

IT525 – Unit 2 – Visio Tutorial

This tutorial is meant to help you use Visio to create an E-R diagram, and especially the associative entity in the diagram for Question 4 in the Unit 2 assignment.

Consider the situation of a Customer placing one or more Orders, each Order being for one or more Products. The business rules for the two binary relationships are:

Customer - Order

One Customer may place many Orders (many)

One Order is placed by one Customer (one)

Customer 1:M Order

To determine which is the "one" table and which is the "many" table, pick the business rule with multiplicity (many). This is "One Customer may place many Orders." "One Customer" implies that Customer is the "1" table; "many Orders" implies that Order is the "M" table.

In a 1:M relationship, the primary key (PK) of the "1" table will be a foreign key (FK) in the "M" table.

Order - Product

One Order may contain many Products (many)

One Product may be contained in many Orders (many)

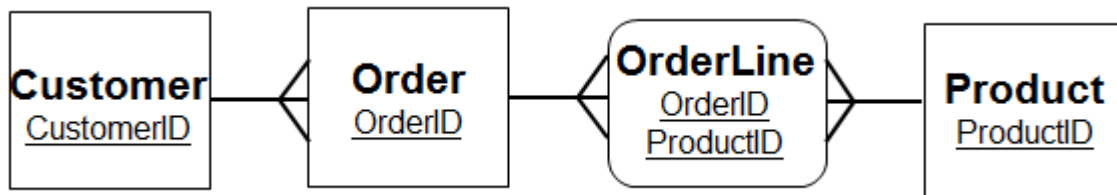
Order M:N Product; AE = OrderLine

The Order – Product M:N relationship will require an associative entity (AE). We will call it OrderLine. (An alternate name for the AE would be LineItem or OrderDetail.) An associative entity (AE) will always be on the "M" side of a relationship with the "many" tables it is linking:

Order 1:M OrderLine M:1 Product.

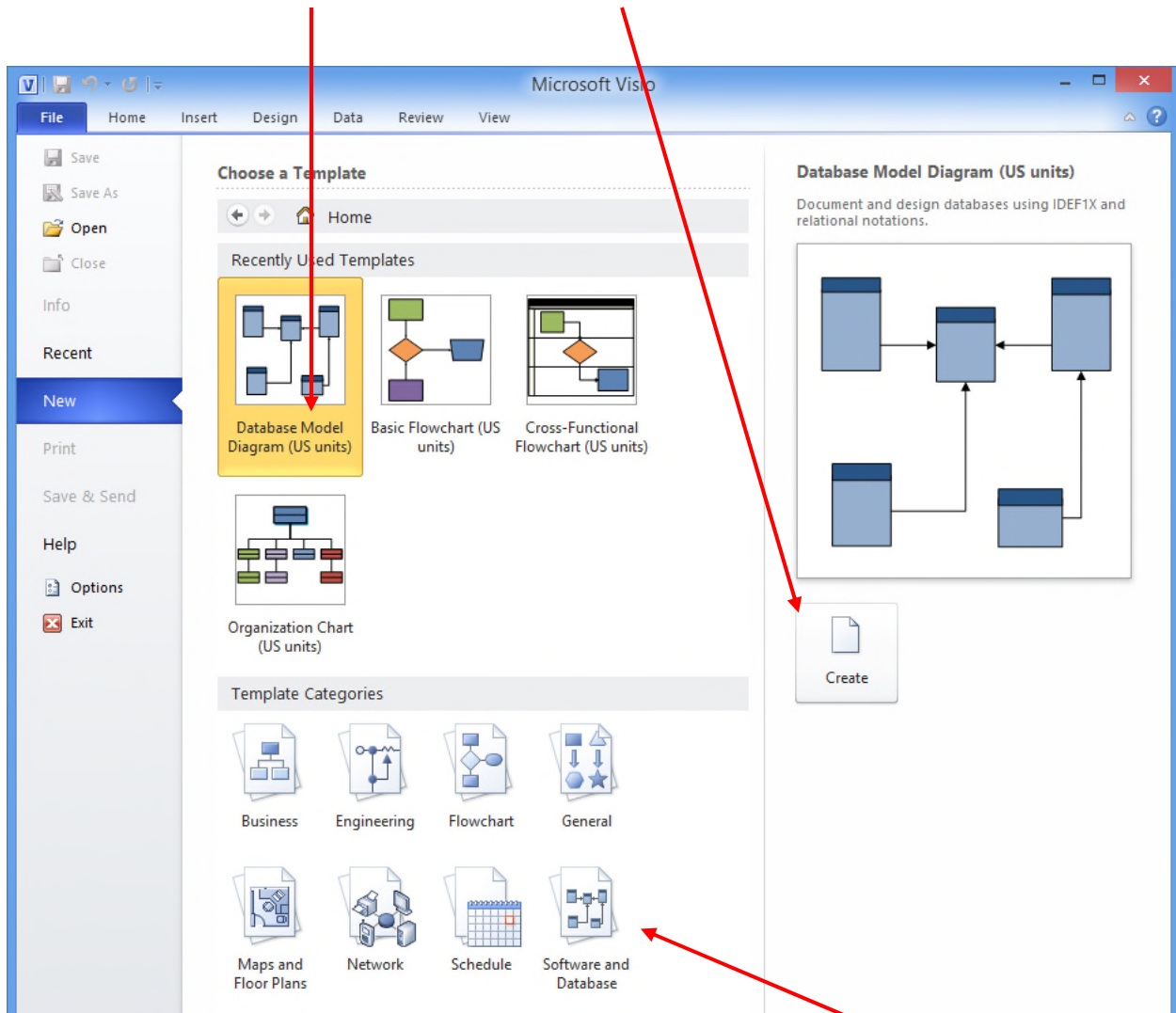
The PK of the AE will be a composite PK consisting of the PKs from the two tables being linked by the AE. Each column in the AE's composite PK will be an FK referencing the PK of the table it came from.

