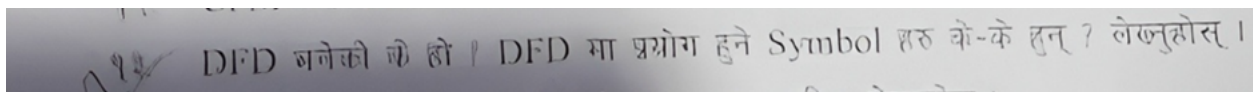


# Module 4: Analyze /Process data

## Develop data flow diagram

- Basic symbols of data flow, conventions
- Context diagram
- Approaches in data flow diagram
- Labelling



A data flow diagram (DFD) is a graphical representation of the flow of data through a system. The development of a DFD is an important step in system analysis and design.

डाटा प्रवाह रेखाचित्र (DFD) प्रणाली मार्फत डाटा को प्रवाह को एक ग्राफिकल प्रतिनिधित्व हो। DFD को विकास प्रणाली विश्लेषण र डिजाइन मा एक महत्वपूर्ण कदम हो।

DFD is the abbreviation for Data Flow Diagram. 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. DFD does not have control flow and no loops or decision rules are present. Specific operations depending on the type of data can be explained by a flowchart.

It is a graphical tool, useful for communicating with users ,managers and other personnel. 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.

Data Flow Diagram can be represented in several ways. The DFD belongs to structured-analysis modeling tools. Data Flow diagrams are very popular because they help us to visualize the major steps and data involved in software-system processes.

**Components of DFD:** The Data Flow Diagram has 4 components:

**Process:** Input to output transformation in a system takes place because of process function. The symbols of a process are rectangular with rounded corners, oval, rectangle or a circle. The process is named a short sentence, in one word or a phrase to express its essence

**Data Flow:** Data flow describes the information transferring between different parts of the systems. The arrow symbol is the symbol of data flow. A relatable name should be given to the flow to determine the information which is being moved. Data flow also represents material along with information that is being moved. Material shifts are modeled in systems that are not merely informative. A given flow should only transfer a single type of information. The direction of flow is represented by the arrow which can also be bi-directional.

**Warehouse:** The data is stored in the warehouse for later use. Two horizontal lines represent the symbol of the store. The warehouse is simply not restricted to being a data file rather it can be anything like a folder with documents, an optical disc, a filing cabinet. The data warehouse can be viewed independent of its implementation. When the data flow from the warehouse it is considered as data reading and when data flows to the warehouse it is called data entry or data updating.

**Terminator:** The Terminator is an external entity that stands outside of the system and communicates with the system. It can be, for example, organizations like banks, groups of people like customers or different departments of the same organization, which is not a part of the model system and is an external entity. Modeled systems also communicate with terminator.

## Rules for creating DFD

- The name of the entity should be easy and understandable without any extra assistance(like comments).
- 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.

## 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.

## Levels of DFD

DFD uses hierarchy to maintain transparency thus multilevel DFD's can be created. Levels of DFD are as follows:

