Tutorial on Database modelling

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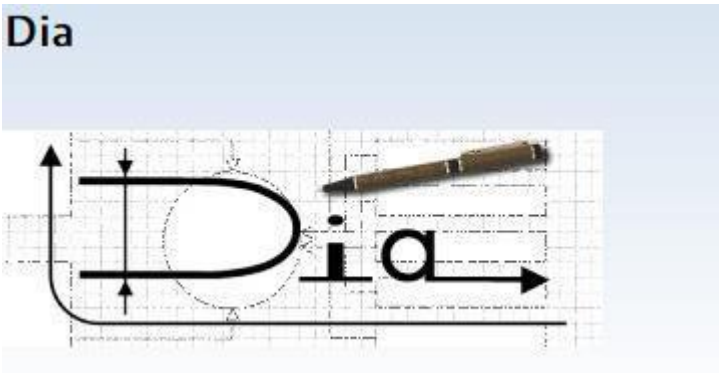
Database modelling can be done using variety of tools such as Oracle SQL developer, Dia (open source software), Microsoft Visio.

In this tutorial we will learn how to use DIA diagram editor tool to model databases using the following steps:

a)

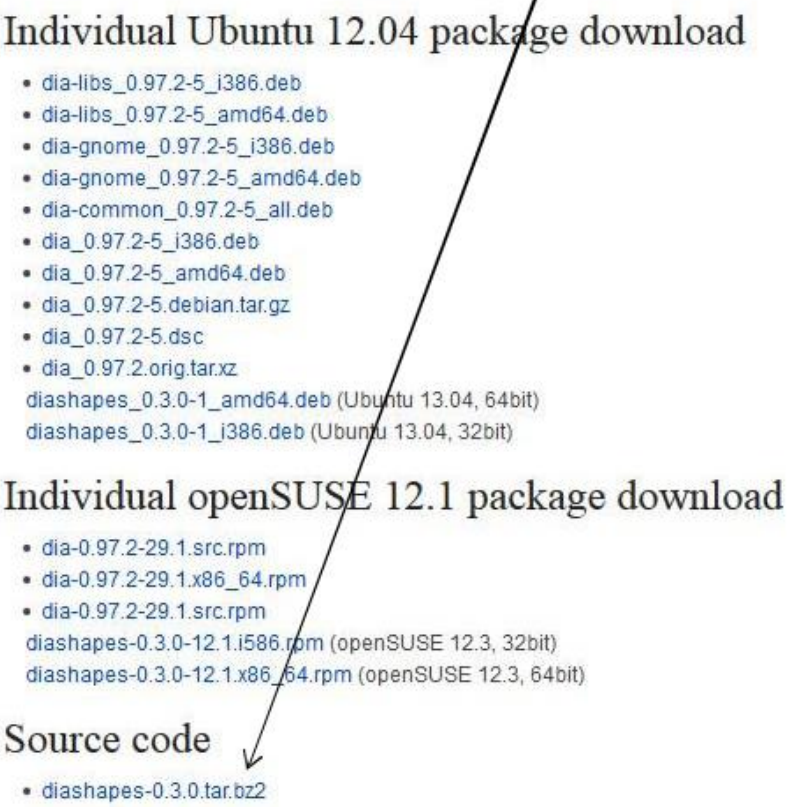


Download this tool Dia from : http://dia-installer.de/download/index.html

b) Widows users please download this file and then double click on the file after it is downloaded to install it in your PC.

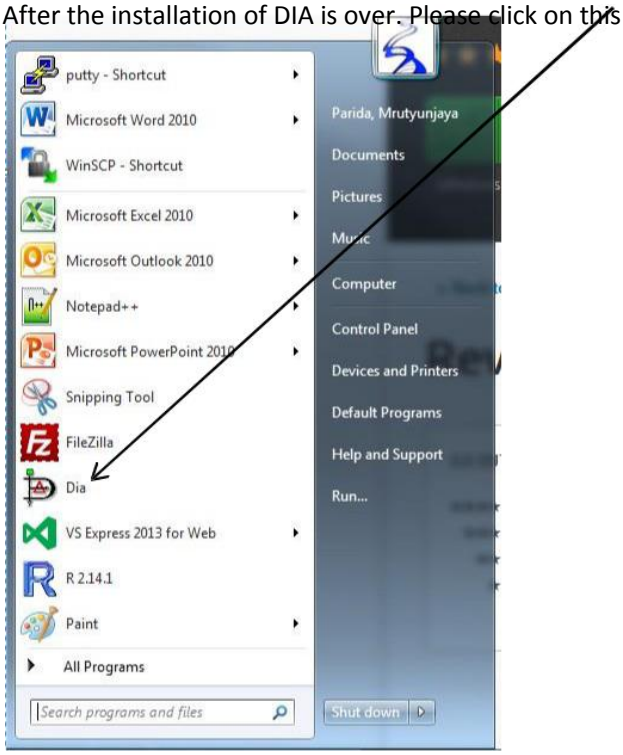
Mac users please download this file and then double click on the file after it is downloaded to install it in your system.

Linux users please download the source code file on your computer depending on what platform LINUX machine you are using:

