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Data Flow Diagram (DFD) Tutorial

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## 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.

How to Draw Data Flow Diagram?
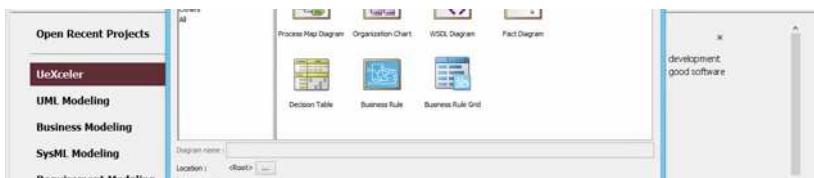
1:42 / 4:25

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 used to draw external entities on the edge of a diagram.
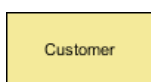

Process

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.
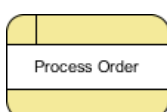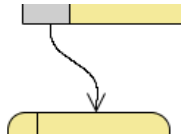

Data Store

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.
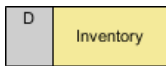
Data Flow

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 Visual Paradigm Standard Edition. You are welcome to download a **free 30-day** evaluation copy of Visual Paradigm to walk through the example below. No registration, email address or obligation is required.

## Steps to Draw a Context Diagram

1. To create new DFD, select **Diagram > New** from the toolbar. In the New Diagram window, select **Business Modelling > Data Flow Diagram**. Click **OK** to confirm.
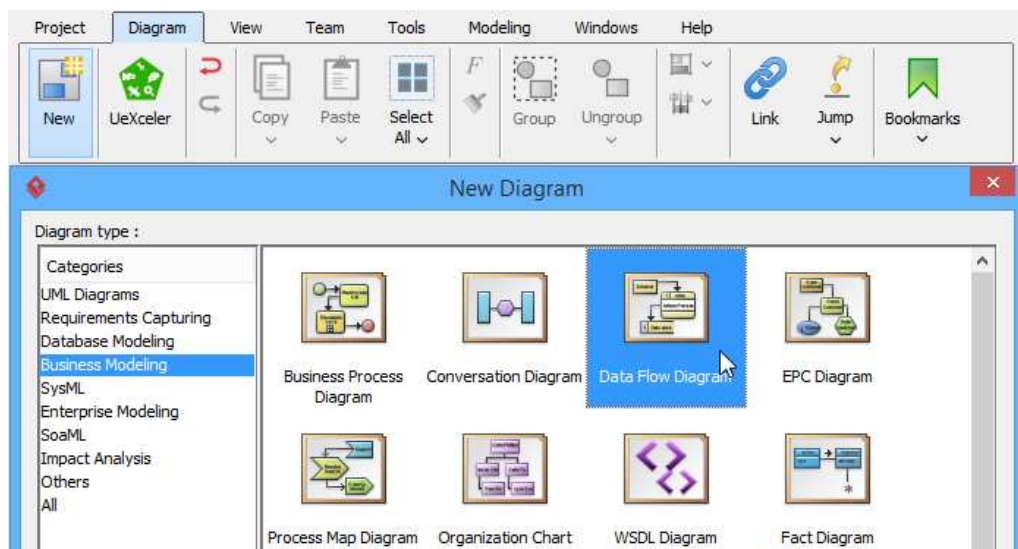

2. To rename the new diagram, right click on the background and select **Rename...**. In the diagram's name box (at the top left corner), enter *Context* and press **ENTER**.

3. We'll now draw the first process. From the Diagram Toolbar, drag **Process** onto the diagram. Name the new process *System*.
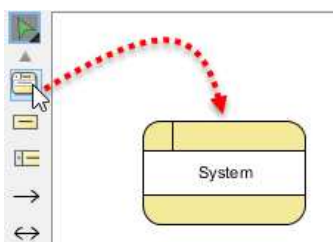