**0-level DFD:** It represents the entire system as a single bubble and provides an overall picture of the system.

**1-level DFD:** It represents the main functions of the system and how they interact with each other.

**2-level DFD:** It represents the processes within each function of the system and how they interact with each other.

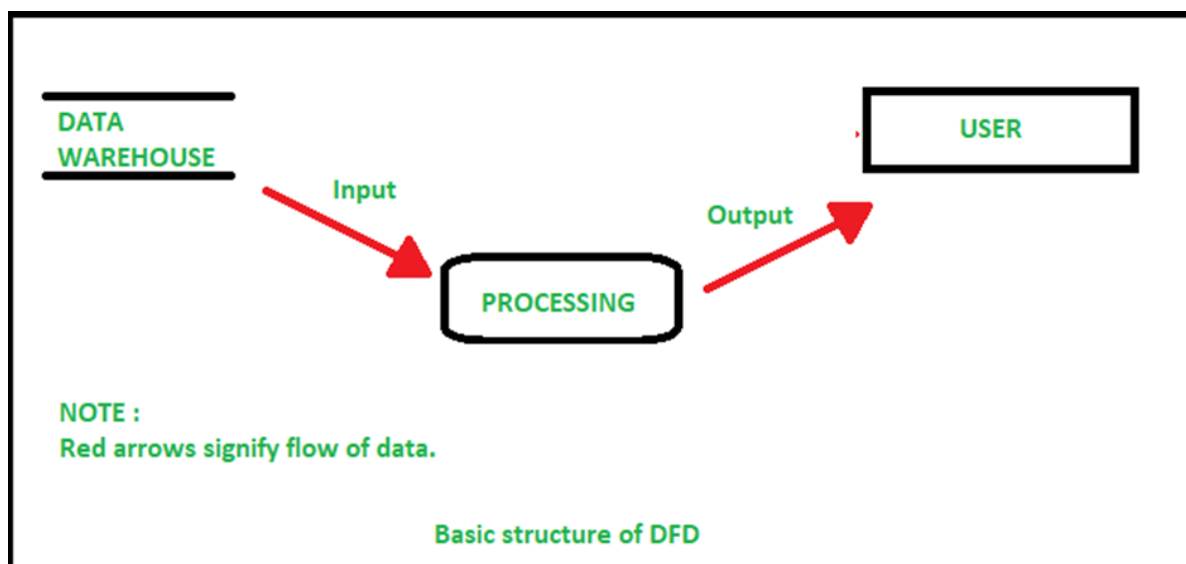
**3-level DFD:** It represents the data flow within each process and how the data is transformed and stored.

### 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.

### Disadvantages of DFD

- At times DFD can confuse the programmers regarding the system.
- Data Flow Diagram takes long time to be generated, and many times due to this reasons analysts are denied permission to work on it.



The following are some of the key topics that need to be covered while developing a DFD:

**Basic symbols of data flow:** A DFD consists of four basic symbols: circles, squares, arrows, and lines. Circles represent entities or processes that are involved in the system, squares represent data stores where the data is stored, arrows represent data flows, and lines represent the boundaries of the system.

**डाटा प्रवाहको आधारभूत प्रतीकहरू:** DFD मा चारवटा आधारभूत प्रतीकहरू हुन्छन्: सर्कल, वर्ग, तीर र रेखाहरू। सर्कलहरूले प्रणालीमा संलग्न निकाय वा प्रक्रियाहरूलाई प्रतिनिधित्व गर्दछ, वर्गहरूले डेटा भण्डारण गर्ने डेटा भण्डारहरू प्रतिनिधित्व गर्दछ, तीरहरूले डेटा प्रवाहलाई प्रतिनिधित्व गर्दछ, र रेखाहरूले प्रणालीको सीमाहरू प्रतिनिधित्व गर्दछ।

**Conventions:** There are certain conventions that need to be followed while developing a DFD, such as each process should have at least one input and one output, a data store should have at least one input or output, and data should flow from higher-level processes to lower-level processes.

**कन्भेन्सनहरू:** DFD विकास गर्दा पछ्याउन आवश्यक केही कन्भेन्सनहरू छन्, जस्तै प्रत्येक प्रक्रियामा कम्तिमा एउटा इनपुट र एउटा आउटपुट हुनुपर्छ, डाटा स्टोरमा कम्तिमा एउटा इनपुट वा आउटपुट हुनुपर्छ, र डाटा उच्च-स्तर प्रक्रियाहरूबाट तल्लो-स्तर प्रक्रियाहरूमा प्रवाह गर्नुपर्छ।

**Context diagram:** A context diagram is a high-level view of the system that shows the system as a single process with inputs and outputs. It is used to identify the system boundaries and the external entities that interact with the system.

**सन्दर्भ रेखाचित्र:** एक सन्दर्भ रेखाचित्र प्रणालीको उच्च-स्तरको दृश्य हो जसले प्रणालीलाई इनपुट र आउटपुटहरूको साथ एकल प्रक्रियाको रूपमा देखाउँछ। यो प्रणाली सीमाहरू र प्रणालीसँग अन्तरक्रिया गर्ने बाह्य संस्थाहरू पहिचान गर्ने प्रयोग गरिन्छ।

**Approaches in data flow diagram:** There are two approaches to developing a DFD: top-down and bottom-up. In the top-down approach, the system is divided into subsystems and each subsystem is further analyzed until the required level of detail is

reached. In the bottom-up approach, the subsystems are analyzed first and then combined to form the overall system.