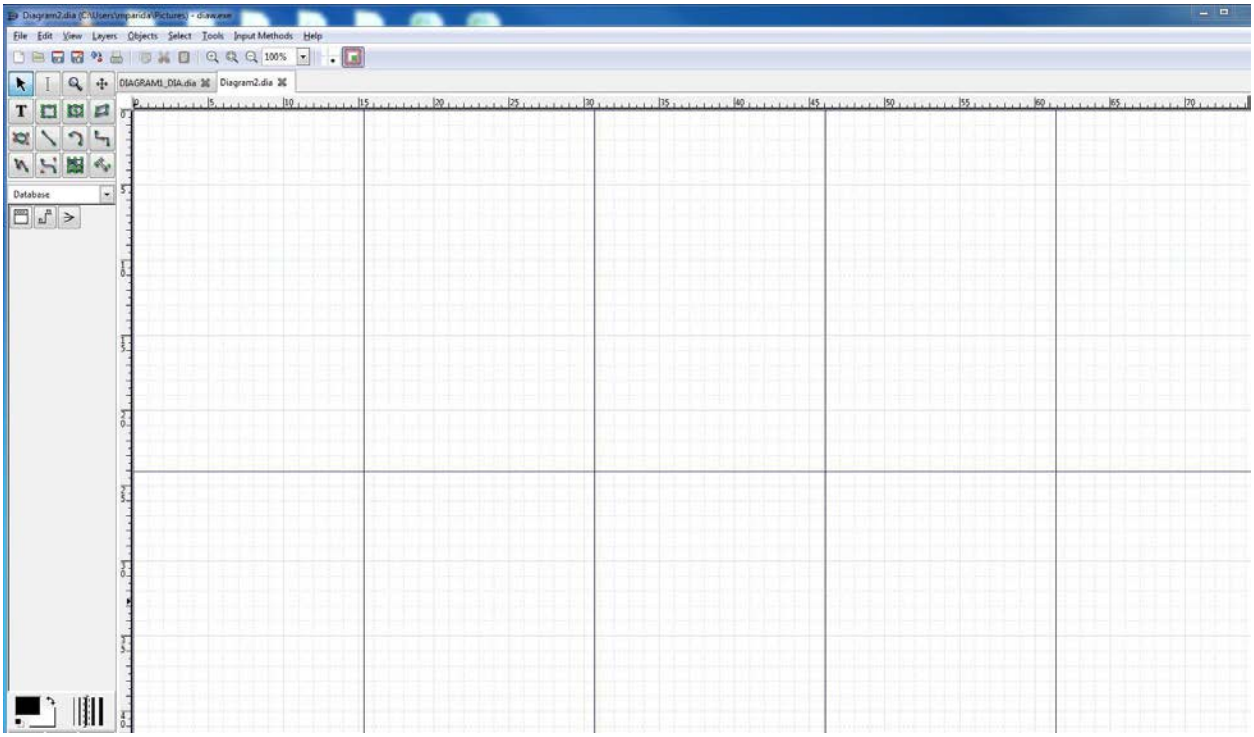


Once you have downloaded the Source code, please type tar –xjvf diashapes-version#.tar.bz2. This command will unzip the tarball for you and put all the files into a newly created folder. Please look for any make or configure files in that folder to build and install it in your linux operating system. If you have further question on installing dia on Linux please meet me during my office hours or just email and I will be happy to help.

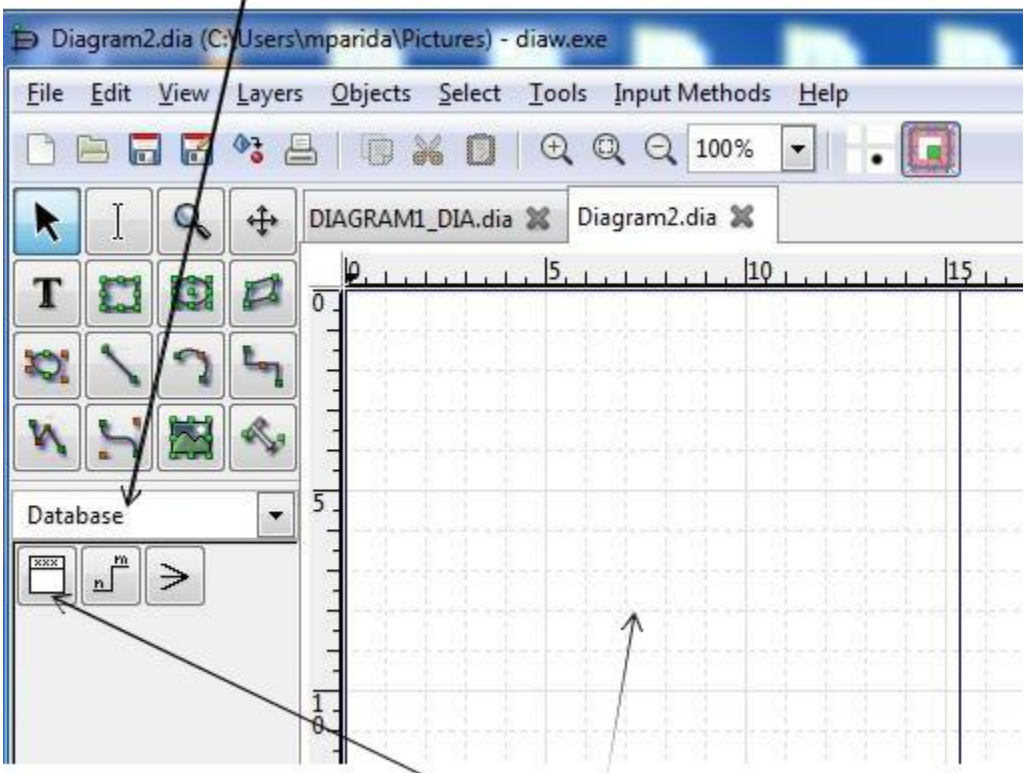
c) After the installation of DIA is over. Please click on this icon on your computer:



d) This is what the interface of the tool looks like:

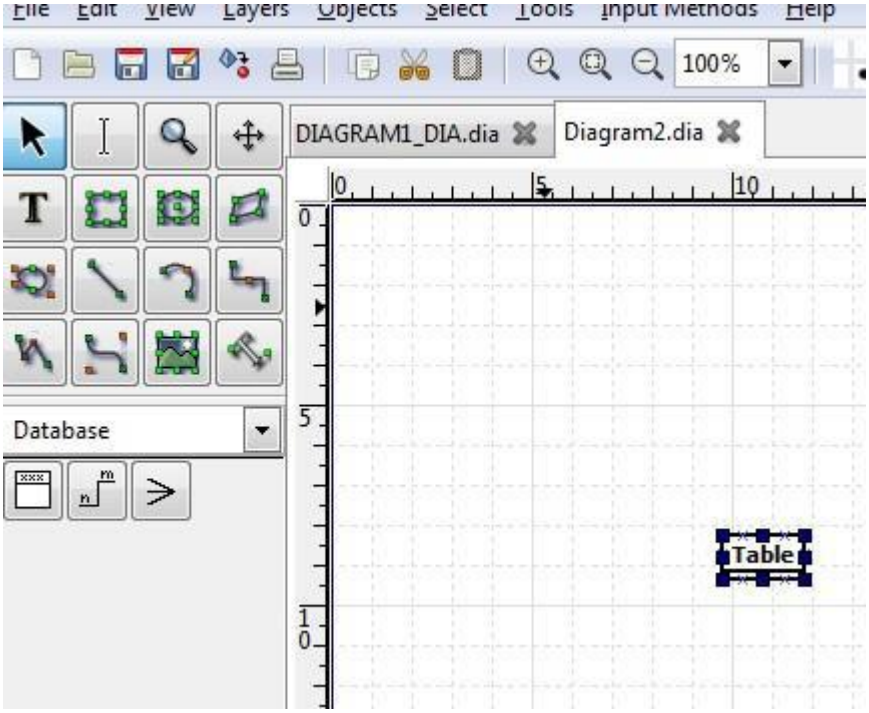


e) Please make sure this selection is Database in the dropdown menu:

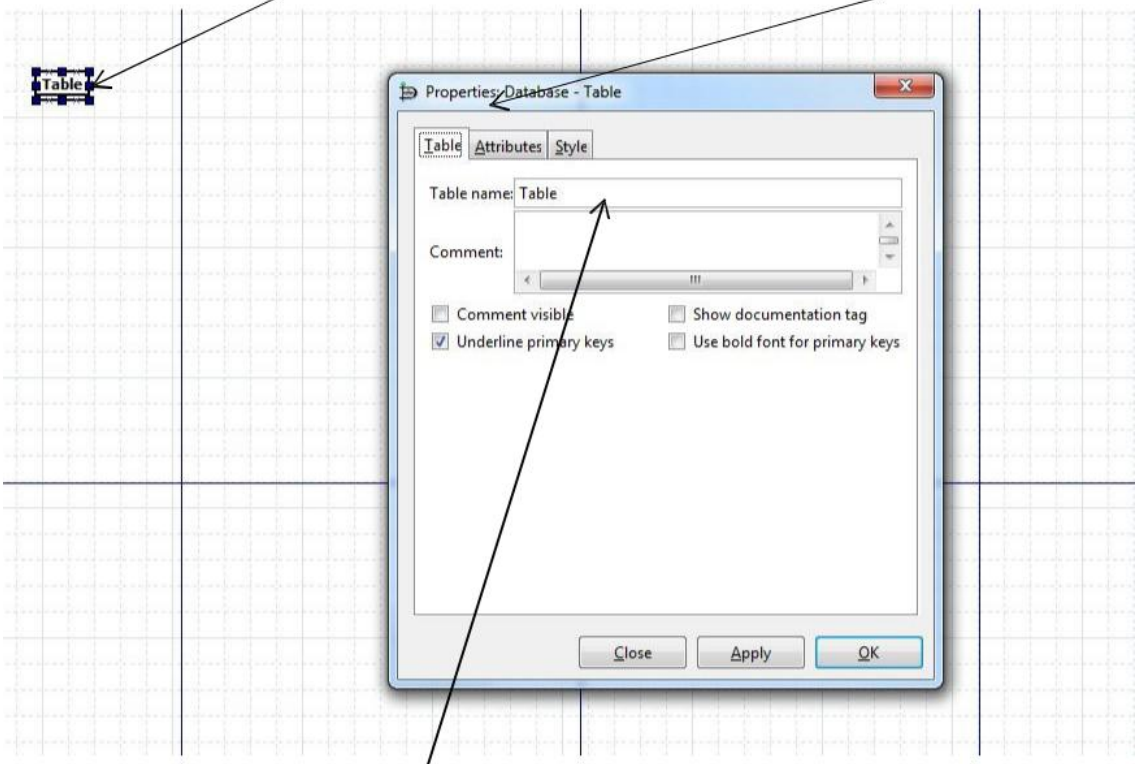


f) To create an entity please drags this icon to the worksheet.

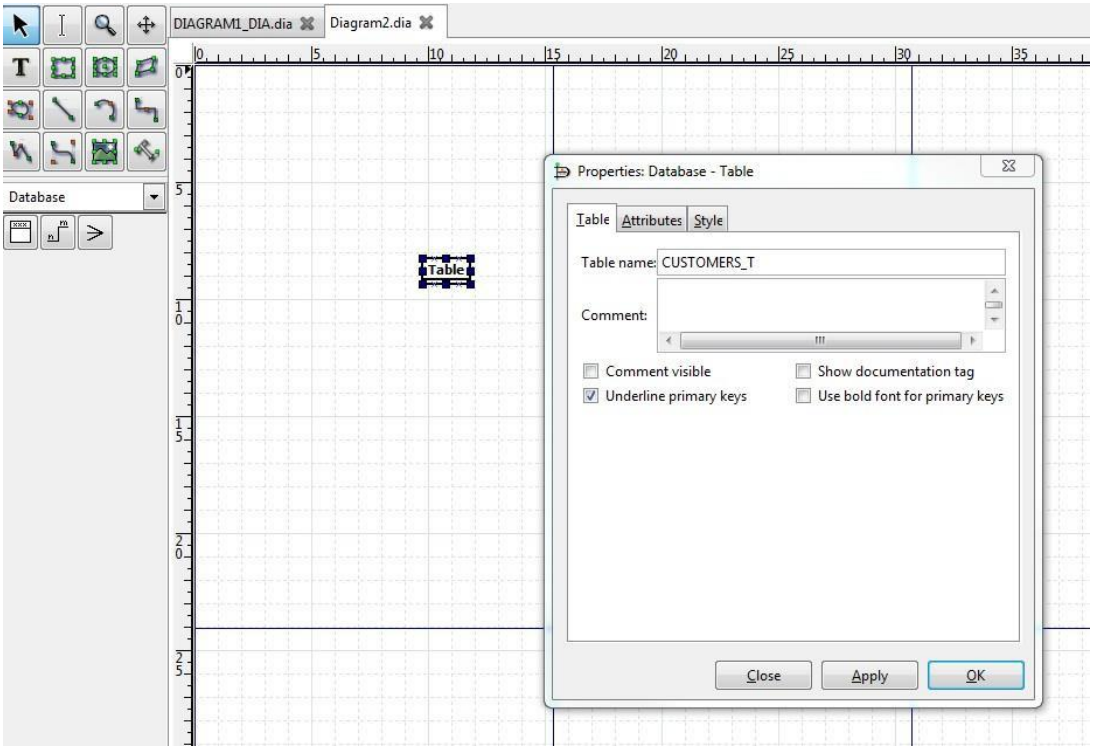
g) This will be an empty table :