Our ERD showing entity type names and primary keys (PKs) only would look like this:



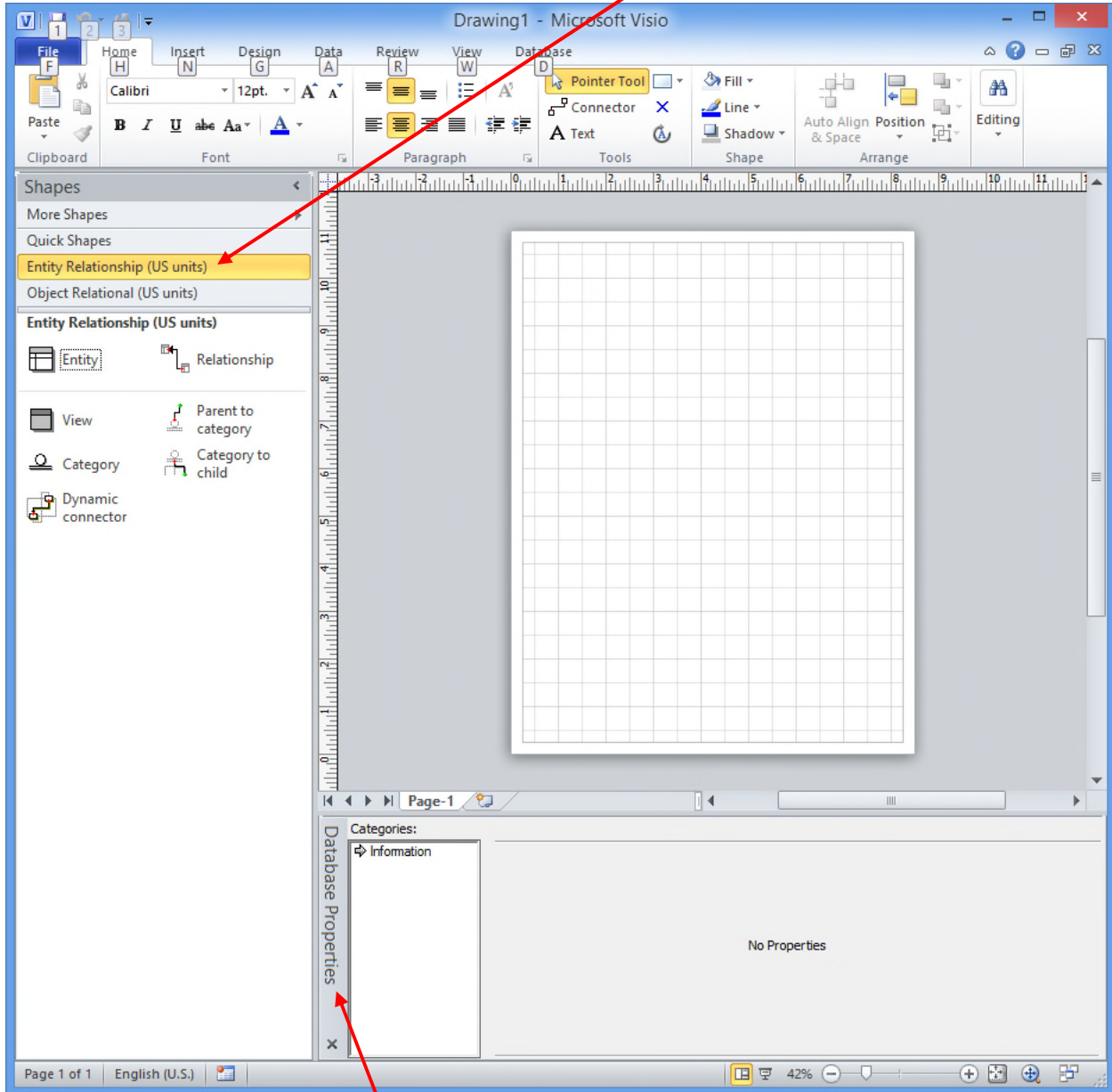
The steps below will show how to construct this part of the diagram in Visio. Visio 2010 Professional was used.

1. Open Visio. **To Create a Database Model Diagram...**
Select Database Model Diagram, then click **Create**.

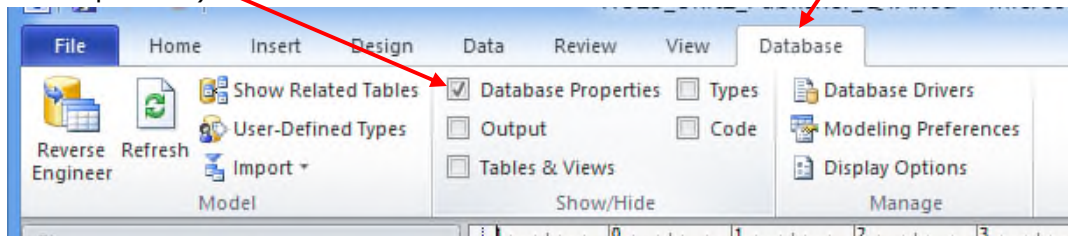


(If you don't see the Database Model Diagram choice, click on Software and Database; the Database Model Diagram choice will show then.)