4. Next, let's create an external entity. Place your mouse pointer over **System**. Drag the resource icon **Bidirectional Data Flow --> External Entity** to the left and release your mouse to create one.
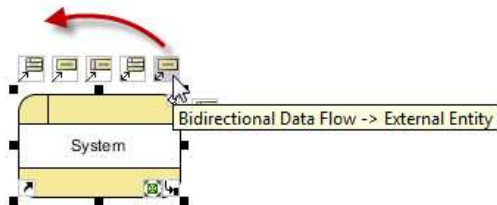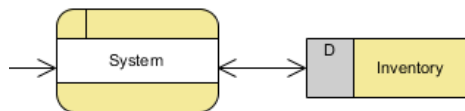
5. Name the new external entity *Customer*.
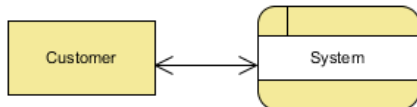
6. Now we'll model the database accessed by the system. Again, place your mouse pointer over **System** but this time drag a different resource icon called **Bidirectional Data Flow --> Data Store** to the right. Then release your mouse to create a new data store.
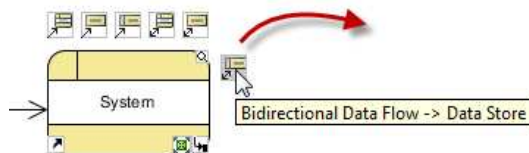
7. Name the new data store *Inventory*.

8. Create two more data stores, *Customer* and *Transaction*, as shown below. We have just completed the Context diagram.
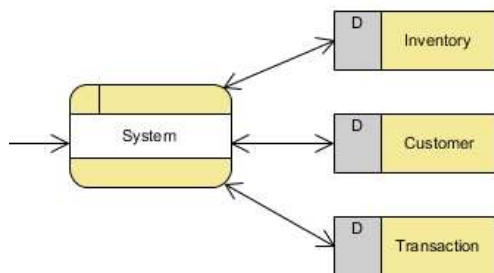
Steps to Draw a Level 1 DFD

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.

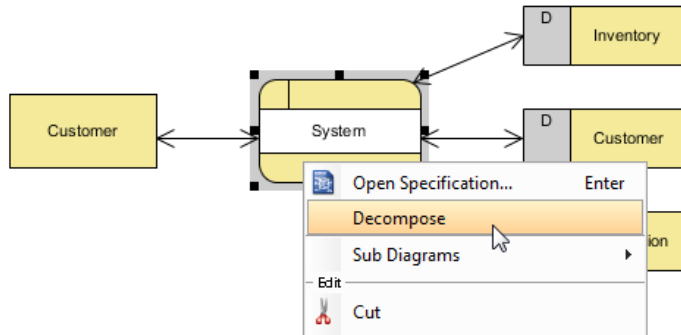2. The data stores and/or external entities connected to the selected process (**System**) would be referred to in the level 1 DFD. So when you are prompted to add them to the new diagram, click **Yes** to confirm.
   Note: The new DFD should look very similar to the Context diagram initially. Every 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**.
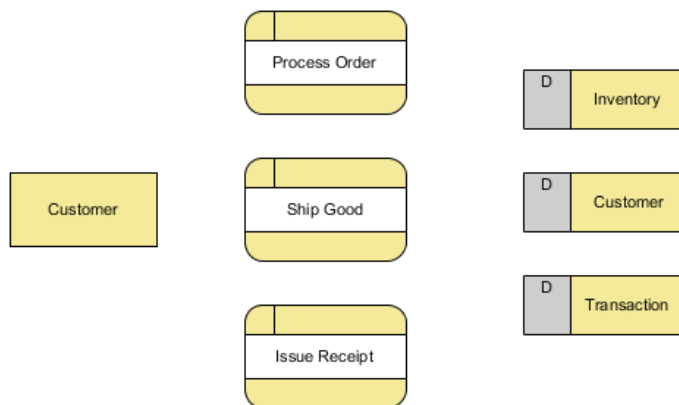
Wiring with connection lines for data flows

