What is a data flow diagram (DFD)?

Data Flow Diagrams (DFD) helps us in identifying existing business processes. It is a technique we benefit from particularly before we go through business process re-engineering.

At its simplest, a data flow diagram looks at how data flows through a system. It concerns things like where the data will come from and go to as well as where it will be stored. But you won't find information about the processing timing (e.g. whether the processes happen in sequence or in parallel).

We usually begin with drawing a context diagram, a simple representation of the whole system. To elaborate further from that, we drill down to a level 1 diagram with additional information about the major functions of the system. This could continue to evolve to become a level 2 diagram when further analysis is required. Progression to level 3, 4 and so on is possible but anything beyond level 3 is not very common. Please bear in mind that the level of detail asked for depends on your process change plan.

Diagram Notations

Now we’d like to briefly introduce to you a few diagram notations which you’ll see in the tutorial below.

External Entity

An external entity can represent a human, system or subsystem. It is where certain data comes from or goes to. It is external to the system we study, in terms of the business process. For this reason, people use to draw external entities on the edge of a diagram.

Process

A process is a business activity or function where the manipulation and transformation of data takes place. A process can be decomposed to finer level of details, for representing how data is being processed within the process.
Data Store

A data store represents the storage of persistent data required and/or produced by the process. Here are some examples of data stores: membership forms, database table, etc.

Data Flow

A data flow represents the flow of information, with its direction represented by an arrow head that shows at the end(s) of flow connector.

**What will we do in this tutorial?**

In this tutorial we will show you how to draw a context diagram, along with a level 1 diagram.

**Note:** The software we are using here is Logizian Analyst edition. You are welcome to download a free 30-day evaluation copy of Logizian to walk through the example below. No registration, email address or obligation is required.

**Steps to Draw a Context Diagram**

1. **To create a new DFD**, select **Business > Data Flow Diagram** from the toolbar at the top.

2. **To rename the new diagram**, right click on the background and select **Rename...**. In the diagram's name box (at the top left corner), enter **Context** and press **ENTER**.

3. **We'll now draw the first process**. From the Diagram Toolbar, drag **Process** onto the diagram. Name the new process **System**.
4. Next, let's create an external entity. Place your mouse pointer over System. Drag the resource icon Bidirectional Data Flow --> External Entity to the left and release your mouse to create one.

5. Name the new external entity Customer.

6. Now we'll model the database accessed by the system. Again, place your mouse pointer over System but this time drag a different resource icon called Bidirectional Data Flow --> Data Store to the right. Then release your mouse to create a new data store.

7. Name the new data store Inventory.
8. Create two more data stores, *Customer* and *Transaction*, as shown below. We have just completed the Context diagram.

![Data Flow Diagram](image)

**Steps to Draw a Level 1 DFD**

1. Instead of creating another diagram from scratch, we will decompose the *System* process to form a new DFD. Right click on *System* and select *Decompose* from the popup menu.

![Decompose](image)

2. The data stores and/or external entities connected to the selected process (*System*) would be referred to in the level 1 DFD. So when you are prompted to add them to the new diagram, click *Yes* to confirm.  
   **Note:** The new DFD should look very similar to the Context diagram initially. Every element should remain unchanged, except that the *System* process (from which this new DFD decomposes) is now gone and replaced by a blank space (to be elaborated).

3. Rename the new DFD. Right click on its background and select *Rename*.... In the diagram’s name box, enter *Level 1 DFD* and press *ENTER*.
4. Create three processes (Process Order, Ship Good, Issue Receipt) in center as shown below. That is the old spot for the **System** process and we place them there to elaborate **System**.

![Diagram showing three processes](image)

**Wiring with connection lines for data flows**
The remaining steps (6-16) in this section are about connecting the model elements in the diagram. For example, **Customer** provides order information when placing an order for processing.

1. Place your mouse pointer over **Customer**. Drag the resource icon **Data Flow --> Process** to the right and drop it over **Process Order**.

2. After dropping the data flow over **Process Order**, a text box near the connection line will open for you to put a label in. Enter **order information** and press **ENTER**.
3. Meanwhile the **Process Order** process also receives customer information from the database in order to process the order. Place your mouse pointer over the **Customer data store**. Drag the resource icon **Data Flow --> Process** to the left and drop it over **Process Order**.

**Optional**: You can label the data flow "customer information" if you like. But since this data flow is quite self-explanatory visually, we are going to omit it here.
4. By combining the order information from **Customer** (external entity) and the customer information from **Customer** (data store), **Process Order** (process) then creates a transaction record in the database.

Place your mouse pointer over **Process Order**. Drag the resource icon **Data Flow --> Data Store** to the right and drop it over **Transaction**. Name the data flow **order details**.

**Drawing Tips:**
To rearrange a connection line, place your mouse pointer over where you want to add a pivot point to it. You'll then see a bubble at your mouse point. Click and drag it to where you need.

Up to this point, your diagram should look something like this.
5. Once a transaction is stored, the shipping process follows. So we will now create a data flow from **Process Order** (process) to **Ship Good** (process). Place your mouse pointer over **Process Order**. Drag the resource icon **Data Flow --> Process** downwards and drop it over to **Ship Good**.

6. **Ship Good** needs to read the transaction information (i.e. the order) in order to pack the right product for delivery. So we'll create a data flow from **Transaction** (data store) to **Ship Good** (process).

   **Note:** If there is a lack of space, feel free to move the shapes around to make room.

7. **Ship Good** also needs to read the customer information for his/her shipping address. So let's create a data flow from **Customer** (data store) to **Ship Good** (process).
8. **Ship Good** then updates the Inventory database to reflect the goods shipped. So we'll create a data flow from **Ship Good** (process) to **Inventory** (data store). Name it *updated product record*.

9. Once the order arrives in the customer's hands, the **Issue Receipt** process begins. In it, a receipt is prepared based on the transaction record stored in the database. So let's create a data flow from **Transaction** (data store) to **Issue Receipt** (process).
10. Then a receipt is issued to the customer. Let's create a data flow from **Issue Receipt** (process) to **Customer** (external entity).
Place your mouse pointer over **Issue Receipt**. Drag the resource icon **Data Flow --> External Entity** to the left and drop it over **Customer** (the external entity, not the data store). Name the data flow **receipt**.

You have just finished drawing the level 1 diagram which should look something like this.

Steps to Make the Level 1 Diagram Easier to Read
The completed diagram above looks a bit rigid and busy. In this section we are going to make some changes to the connectors to increase readability.
1. Right click on the diagram (Level 1 DFD) and select **Connectors > Curve**. Connectors in the diagram are now in curve lines.

2. Move the shapes around so that the diagram looks less crowded.