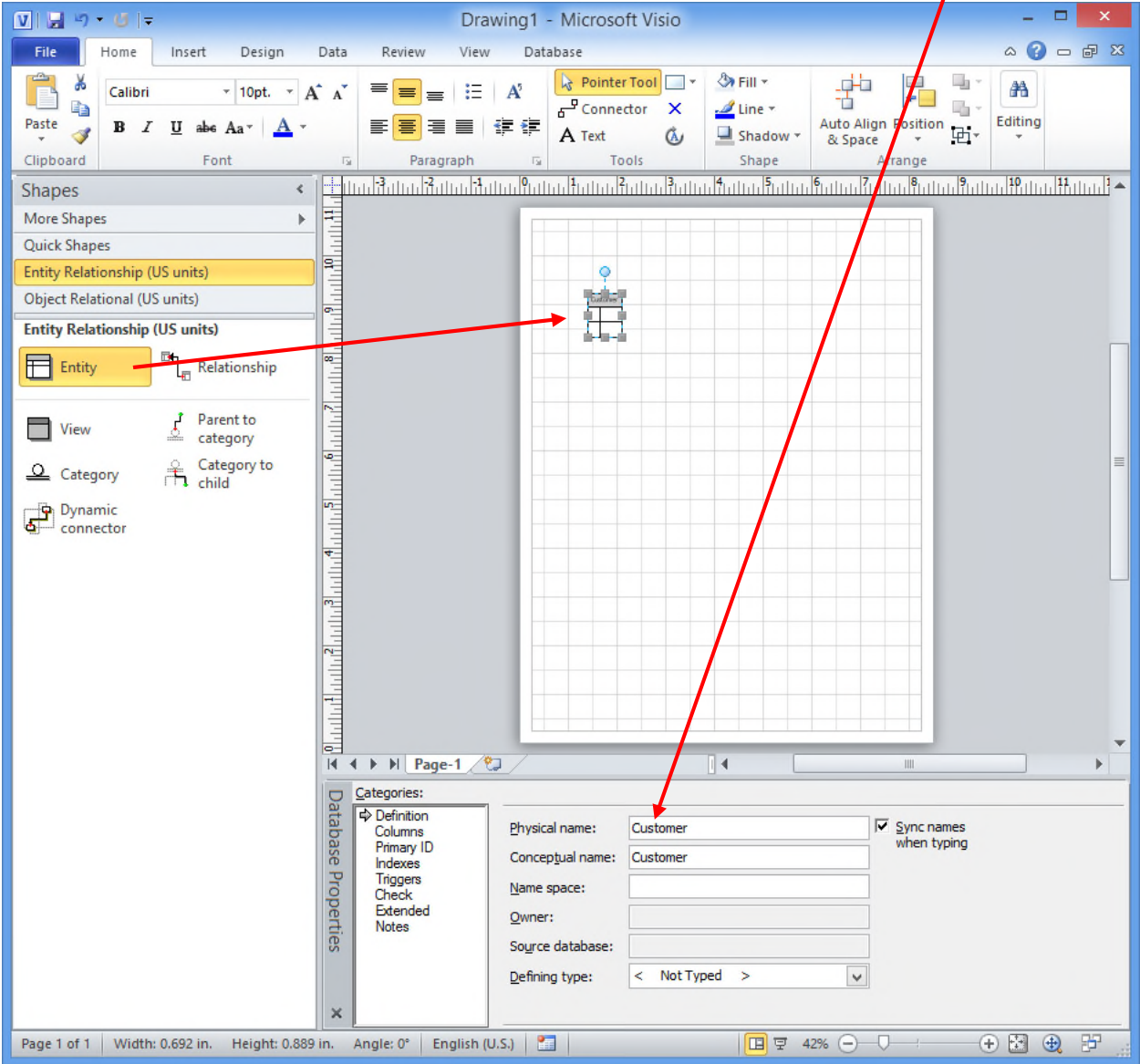
Visio will now look like this. Be sure to choose **Entity Relationship** (not Object Relational).



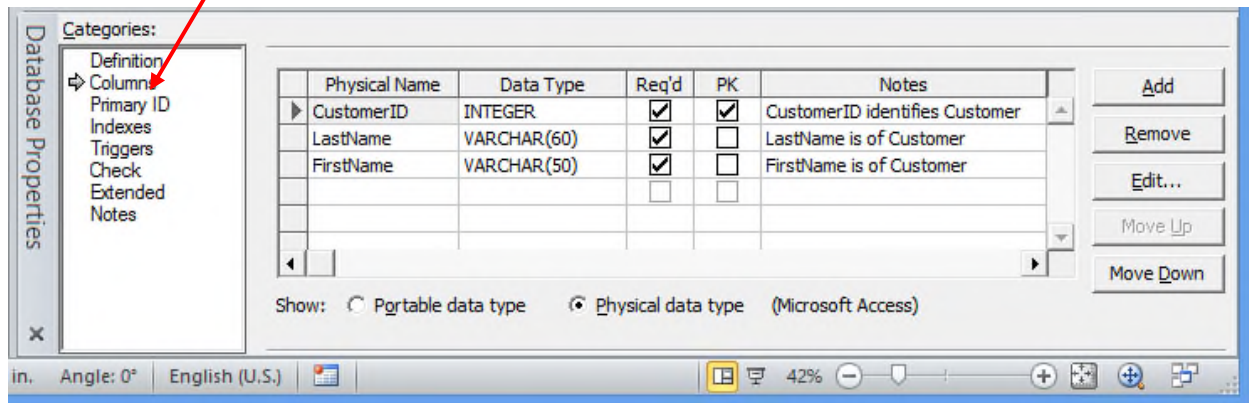
(If you do not see the Database Properties pane, select the Database tab and check Database Properties.)



2. **Create Entity Types.** In the left pane, select Entity and drag it onto the "graph paper" work area. The Properties pane will change to show Categories, with **Definition** selected by default. Give the Entity a Physical name. In this case, we will define the Customer entity type. When "Customer" (without the quotes) is typed into the Physical name box, the Conceptual name box is also filled out for you (because Sync is checked).