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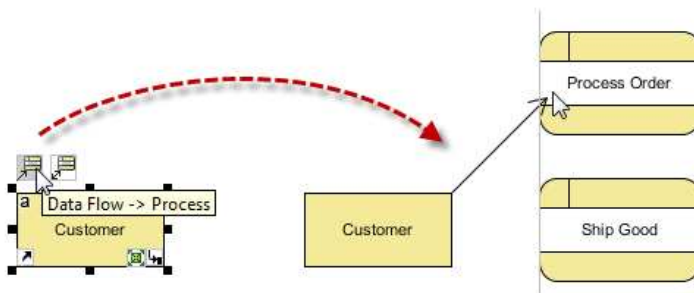
2. After dropping the data flow over **Process Order**, a text box near the connection line will open for you to put a label in. Enter *order information* and press **ENTER**.
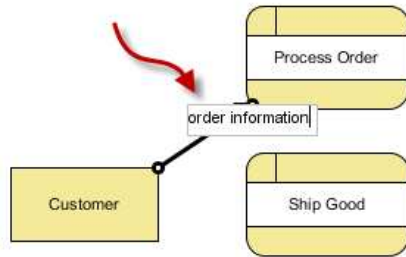
3. Meanwhile the **Process Order** process also receives customer information from the database in order to process the order.
   Place your mouse pointer over the **Customer** data store. Drag the resource icon **Data Flow --> Process** to the left and drop it over **Process Order**.

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.
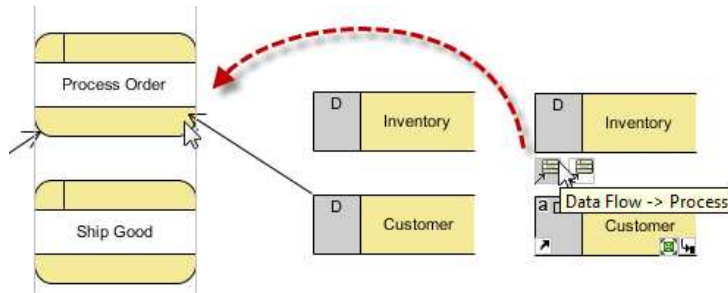
4. By combining the order information from **Customer** (external entity) and the customer information from **Customer** (data store), **Process Order** (process) then creates a transaction record in the database.
   Place your mouse pointer over **Process Order**. Drag the resource icon **Data Flow --> Data Store** to the right and drop it over **Transaction**. Name the data flow *order details*.
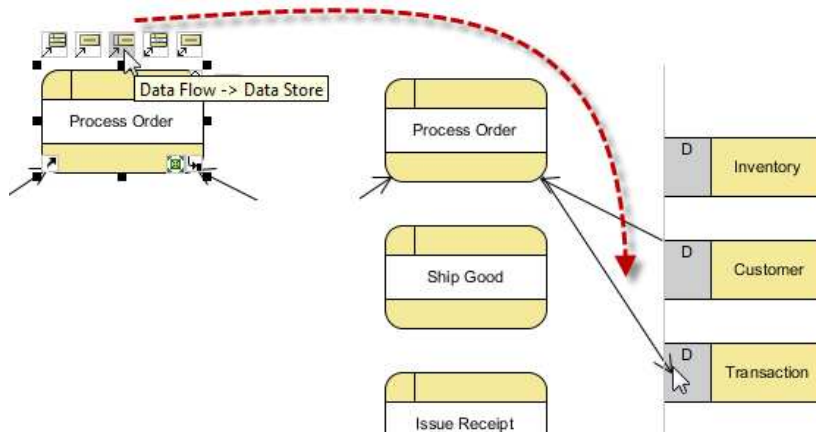
Drawing Tips:
To rearrange a connection line, place your mouse pointer over where you want to add a pivot point to it. You'll then see a bubble at your mouse point. Click and drag it to where you need.
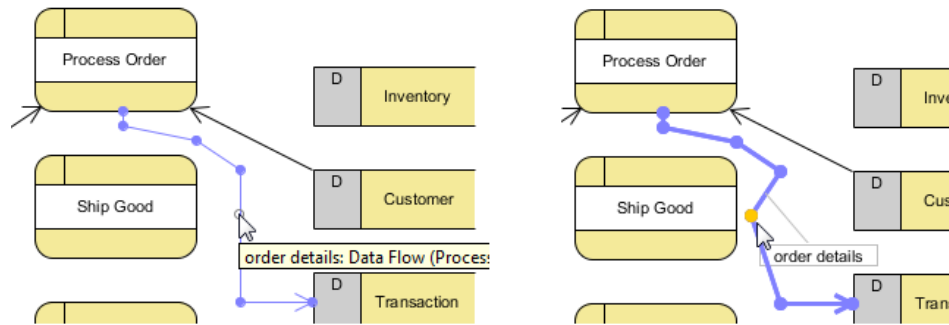
Up to this point, your diagram should look something like this.
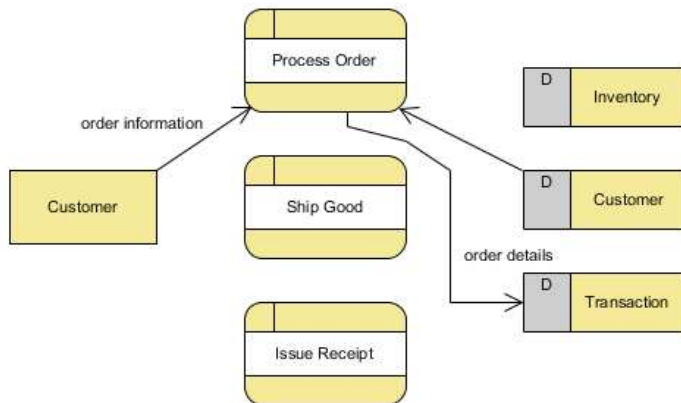
5. Once a transaction is stored, the shipping process follows. So we will now create a data flow from **Process Order** (process) to **Ship Good** (process).