**डेटा प्रवाह रेखाचित्रमा दृष्टिकोणहरू:** DFD विकास गर्न दुईवटा दृष्टिकोणहरू छन्: माथि-डाउन र तल-माथि। माथि-डाउन दृष्टिकोणमा, प्रणालीलाई उपप्रणालीहरूमा विभाजन गरिएको छ र आवश्यक स्तरको विवरण नपुगेसम्म प्रत्येक उपप्रणालीलाई थप विश्लेषण गरिन्छ। तल्लो-माथिको दृष्टिकोणमा, उपप्रणालीहरूलाई पहिले विश्लेषण गरिन्छ र त्यसपछि समग्र प्रणाली बनाउनको लागि जोडिन्छ।

**Labelling:** Each data flow, process, and data store should be labelled appropriately to clearly identify its purpose and function within the system.

**लेबलिङ:** प्रत्येक डाटा प्रवाह, प्रक्रिया, र डाटा भण्डारलाई प्रणाली भित्र यसको उद्देश्य र कार्य स्पष्ट रूपमा पहिचान गर्न उपयुक्त रूपमा लेबल गरिनुपर्छ।

Overall, a well-designed DFD can help in understanding the flow of data through the system, identifying bottlenecks, and improving the overall efficiency of the system.

समग्रमा, राम्रोसँग डिजाइन गरिएको DFD ले प्रणाली मार्फत डाटाको प्रवाह बुझ्न, अवरोधहरू पहिचान गर्न, र प्रणालीको समग्र दक्षता सुधार गर्न मद्दत गर्न सक्छ।

---

## Develop data dictionary

- Data in data dictionary,
- Cataloguing,
- Data processes, data flow, data store, data structure, data elements
- Steps in compiling data dictionaries

**A data dictionary** is a central repository of information about data that is used within an organization. It provides a description of the data elements, data structures, data flows, and data stores in a system. The following are the steps involved in compiling a data dictionary:

**डाटा शब्दकोश** भनेको संगठन भित्र प्रयोग हुने डाटाको बारेमा जानकारीको केन्द्रीय भण्डार हो। यसले डाटा तत्वहरू, डाटा संरचनाहरू, डाटा प्रवाहहरू, र प्रणालीमा डाटा भण्डारहरूको विवरण प्रदान गर्दछ। डाटा शब्दकोश कम्पाइल गर्न निम्न चरणहरू समावेश छन्:

**Data in data dictionary:** The data dictionary should include information about all data elements used in the system. This information should include data element names, descriptions, data types, lengths, formats, and other properties.

**डाटा शब्दकोशमा डाटा:** डाटा शब्दकोशमा प्रणालीमा प्रयोग गरिएका सबै डाटा तत्वहरूको बारेमा जानकारी समावेश हुनुपर्छ। यो जानकारीमा डेटा तत्व नामहरू, विवरणहरू, डेटा प्रकारहरू, लम्बाइहरू, ढाँचाहरू, र अन्य गुणहरू समावेश हुनुपर्छ।

**Cataloguing:** Cataloguing is the process of organizing and grouping data elements in a logical way to make it easier to manage and maintain the data dictionary. This involves creating categories and subcategories of data elements.

**क्याटलगिङ:** क्याटलगिङ भनेको डाटा डिक्शनरीलाई व्यवस्थित गर्ने र मर्मत गर्ने सजिलो बनाउनको लागि तार्किक तरिकामा डेटा तत्वहरूलाई व्यवस्थित र समूहबद्ध गर्ने प्रक्रिया हो। यसमा डेटा तत्वहरूको कोटीहरू र उपश्रेणीहरू सिर्जना गर्ने समावेश छ।

**Data processes:** Data processes are the steps involved in creating, updating, retrieving, or deleting data in the system. The data dictionary should include information about all data processes and their associated data elements.