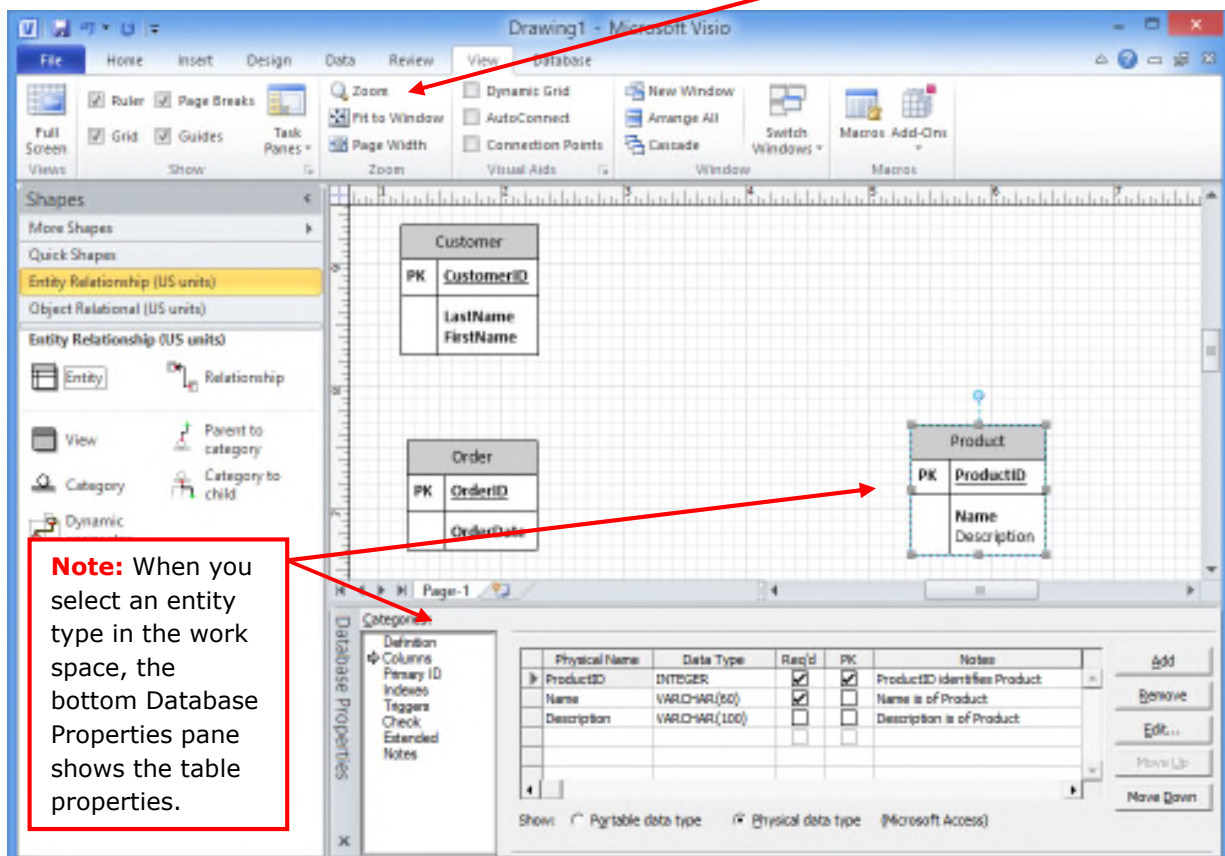


Click on the **Columns** in the Categories area. Enter a few columns (but not any foreign keys). "Req'd" means NOT NULL, i.e. a value must be specified. PK indicates the primary key.



If you say VARCHAR, you get a length of 10 by default. You have to type the entire VARCHAR(60) or click a few times on the VARCHAR(10) to be able to edit the number to the length you want. (For diagramming only, you need not worry about the data type.)

Order and Product entity types are created. The size (Zoom on the View tab) is set to 100% so the details may be seen.

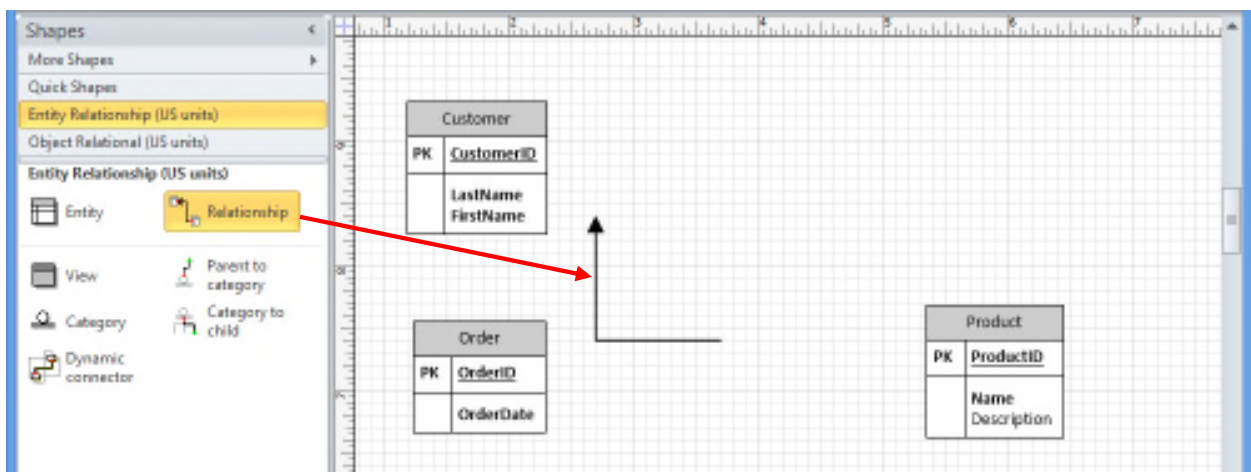


3. **Create a relationship between tables.** We know that Customer 1:M Order. Therefore, the PK of Customer should be a FK in Order. We can get Visio to do that for us. From Visio help:

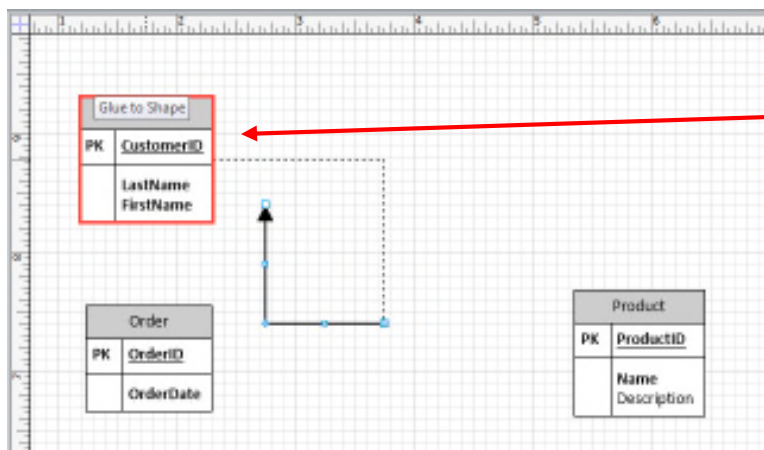
- a. Make sure that the "1" or parent table (in this case, Customer) has a PK defined.
- b. From the Entity Relationship stencil, drag a Relationship shape and drop it onto the blank space in the grid.
- c. Connect the higher end to the table with the parent table (the "1" table).
- d. Connect the other end to the child table (the "M" table). If the child table does not already contain a column with the same name as the primary key, the Visio modeler adds the column to the child table as a foreign key.
- e. Set the relationship's cardinality.