   Place your mouse pointer over **Process Order**. Drag the resource icon **Data Flow --> Process** downwards and drop it over to **Ship Good**.
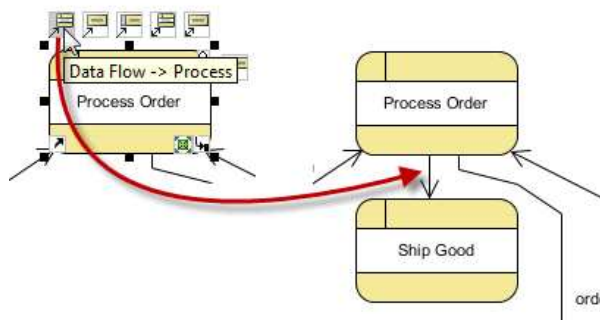
6. **Ship Good** needs to read the transaction information (i.e. the order) in order to pack the right product for delivery. So we'll create a data flow from **Transaction** (data store) to **Ship Good** (process).
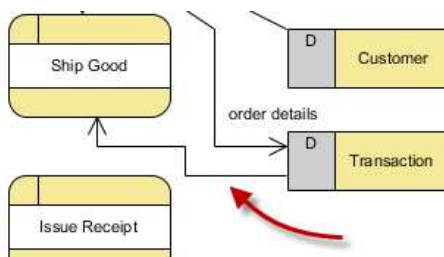
   Note: If there is a lack of space, feel free to move the shapes around to make room.