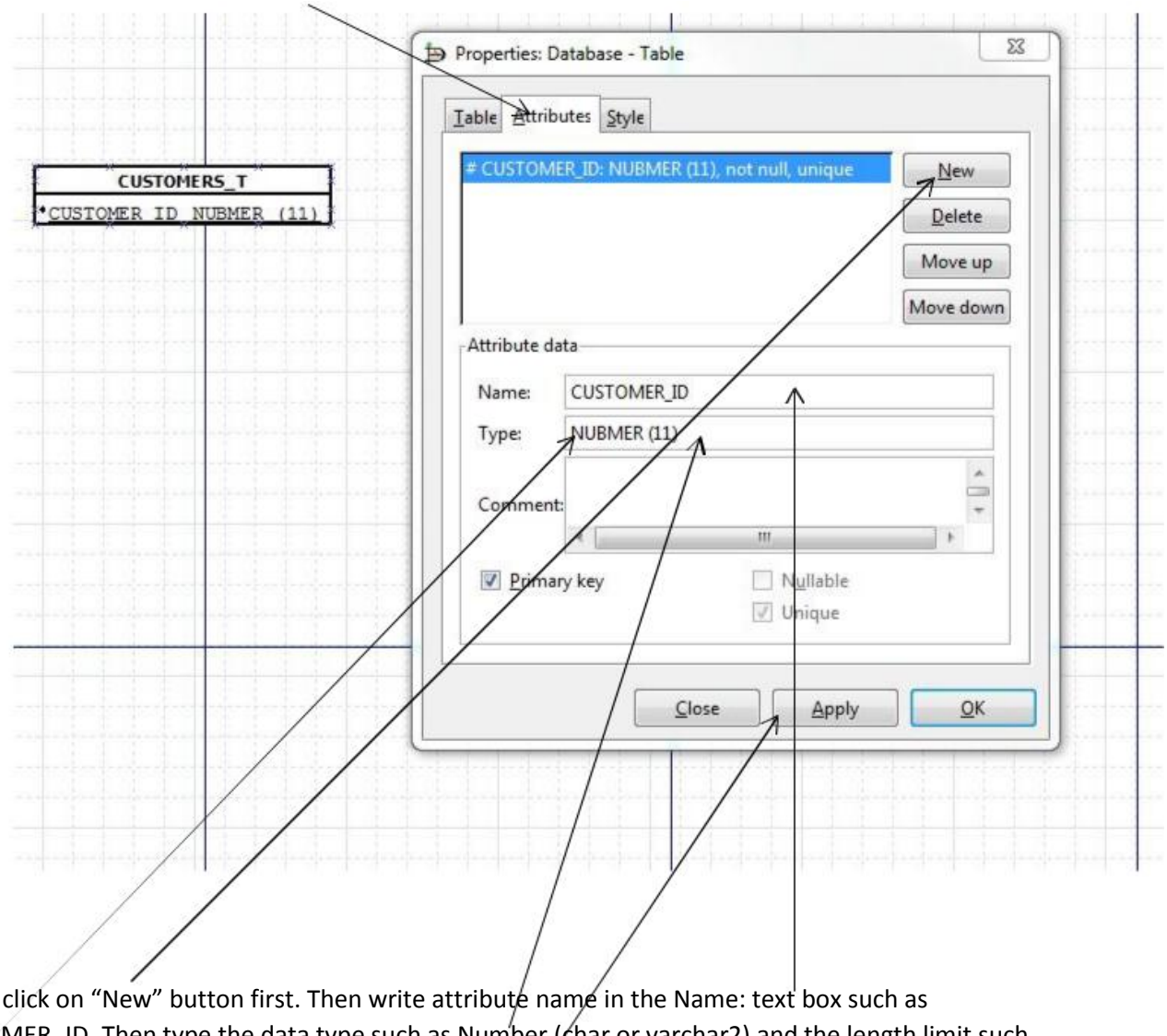
h) Next, please double click on this icon and change the values in the Properties windows:



i) First, please change table name here and leave Underline primary keys as it is.