**डाटा प्रक्रियाहरू:** डाटा प्रक्रियाहरू प्रणालीमा डाटा सिर्जना, अद्यावधिक, पुनः प्राप्ति, वा मेटाउने चरणहरू हुन्। डाटा शब्दकोशमा सबै डाटा प्रक्रियाहरू र तिनीहरूसँग सम्बन्धित डाटा तत्वहरूको बारेमा जानकारी समावेश हुनुपर्छ।

**Data flow:** Data flow describes the movement of data through the system. The data dictionary should include information about all data flows and their associated data elements.

**डाटा प्रवाह:** डाटा प्रवाह प्रणाली मार्फत डाटा को चाल को वर्णन गर्दछ। डाटा शब्दकोशमा सबै डाटा प्रवाहहरू र तिनीहरूसँग सम्बन्धित डाटा तत्वहरूको बारेमा जानकारी समावेश हुनुपर्छ।

**Data store:** Data store is where data is stored in the system. The data dictionary should include information about all data stores and their associated data elements.

**डाटा स्टोर:** डाटा स्टोर भनेको प्रणालीमा डाटा भण्डारण गरिएको ठाउँ हो। डाटा शब्दकोशमा सबै डाटा स्टोरहरू र तिनीहरूसँग सम्बन्धित डाटा तत्वहरूको बारेमा जानकारी समावेश हुनुपर्छ।

**Data structure:** Data structure refers to the way data is organized within a data store. The data dictionary should include information about all data structures used in the system.

**डाटा संरचना:** डाटा संरचनाले डाटा स्टोर भित्र डाटा व्यवस्थित गर्ने तरिकालाई जनाउँछ। डाटा शब्दकोशले प्रणालीमा प्रयोग गरिएका सबै डाटा संरचनाहरूको बारेमा जानकारी समावेश गर्नुपर्छ।

**Data elements:** Data elements are the basic units of information used in the system. The data dictionary should include detailed information about all data elements used in the system.

**डाटा तत्वहरू:** डाटा तत्वहरू प्रणालीमा प्रयोग हुने जानकारीको आधारभूत एकाइहरू हुन्। डाटा शब्दकोशले प्रणालीमा प्रयोग गरिएका सबै डाटा तत्वहरूको बारेमा विस्तृत जानकारी समावेश गर्नुपर्छ।

**Steps in compiling data dictionaries:** The process of compiling a data dictionary involves the following steps:

- Identify all data elements used in the system
- Catalogue data elements into logical categories and subcategories
- Define data elements and their properties, such as data type, length, format, and other attributes
- Document data flows, data stores, and data structures
- Validate and verify the accuracy of the data dictionary
- Update the data dictionary as changes are made to the system.

**डेटा शब्दकोशहरू संकलन गर्ने चरणहरू:** डेटा शब्दकोश कम्पाइल गर्ने प्रक्रियामा निम्न चरणहरू समावेश छन्:

- प्रणालीमा प्रयोग गरिएका सबै डाटा तत्वहरू पहिचान गर्नुहोस्



- तार्किक कोटिहरू र उपश्रेणीहरूमा डेटा तत्वहरूको सूची
- डेटा तत्वहरू र तिनीहरूका गुणहरू परिभाषित गर्नुहोस्, जस्तै डेटा प्रकार, लम्बाइ, ढाँचा, र अन्य विशेषताहरू
- कागजात डेटा प्रवाह, डेटा भण्डार, र डेटा संरचना
- डेटा शब्दकोशको शुद्धता प्रमाणित र प्रमाणित गर्नुहोस्
- प्रणालीमा परिवर्तनहरू गरिएपछि डेटा शब्दकोश अपडेट गर्नुहोस्।

By following these steps, a comprehensive data dictionary can be created that provides a detailed understanding of the data used in a system, which can be useful for system analysis, design, and maintenance.

यी चरणहरू पछ्याएर, एक व्यापक डेटा शब्दकोश सिर्जना गर्न सकिन्छ जसले प्रणालीमा प्रयोग गरिएको डाटाको विस्तृत बुझाइ प्रदान गर्दछ, जुन प्रणाली विश्लेषण, डिजाइन, र मर्मतका लागि उपयोगी हुन सक्छ।