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).
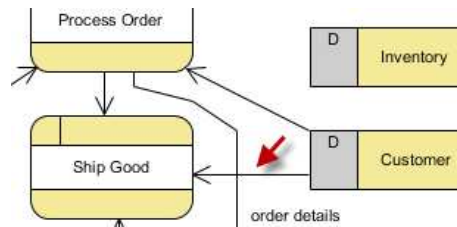
8. **Ship Good** then updates the Inventory database to reflect the goods shipped.
    So we'll create a data flow from **Ship Good** (process) to **Inventory** (data store). Name it *updated product record*.
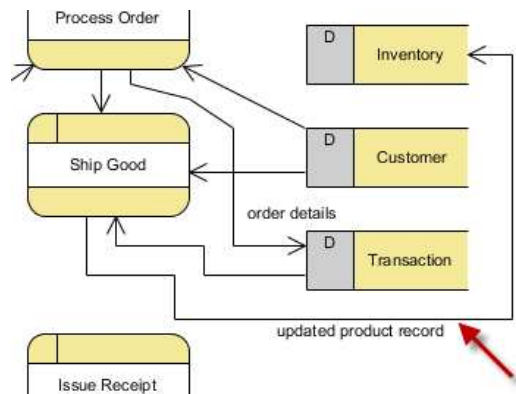
9. Once the order arrives in the customer's hands, the **Issue Receipt** process begins. In it, a receipt is prepared based on the transaction record stored in the database. So let's create a data flow from **Transaction** (data store) to **Issue Receipt** (process).
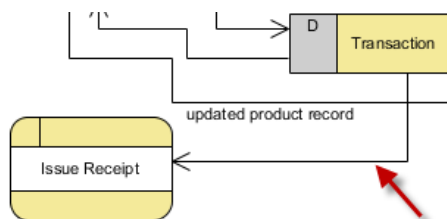
10. Then a receipt is issued to the customer. Let's create a data flow from **Issue Receipt** (process) to **Customer** (external entity).
    Place your mouse pointer over **Issue Receipt**. Drag the resource icon **Data Flow --> External Entity** to the left and drop it over **Customer** (the external entity, not the data store). Name the data flow *receipt*.
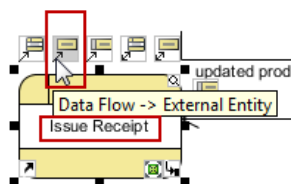
You have just finished drawing the level 1 diagram which should look something like this.
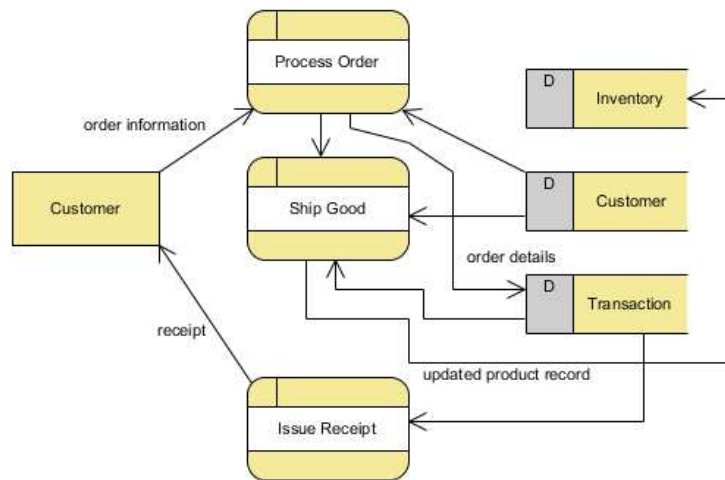
Steps to Make the Level 1 Diagram Easier to Read

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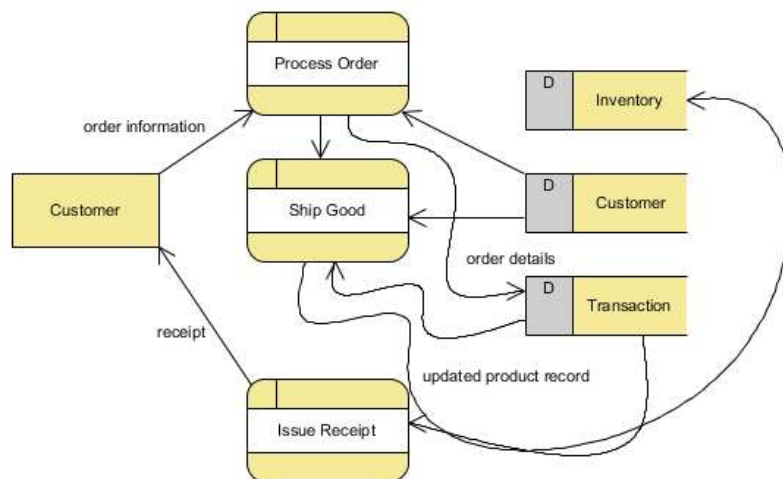
2. Move the shapes around so that the diagram looks less crowded.
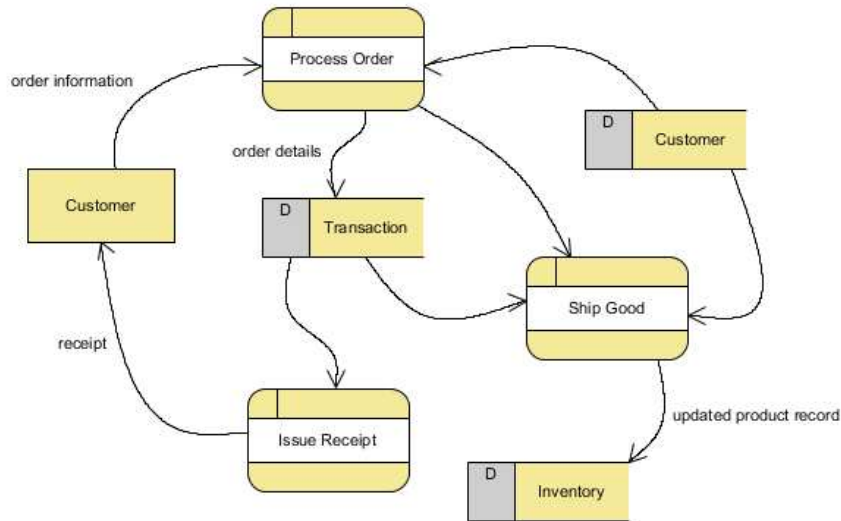
More Examples

