- **DFD (Data Flow Diagram)**

- A graphical tool, useful for communicating with users, managers and other personnel.

- The flow of data of a system or a process is represented by DFD.

- It also gives insight into the inputs and outputs of each entity and the process itself.

- The DFD is also called as a **data flow graph** or **bubble chart**.

- It is useful for analyzing existing as well as proposed system.

- It provides an overview of,

  - What data is system processes.

  - What transformation are performed.

  - What data are stored.

  - What results are produced, etc.

- **Components of DFD**

- The Data Flow Diagram has 4 components:

- **Process**

- A circle is a process in data flow diagrams and depicts how the data is handled and processed in the system.

- **Data Flow**

- The data flow is the curved line that shows the flow of data in or out of the system.

- A relatable name should be given to the flow to determine the information which is being moved.

- **Data Store (Database)**

- A data store denotes the storage of information that can be retrieved later or by other processes in a different order.

- A single element or a set of elements can be found in the data storage.

- The group of parallel lines denotes a location to collect the data items.

- **Entity**

- An external entity that serves as a source of system inputs or a sink of system outputs is called a source or sink.

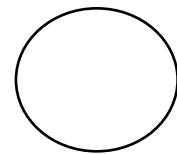- **Symbols Used in DFD**

- **Square Box:**

- A square box defines **source** or destination of the system.

- It is also called entity.

- It is represented by rectangle.

- **Arrow or Line:**

- An arrow identifies the data flow i.e., it gives information to the data that is in motion.

- **Circle or bubble chart:**

- It represents as a process that gives us information.

- It is also called processing box.

- **Open Rectangle:**

- An open rectangle is a data store.

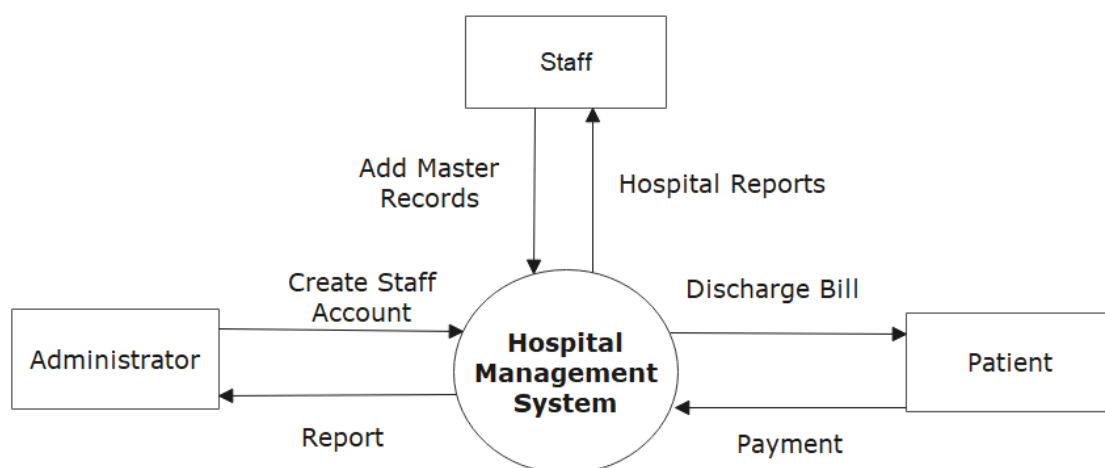- In this data is store either temporary or permanently.

→	dataflow	Arrows showing direction of flow
○	process	circles
═══	file	horizontal pair of lines
▭	data-source, sink	rectangular box

- **Rules for making creating DFD**

- The name of the entity should be easy and understandable.

- The processes should be numbered or put in ordered list to be referred easily.

- The DFD should maintain **consistency** across all the DFD levels.

- A single DFD can have a maximum of nine processes and a minimum of three processes.

- Data **cannot** directly flow between **two entities**; it must flow from entity to process and vice versa.

- Data **cannot** directly flow between **two data stores**; it must flow from the data store to a process and vice versa.

- The diagram must include one input data flow and one output data flow.

- The two data flows **cannot cross** one another.

- All the processes in the system must be linked to a minimum of one data store or any other process.

- **Levels of DFD**

- DFD uses hierarchy to maintain transparency thus multilevel DFD's can be created.

- **Level 0 DFDs**

- It also known as a "context diagram", this is the highest level and represents a very simple, top-level view of the system being represented.

- It represents the entire system as a single bubble and provides an overall picture of the system.

- The level 0 data flow diagrams are the most basic, and they do not provide every little detail of the information or the structure.

- It gives a broad view that can easily be understood.

- These diagrams are straightforward and show single process nodes and connections of those nodes with externalities.

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- **Level 1 DFDs**

- It represents the main functions of the system and how they interact with each other.

- The level 1 data flow diagrams provide more information than the Level 0 DFDs.

- It shows the general overview of the system.

- The single process node from the level 0 diagram is split into subprocesses in a level 1 data flow diagram.

- Additional data flows and data stores will be required as these processes are added to the diagram.

- **Level 2 DFDs**

- It represents the processes within each function of the system and how they interact with each other.

- The level 2 data flow diagrams are way too detailed, where processes from Level 1 DFDs are further broken down into more chunks.

- The objective is to create a map of every little detail of the system to help the engineers to understand and work on it.

- **Advantages of DFD**

- It helps us to understand the functioning and the limits of a system.

- It is a graphical representation which is very easy to understand as it helps visualize contents.

- Data Flow Diagram represent detailed and well explained diagram of system components.

- It is used as the part of system documentation file.

- Data Flow Diagrams can be understood by both technical or nontechnical person because they are very easy to understand.

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- **Disadvantages of DFD**

- **Can be time-consuming:** Creating DFDs can be a time-consuming process, especially for complex systems.

- **Limited focus:** DFDs focus primarily on the flow of data in a system, and may not capture other important aspects of the system, such as user interface design, system security, or system performance.

- system to help the engineers to understand and work on it.

- **Example:**

Context Level DFD for Hospital Management System

Staff

Add Master Records

Hospital Reports

Create Staff Account

Discharge Bill

Administrator

Hospital Management System

Patient

Report

Payment

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- **College Management System**

<div align="center">

Context Level DFD (0 - Level)

</div>

Request for Login → College Management System ← Request for Login

Student → College Management System ← Admin

Login

Search Result

Request for Search

Search Result

Request for Search Info

Login Confirm

Staff

Request for Login

Login

Request for Search Info

Search Detail

Search Feedback

Request for Search Info

Visitors

Search Result