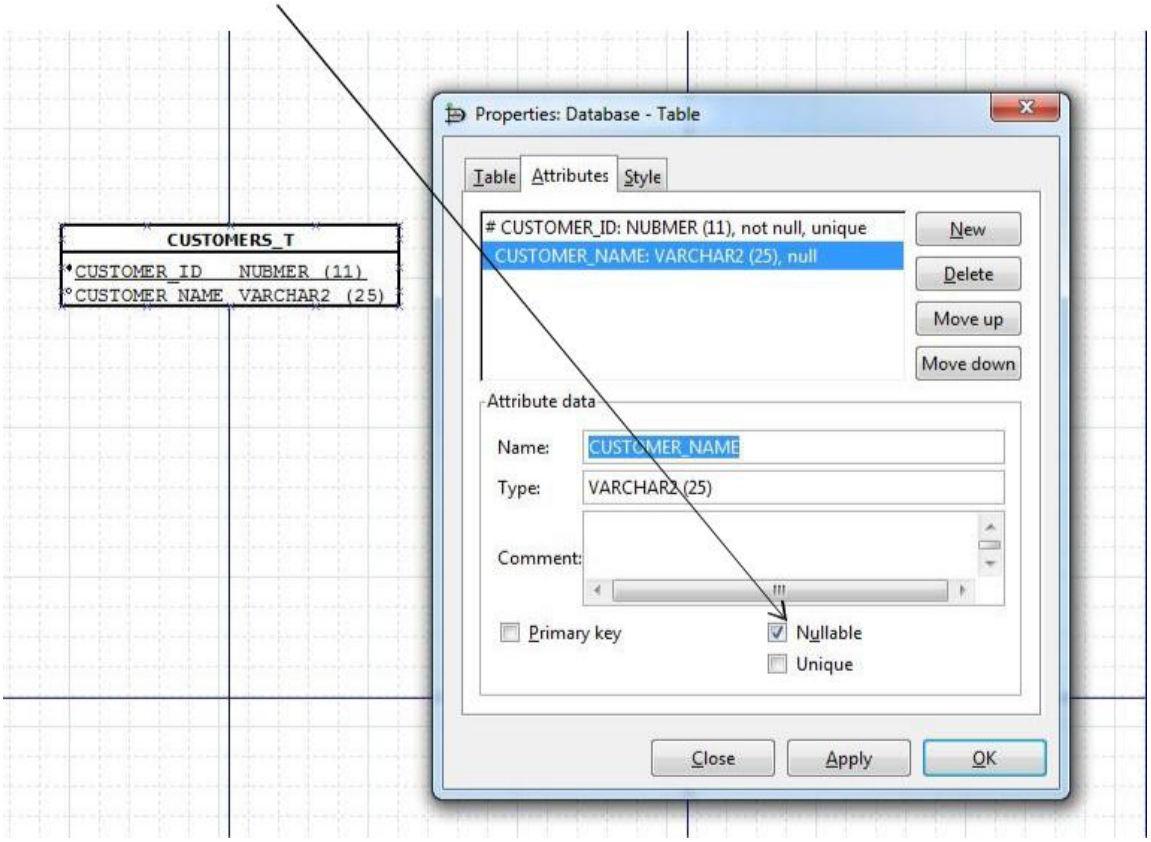


j) Then click on Attributes tab to add attributes to this table as follows:



Please click on “New” button first. Then write attribute name in the Name: text box such as CUSTOMER_ID. Then type the data type such as Number (char or varchar2) and the length limit such as (11), based on the datatype. Next, please click on “Apply” button to see the empty table implemented. Please keep the Primary key checkbox checked for CUSTOMER_ID because it is the unique identifier for this table.

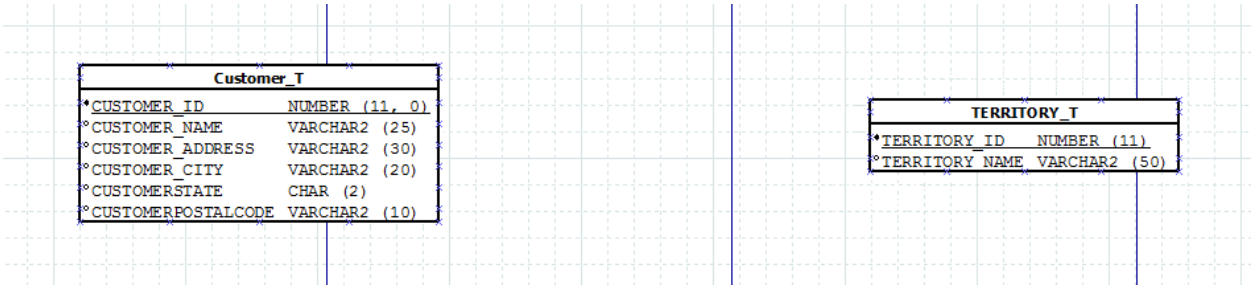
To add non unique attributes such as CUSTOMER NAME, ADDRESS and others please click on “New” and repeat as mentioned above except for unchecking the checkbox before Primary key and checking the checkbox before Nullable and finally click on apply to see the implementation as follows :



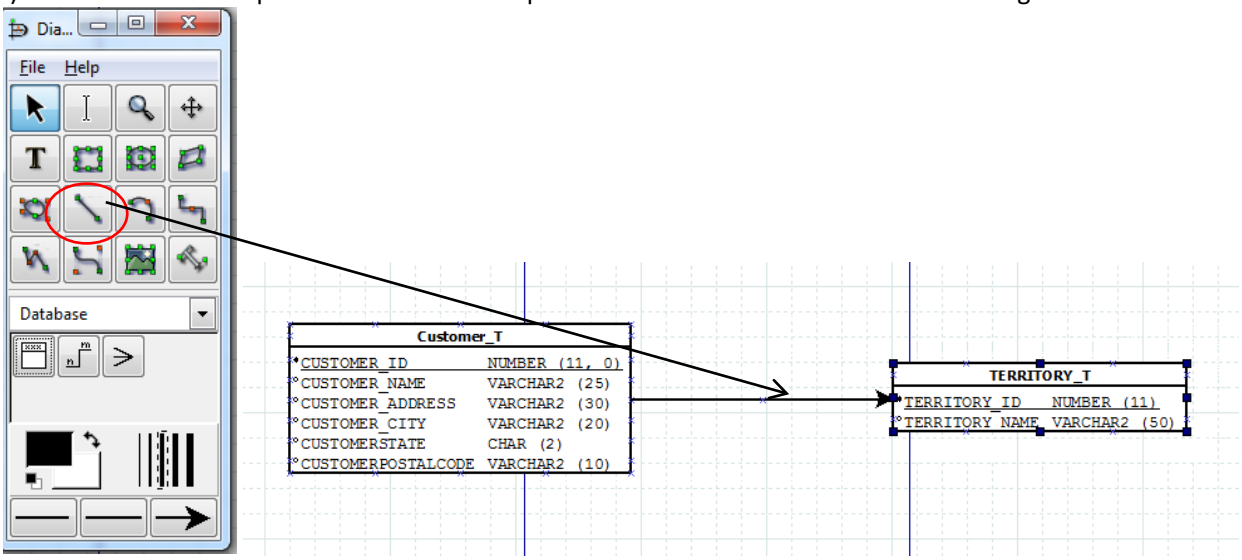
This means you may or may not add a value under this attribute when you are inserting data into this table.

Likewise, you can add more tables and fill them up based on the entity and its attributes. As you will see below, CUSTOMER_ID data type is written as NUMBER (11, 0), this means 11 is precision (numbers before decimal) and 0 is scale (numbers after decimal). Columns such as CUSTOMER_NAME , CUSTOMER_ADDRESS , and etc. require a datatype that is flexible to accept character lengths of various sizes, therefore, VARCHAR2 (treats empty string and NULL being the same thing) is used here. On the other hand CUSTOMERSTATE such as IA, MI,NY and CA, are fixed length characters and require CHAR instead of VARCHAR as its datatype.