Customer Service System   **Food Ordering System**   **Securities Trading**

Supermarket App   **Vehicle Maintenace Depot**   **Video Rental Store**

Resources

- Order-Processing.vpp
- Order-Processing_result.vpp

Something more...

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Define key project vocabularies
Collect the keywords from process, entity, data store and flow names. Form a glossary.

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Tagged: DFD, data flow diagram

Tags of this article: data flow diagram, DFD, business process modeling

Comments (50)

written by Coilnd77 on October 12, 2011

I can't find this ' Order-Processing.vpp ' file needed to go through this tutorial. Where is it? The file at the bottom of the page is a link to a webpage. I don't think you have put it in a place people can find very easy (accessibility)

written by Jick Yeung on October 12, 2011

Hi Coilnd77,

To get the project, please right click on the link (e.g. Order-Processing.vpp) and select "Save Link As...". The file saved is a .vpp which can be opened by BP-VA.

written by Colin on October 12, 2011

Thanks for the help Jick, all the best.

written by eduardo on February 4, 2012

First time using the software for DFD. Excellent tutorial. At first, it took me a few minutes to orient myself with the menu organization (many options listed at the beginning). Going step-by-step with the tutorial is sufficient to go solo.
Thank you!

written by raisoni college on March 31, 2012

it is very easy to understand..thanx!!!!!!!!!!!

written by sowmya on April 27, 2012

if we have 2 data flowing among entities like username and password then how we will represent on the directed arrow ??
can we use "+" symbol like username+password ??

written by Jick Yeung (VP) on May 2, 2012

Hi sowmya,

You can create multiple connectors among entities, one for username and another for password.

written by sowmya on May 4, 2012

thank u..

written by smsmbek on October 12, 2012

thanx but i want to know if we can write arabic langauge in this software you recomended or not plz answer me

written by Jick Yeung (VP) on October 12, 2012

Hi smsmbek,

Our tool supports all languages, including Arabic language.

Jick

---

written by Djama on October 18, 2012

When designing the DFD, can you add the other Entities and Data stores such as Customer Types, Sale Types, Payment Types (in your example)

---

written by Tahir Islam on October 19, 2012

can anyone tell which software is used in above tutorial?????

---

written by Jick Yeung (VP) on October 19, 2012

Hi Tahir,

The software used in this tutorial is BP Visual ARCHITECT
http://www.visual-paradigm.com/product/bpva/

It supports DFD, BPMN, EPC, glossary, reporting and more. Checkout the above hyperlink for more details.

---

written by Dhanapal.IPS on February 14, 2013

Thanks for the help, keep it up,

---

written by mangesh h. on March 5, 2013

its a very easy language in dfd, thanks......

---

written by prisca on July 4, 2013

thats trick bt understarble

---

written by dfd ror jewelry making system plz on August 1, 2013

good example

---

written by Jick Yeung (VP) on August 16, 2013

Hi mahua,

Thank you for your post. Could you apply the skills written in the tutorial to draw the data flow diagram you want? If you find anything unclear, please feel free to post again.

---

written by Par on August 16, 2013

Hi,how can I use the Data Flow diagram in word format without having a background containing Logizian text?

---

written by Jick Yeung (VP) on August 19, 2013

Hi Par,

Thank you for your post. The watermark will be removed in purchased copy.

---

written by Naina khandelwal on September 21, 2013

plz send me the all types of DFD diagram for mail processing system......plzzzzzzzzzzzzz

---

written by Jick Yeung (VP) on September 24, 2013

hi Naina,

Regretfully we do not have any DFD sample for mail processing system. But I think that you can draw it yourself easily with our Logizian.