The following screen images show the steps to do this for Customer - Order:

b. Relationship shape dragged onto grid:

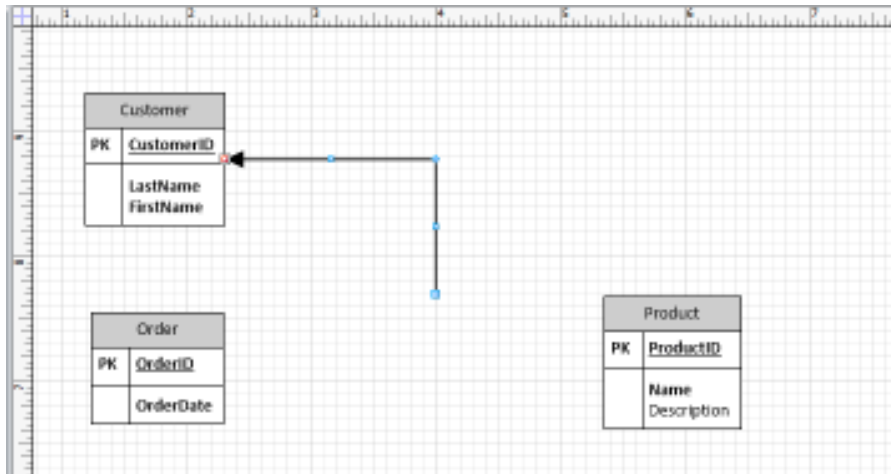


c. Upper end (with arrow) placed onto the "1" (parent) table, Customer:

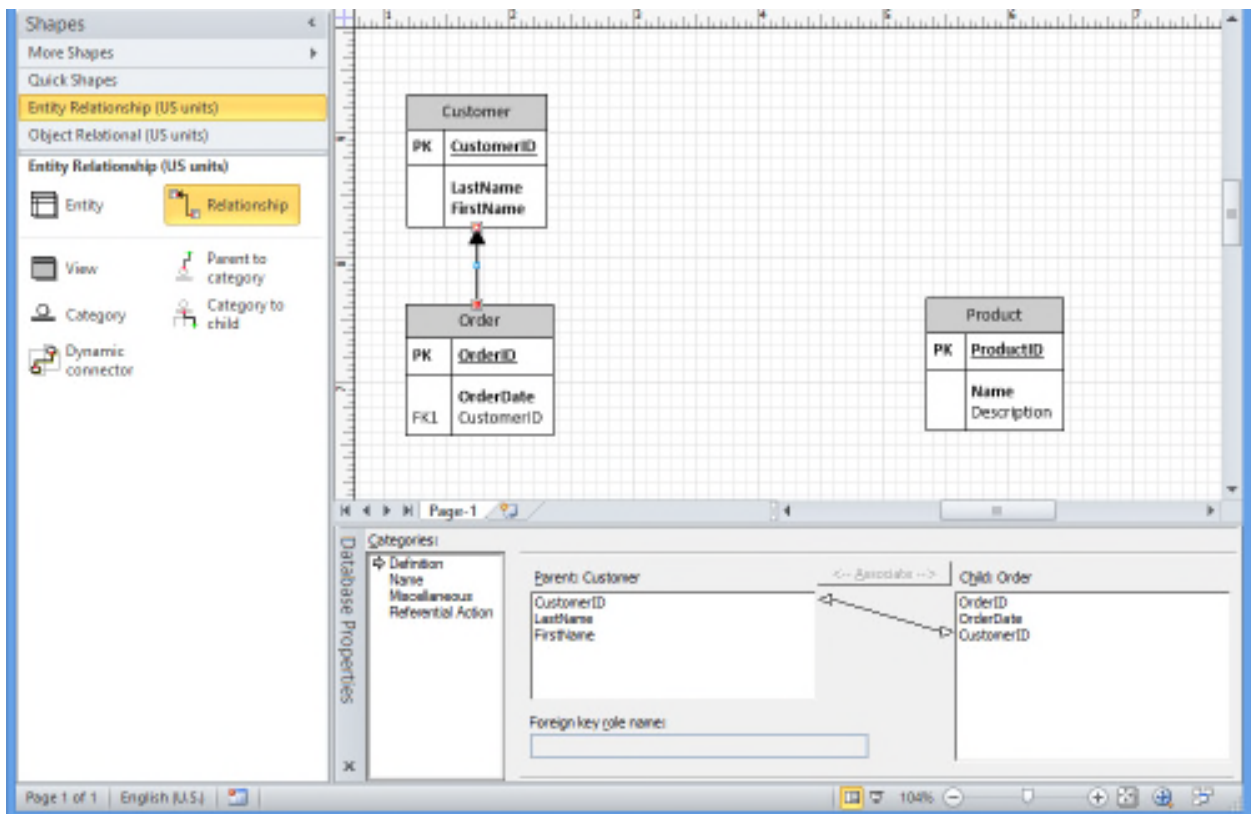


Note: You must drag the upper (arrow) end into the **middle** of the table so the table appears outlined in red, and you see the "Glue to Shape" message.