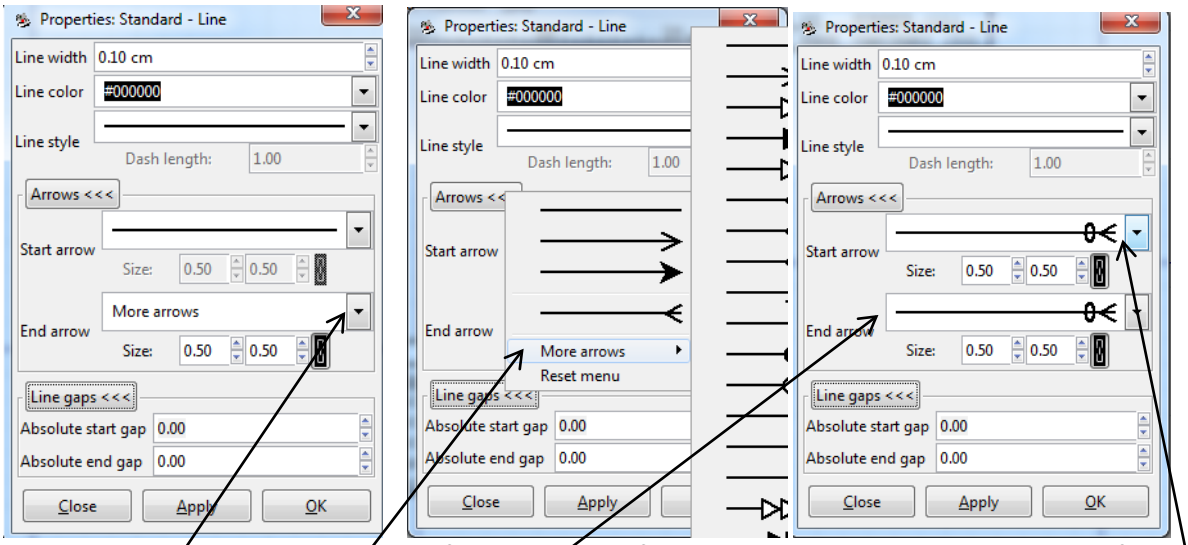
k) Please add another entity called “TERRITORY_T” as follows:



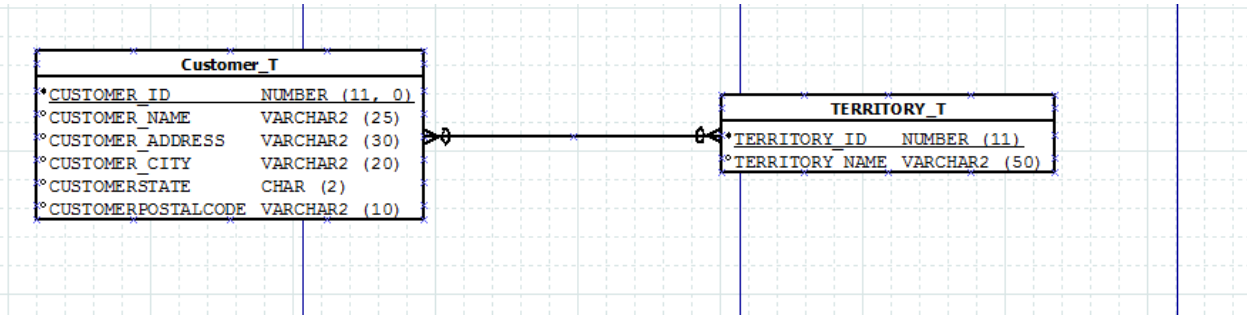
l) To add a relationship between two entities please use the line from the stencil and drag it here:



Next, please go to the properties of the arrow by double clicking on it and add cardinalities to this relationship. The business rule here states a customer does business in 0 or multiple territories and a territory can have zero or more than one customer. Therefore, the cardinality becomes many to many from both sides. Please draw them as follows:



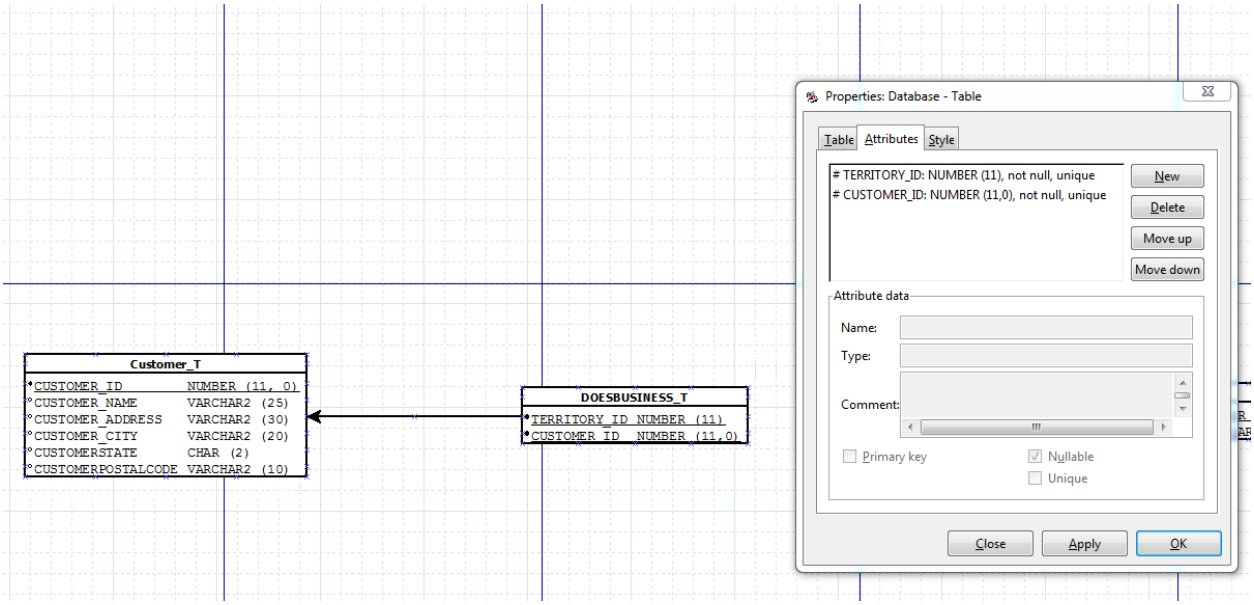
Please click here and then select the following arrow from these options. Please do the same for Start arrow to assign it a cardinality.