---

written by Pearl Anne Mae Biong on October 13, 2013

This example is good as a guide as I start on diagrams. But, can you please send me a context diagram and data flow diagram for a point-of-sale and inventory system? Thanks! :)

written by Jick Yeung (VP) on October 16, 2013

Hi Anne Mae Biong,

Regretfully we do not have any DFD sample for the case you described. But I believe that you can draw the DFD yourself easily with Logizian. If you have any questions please feel free to contact our support team for assistance.

written by Chamath Elapatha on October 24, 2013

Thanks a lot for helping me.... ^_^

written by Arsalan on November 11, 2013

hi, can anyone show me a data flow diagram for school- in England plz its for ICT, a context and level 0

written by sunny on December 10, 2013

it help me a lot .... thx

written by sunny on December 10, 2013

it help me a lot .... thx

written by sneha on January 2, 2014

confused

written by kanchana on February 17, 2014

it helped

written by natasha on March 19, 2014

i m nt gettint that where is that business written in the toolbars at the top?

written by Haro on March 28, 2014

According to the rules of a DFD, a process must have input and output streams, then to decompose or explode a process, how can I keep the data flows in and out in the diagram, if the parent process has no relation to a datastore or an external entity.

Example: I have a parent process at Level 1 MANAGING PRODUCT and for that I need the input data streams and NAME and QUANTITY PRODUCT REPORT output which is generated and sent to other processes. At Level 2, the break MANAGING PRODUCTS, inputs and outputs must persist. However, I can not find how to do it in the Visual Paradigm. I know how to do when they come or go to datastore entities, but not when coming or going to process

written by khushboo darji on April 10, 2014

i want dfd for article rewrite tool...

written by Yemisrach on May 2, 2014

Thanx it is great, a very good example is shown in the above.

written by Adeel Ahmed on May 22, 2014

This is the best and very illustrative dfd. It has almost everything for the beginners

written by Chadwick on July 1, 2014

Would be great if you could just drag in the processes or subprocesses from BPMN, or the other way round - use a DFD as a high-level starting point to index more detailed flowcharts that show the sequence of events. Even better if 'exploding' a prices to the next level retained all the flow arrows into and out of the new surrounding 'context' box, as stubs to connect to new more detailed subprocess entries within the new context. Like other enterprise modellers I could mention!

written by Chadwick on July 1, 2014

Would be great if you could just drag in the processes or subprocesses from BPMN, or the other way round - use a DFD as a high-level starting point to index more detailed flowcharts that show the sequence of events. Even better if 'exploding' a prices to the next level retained all the flow arrows into and out of the new surrounding 'context' box, as stubs to connect to new more detailed subprocess entries within the new context. Like other enterprise modellers I could mention!

written by Angus Chan on July 2, 2014

Thank you for your comment. I will follow up with our team to see how we can improve.

written by Singh on August 10, 2014

be more easier if you have gone thurogh our previous tutorials on issuing books out of library and returning books to library. Such, functions in a Library Management System Software project describes how the control flow of

written by sree on August 25, 2014

it's very useful

written by gopal on September 18, 2014

sir i am needed the material management data flow so please tell me that how can i draw ......

written by kishor ramani on October 15, 2014

my questions is that the how can i draw a 2 level DFD and 3 level DFD diagram for the another system.

and it is very complex to draw this diagram.

and my actual question is
when we draw a 2 level diagram at that time we should remain same 0 or 1 level diagram in the 2 level DFD diagram?

written by Laurens on December 16, 2014

Would you see an ERP system as a proces or as a data store? Or could it be both?

written by brenda on January 7, 2015

great job.. i enjoy reading a I have a lot of things get here :)

written by narashi hadiya on February 23, 2015

this diagram is for simple system but my system is much more complex so do you have any idea that how to draw diagram for complex system

written by steve on April 2, 2015

hello, i have drawn the dfd diagram and i would lie to get it out of the application and dont now how to get it out of it. kindly help

written by abdullah on April 9, 2015

noce.... thanks for it........

---

written by abdullah on April 9, 2015

nice.... thanks for it........

---

written by Agus Mulyanto on April 11, 2015

thank for it

---

written by patil shubhangi on April 26, 2015

thank you

```
Write comment
```

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