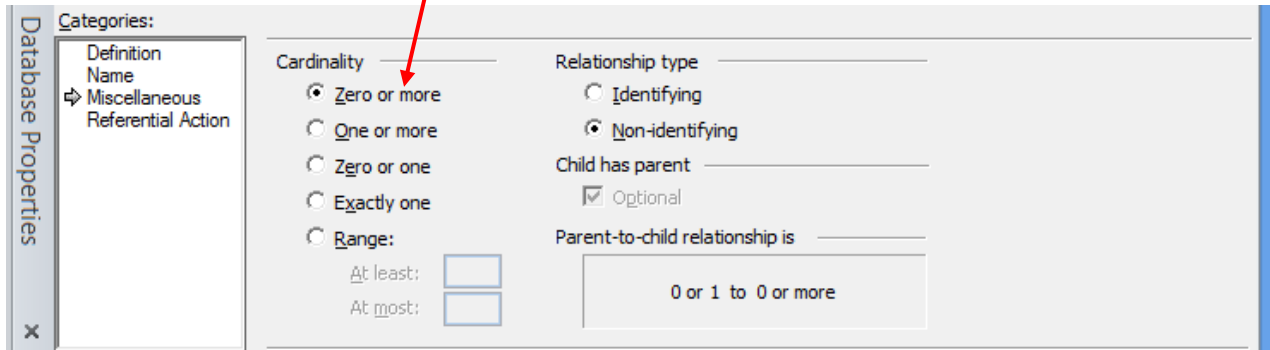
(When you let go of the upper end of the relationship shape, it will look like this:)



d. Connect other end of Relationship shape to the middle of the "M" (child) table. When the line end is in the center of the table, the table will be outlined in red, with the "Glue to Shape" message appearing. When you let go, the diagram will look like this. Notice that the CustomerID column is placed into the Order table and marked "FK1". With the relationship arrow selected, the Properties (lower) pane shows the Parent and Child table column lists, and the related columns.

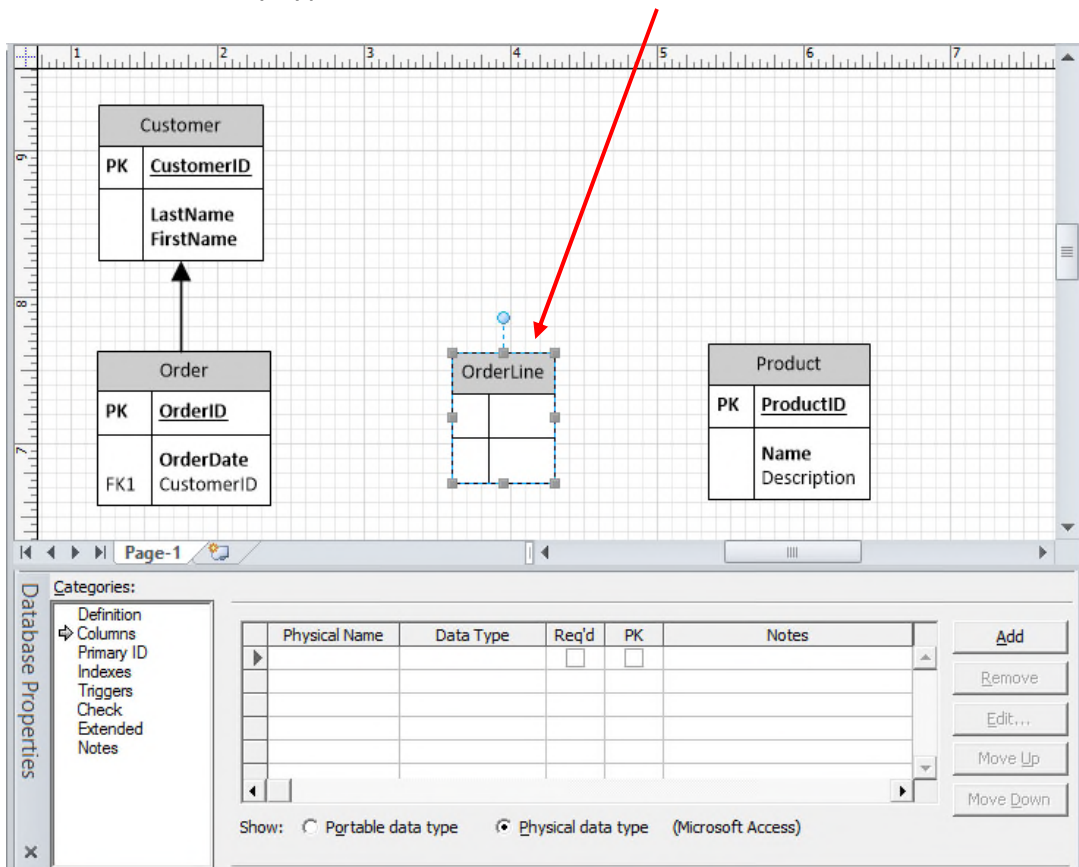


e. Set the relationship's Cardinality. In the Database Properties window, under Categories, click Miscellaneous. This relationship is non-identifying (because Order is not a weak entity type) and is probably "Zero or more" (a Customer might not have placed an Order yet).

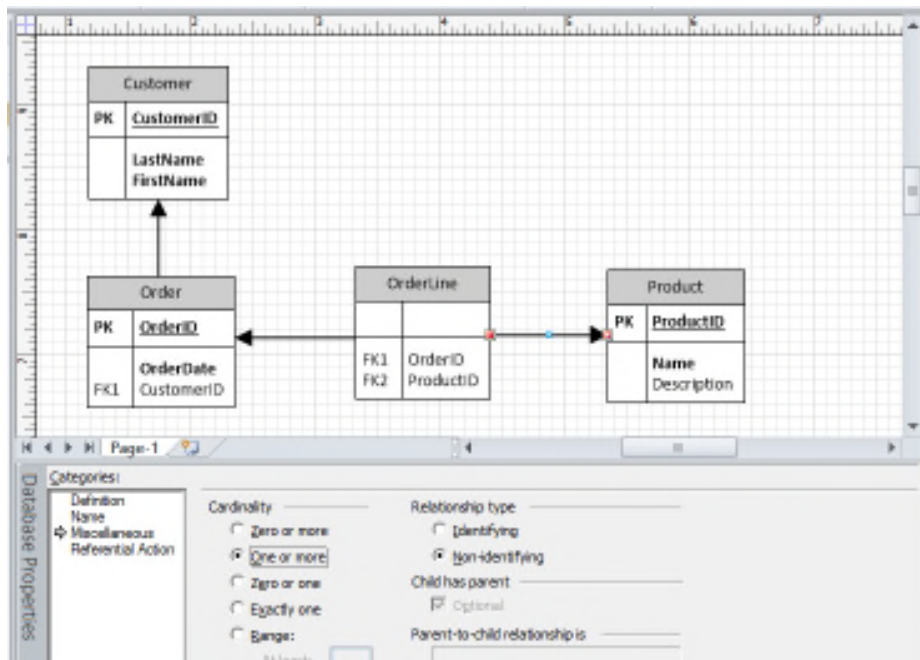


4. **Create the Associative Entity (AE).** The OrderLine AE is created by creating the entity type and the relationships with Customer and with Order. Remember that in an AE, each table being "bridged" or "linked" by the AE will have its PK appear as an FK in the AE.