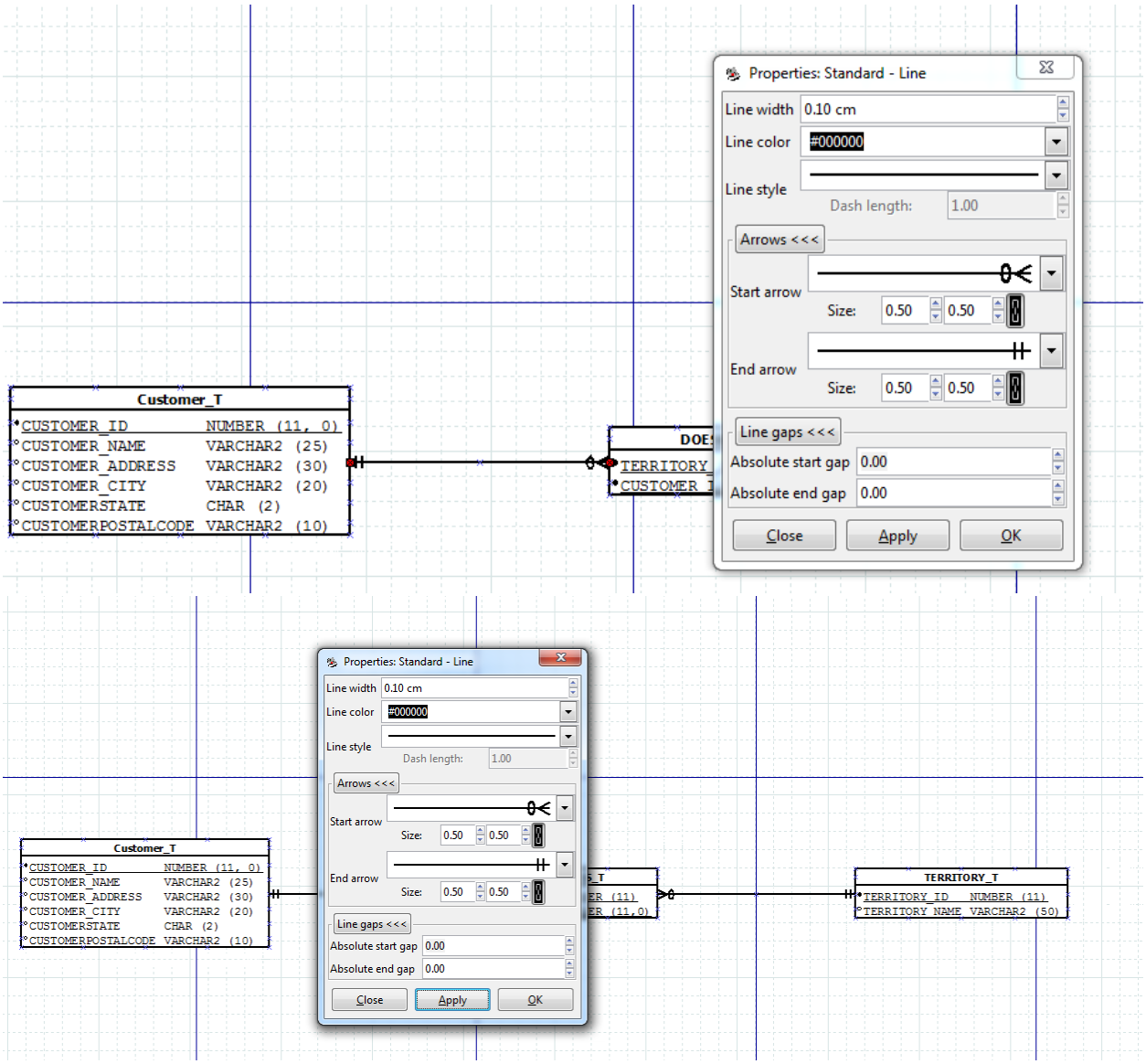


m) You have created a sample ER-diagram.

