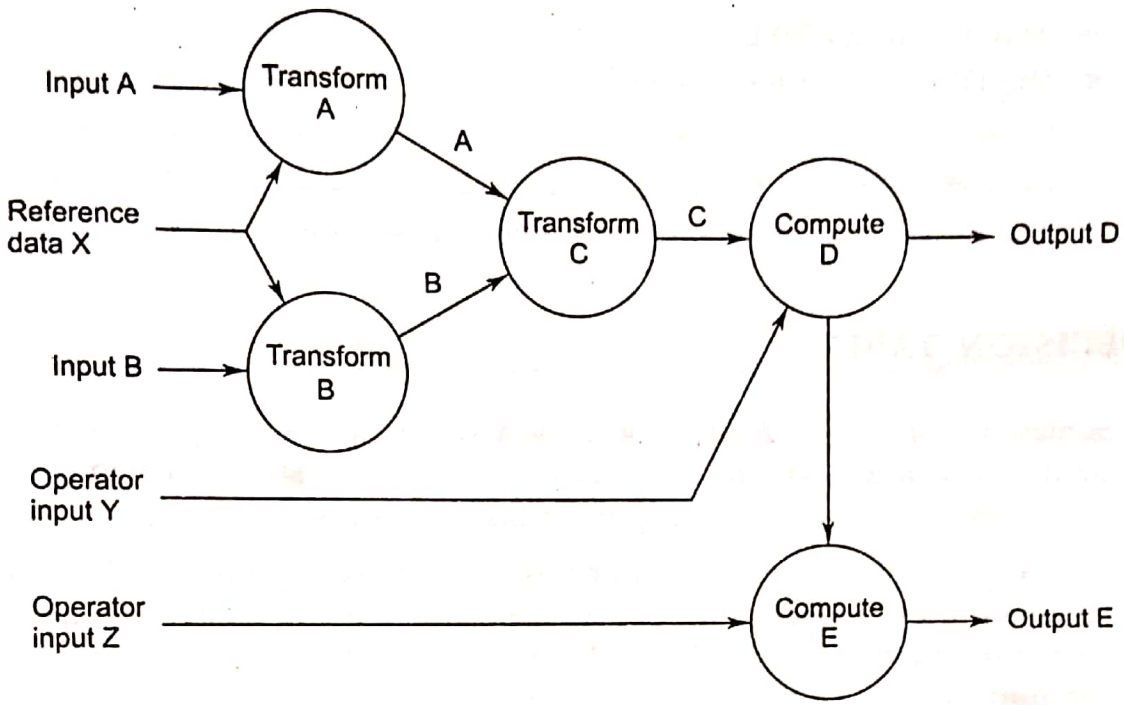


Figure 3.9(a) ■ *An Informal DFD or Bubble Chart*

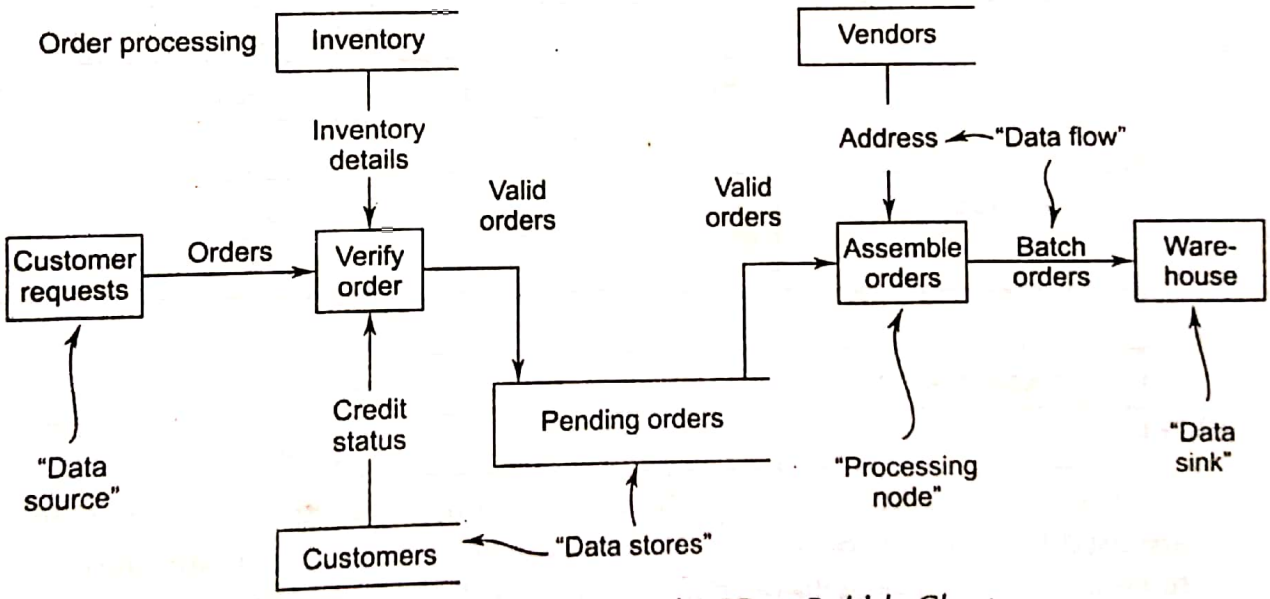


Figure 3.9(b) ■ *A Formal DFD or Bubble Chart*

3.4.4 General Guidelines and Rules for Constructing DFDs

The following guidelines will help avoid constructing DFDs that are quite simply wrong or incomplete.

- Remember that a DFD is not a flow chart.
- All names should be unique.
- Processes are always running, they do not start or stop.
- All data flows are named.

- Keep a note of all the processes and external entities. Give unique names to them. Identify the manner in which they interact with each other.
- Do numbering of processes.
- Avoid complex DFDs (if possible)
- The DFD should be internally consistent.
- Every process should have minimum of one input and one output.
- Only data needed to perform the process should be an input to the process.
- The direction of flow is from source to destination.