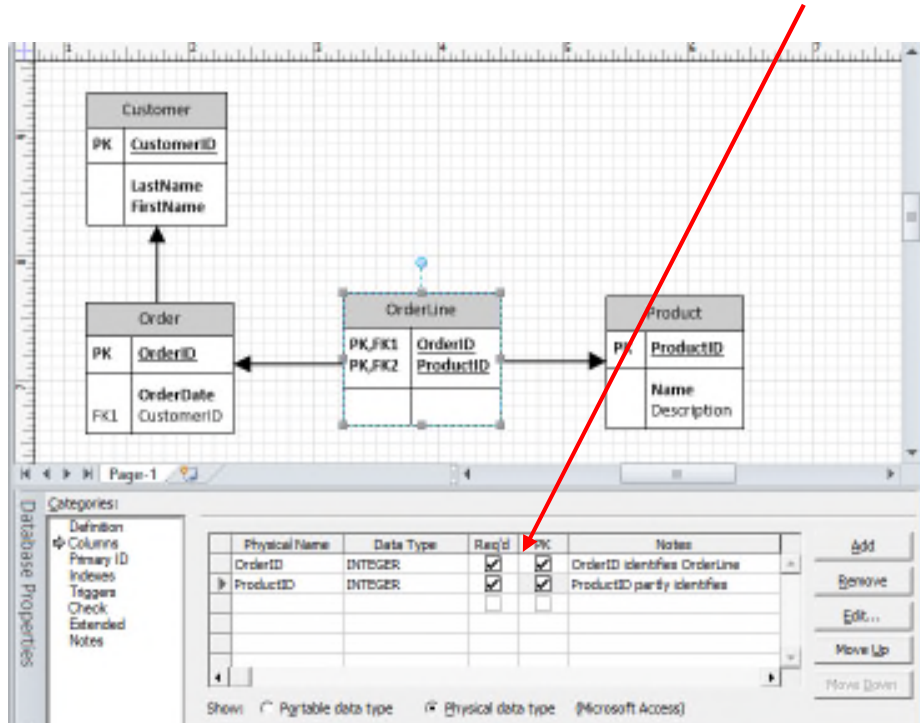
First, the OrderLine entity type is created with no columns.



Then, the two relationships are defined. (Each relationship should be "One or more.")

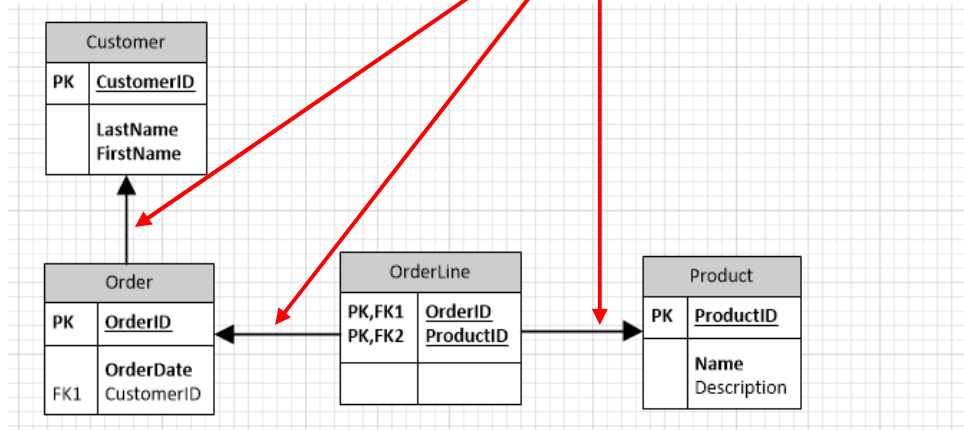


Then, in the OrderLine table's properties, check the PK box for both columns.



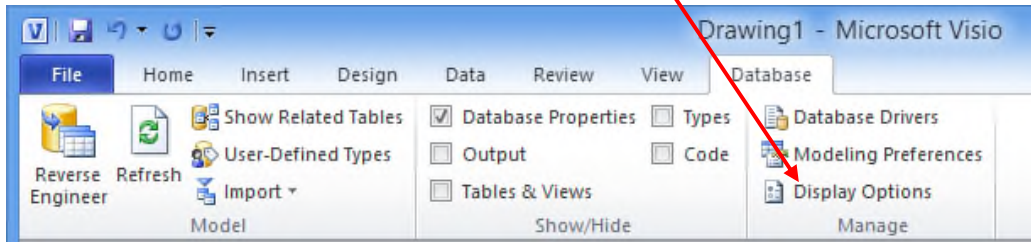
Now, the two columns are a composite PK, and each column is an FK referencing its source table. [Note: This "promotion" of two FKs to be a composite PK should be done **ONLY** in an AE. Do **NOT** promote an FK to be part of the PK in a table that is not an AE!]

The diagram now has "referencing" arrows. These arrows point from the foreign key table to the primary key table, because the foreign key "references" the primary key.