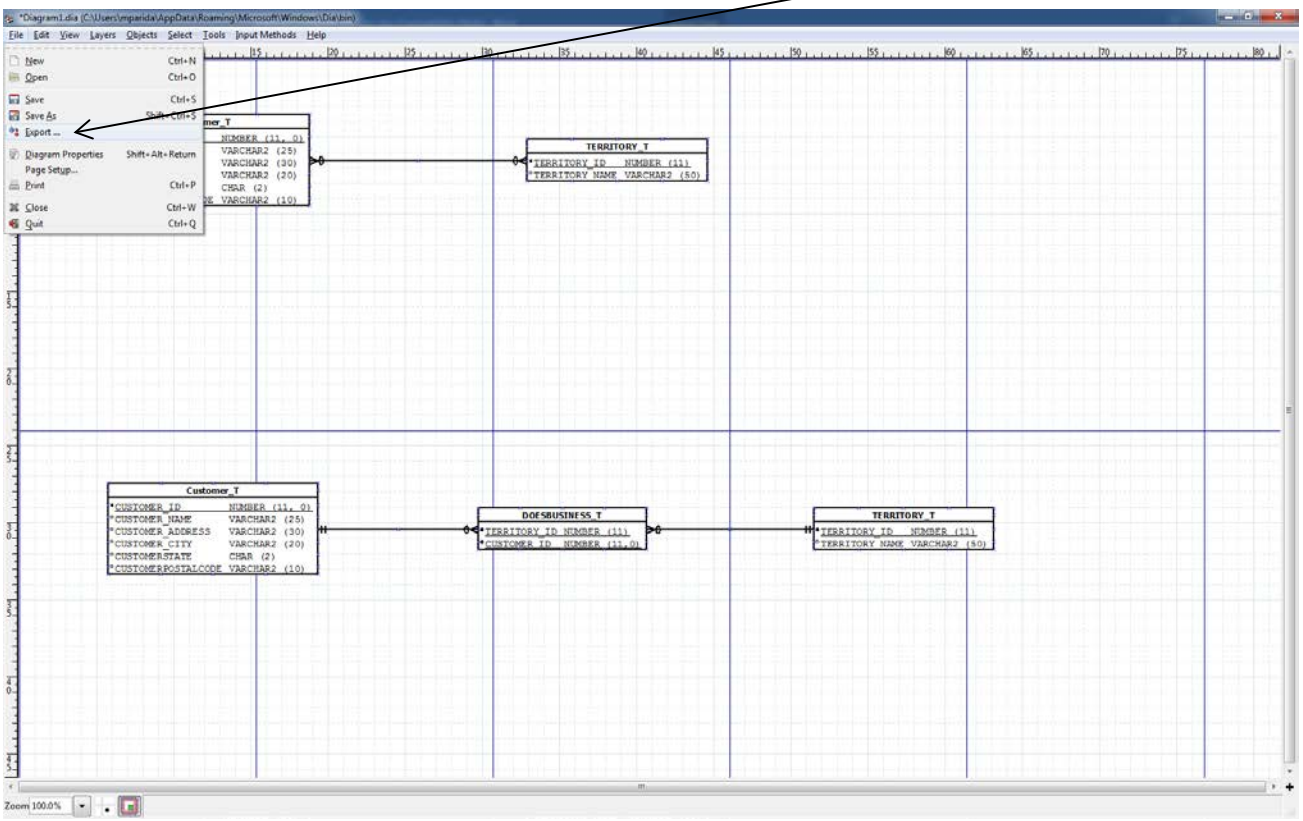
Since, Customer_T and Territory_T have a many to many relationship and given that many to many relationships are extremely complicated to design in a database structure, an associative entity called Doesbusiness_T was added to this ER design below. Now, every cardinality from this associative entity to Customer_T and Territory_T is a > to |. This is an ER modelling rule that dictates every relationship from an associative entity to another entity shall be > (0 /|, depending on the business rule) to ||.

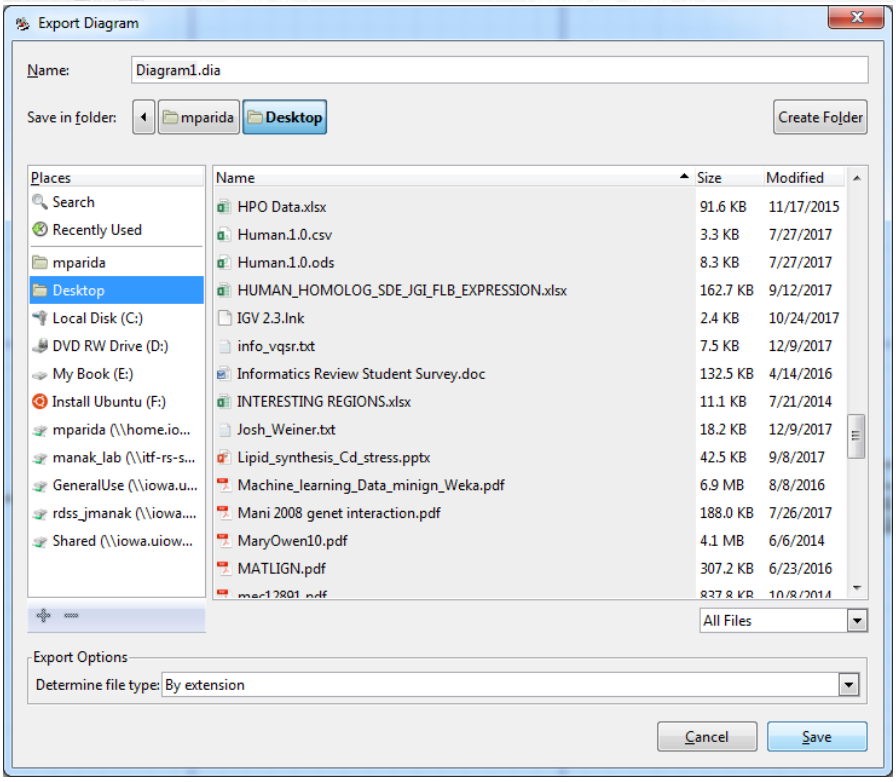
Customer_T to Doesbusiness_T is (min=1 or |, max=1 or |) to (min=0, max=M or <) relationship. What this means is a customer can do business in 0 or < territories but it can only do business in a territory once. For example, CUSTOMER_ID 1 can do business in TERRITORY_ID 001 and 002 but it can only do business in territory 001 once and similarly in territory 002 once only. This explains why the max from Doesbusiness_T to Customer_T is |. Since, we are only storing data on those customers that do business in some territory (atleast 1 territory, meaning | territory or <) the min from Doesbusiness_T to Customer_T is also |. Please see below on how to represent minimum and maximum cardinalities for each start and end description using the appropriate arrows.




Properties: Standard - Line
Line width
0.10 cm
Line color
#000000
Line style
Dash length:
1.00
Arrows <<<
Start arrow
Size:
0.50
0.50
End arrow
Size:
0.50
0.50
Line gaps <<<
Absolute start gap
0.00
Absolute end gap
0.00
Close
Apply
OK
Customer_T
CUSTOMER_ID NUMBER (11, 0)
CUSTOMER_NAME VARCHAR2 (25)
CUSTOMER_ADDRESS VARCHAR2 (30)
CUSTOMER_CITY VARCHAR2 (20)
CUSTOMERSTATE CHAR (2)
CUSTOMERPOSTALCODE VARCHAR2 (10)
TERRITORY_T
TERRITORY_ID NUMBER (11)
TERRITORY_NAME VARCHAR2 (50)

n) After finishing the ER diagram you can export this as a .dia file using the Export tab from the tool pane above as follows:





Here is your saved .dia file:

In case of any questions regarding DIA installation and ER diagram drawing please email or meet me during my office hours. Hope this tutorial was helpful.