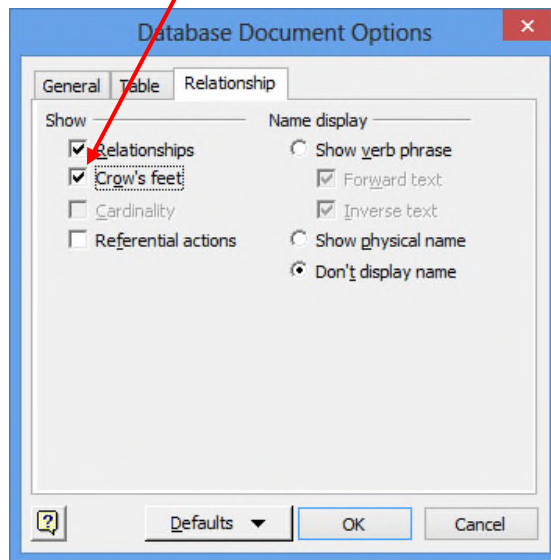


5. **Crow's Feet.** What we want are the crow's foot symbols. To get those:

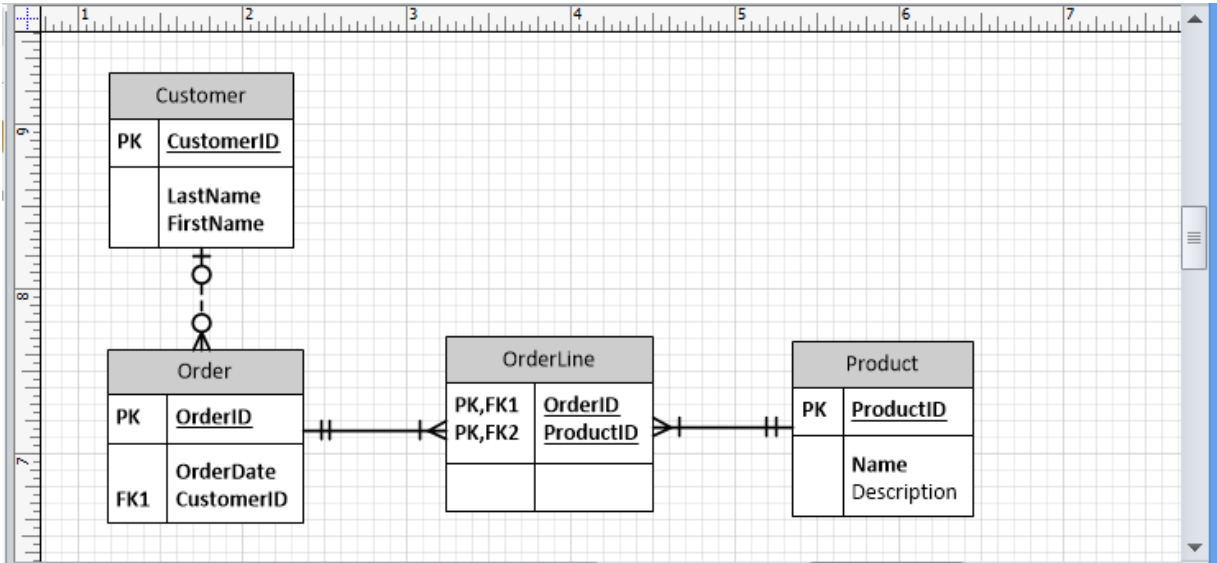
a. On the **Database** tab, select **Display Options**.



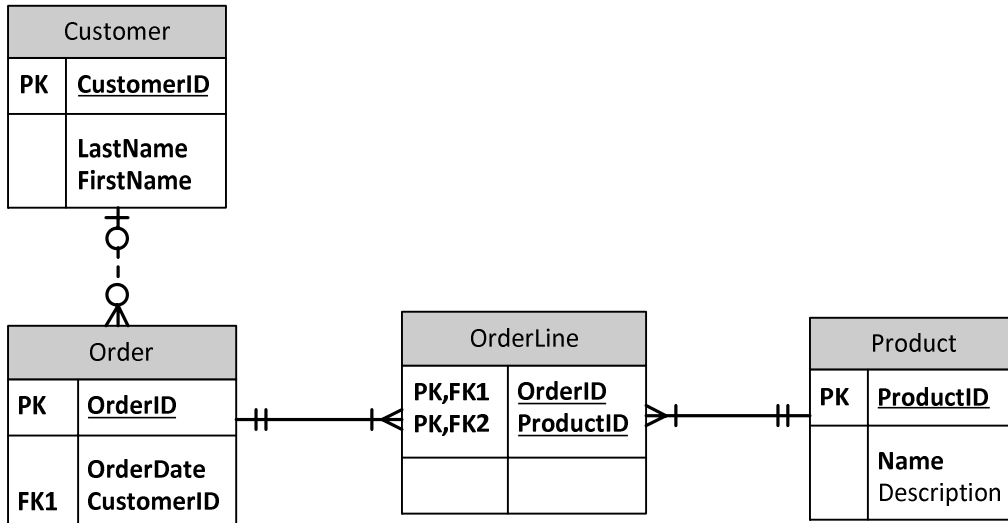
b. A **Database Document Options** dialog window will appear. On the **Relationship** tab, select the **Crow's feet** check box, and then click **OK**.



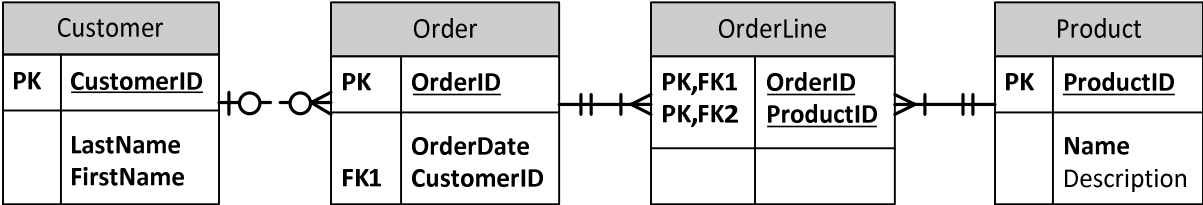
The diagram will now look like this:



The diagram may be copied into Word. Click in the upper left and drag to the lower right. A light blue rectangle will appear around the diagram, with included items outlined in pink. Press **CTRL+C** to copy the diagram. Click in your Word document, and type **CTRL+V** to paste:



6. **Rearranging the tables.** Note that you can move the tables around in the diagram as you wish. That capability becomes essential as you add more entity types to a complex diagram. Save your Visio work early and often. Here is the diagram with tables rearranged:



[I do not know how to get the associative entity to have rounded corners.]

Additional note:

If you take the 4th or "relationship" row of your business rules – in this case:

Customer 1:M Order

and

Order M:N Product; AE = OrderLine

– notice that those 4th-row or "relationship" items tell you exactly how to make your diagram!