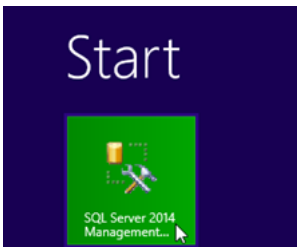
ERD Tutorial: How to Design and Generate SQL Server DB?

Written Date : June 19, 2015

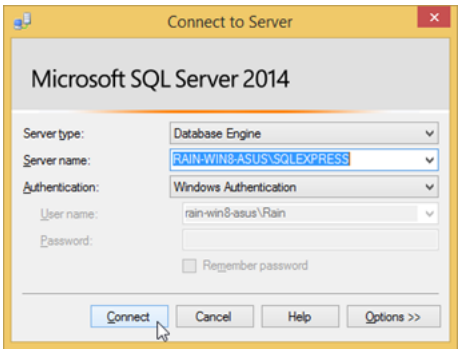
Create a Database in SQL Server

The first thing we need to do is to get a brand new database ready in SQL Server. To create a new database in SQL Server:

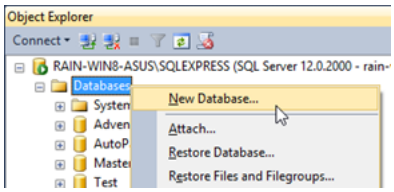
1. Open **SQL Server Management Studio**.



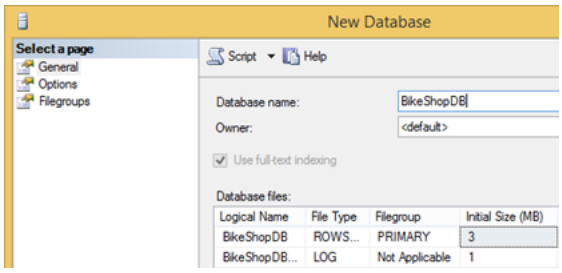
2. Log in to your SQL Server.



3. Right-click on the **Databases** root node in **Object Explorer** and select **New Database...**.



4. Name the database *BikeShopDB*, and click **OK** to create it.

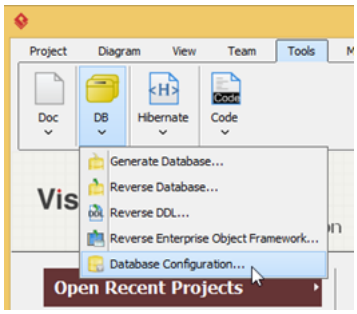


Once the database is created, we can prepare Visual Paradigm to model it.

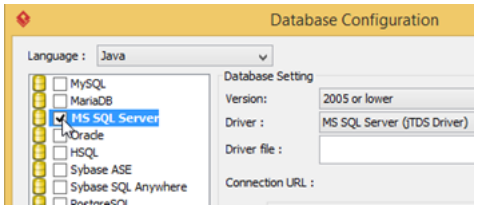
Configure the Default Database for Your Project

Visual Paradigm supports database modeling for multiple DBMS. Since each DBMS has its own data types that may not be compatible with others, it is important to specify SQL Server as our default database before we start modeling. The data types for SQL Server will be available in our ER diagram once we specify it as our default database. To configure the default database in Visual Paradigm:

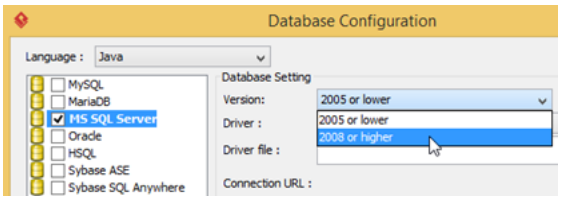
1. Go to **Tools > DB > Database Configuration...**



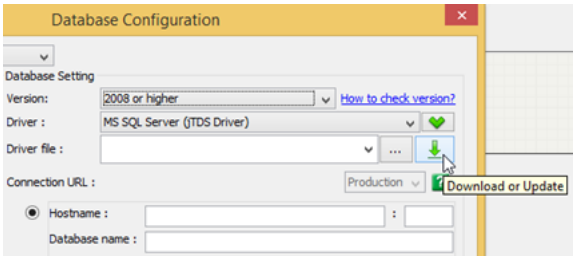
2. Select **MS SQL Server** in the database list.



3. Select **2008 or higher** in the Version field (as we are using SQL Server 2014).

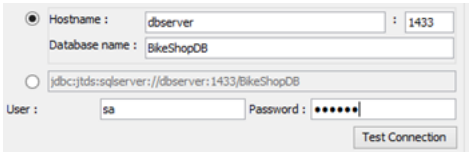


4. In this tutorial, we will use the jTDS driver to establish a connection with our database. Click the green arrow button next to the **Driver file** field to have Visual Paradigm download the driver for you.

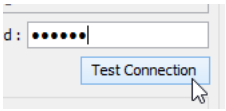


If you wish to use another driver, you can select it from the **Driver** field and click the **...** button to locate the driver file on your local file system.

5. Fill in the hostname or IP address of the machine hosting your SQL Server in the **Hostname** field, and enter the port number of your SQL Server instance in the **Port** field. After that, enter *BikeShopDB* in the **Database name** field, as well as your username and password for accessing the database.



6. When you have finished entering the connection details, click the **Test Connection** button to check that everything is correct.

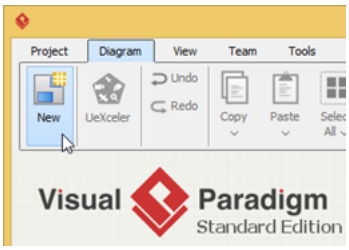


Now we are ready to start modeling our database with an ERD.

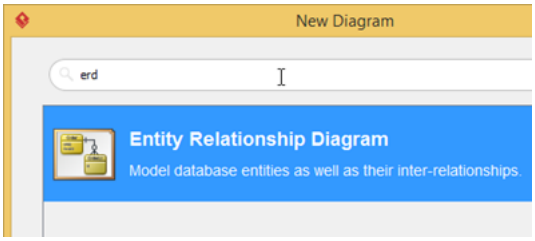
Model Your Database with an ERD

Let's start to model our bike store database with an ERD.

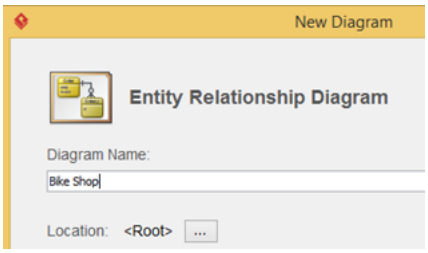
1. Go to **Diagram > New** to open the **New Diagram** dialog.



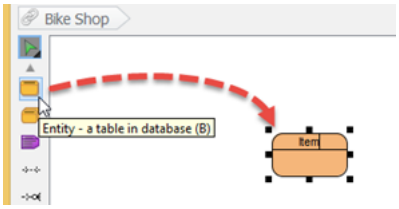
2. Enter *erd* in the search box to locate the **Entity Relationship Diagram**. Click **Next** to proceed.



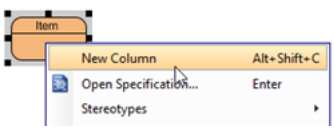
3. Name the ERD *BikeShop*, and click **OK** to create the blank ER diagram.



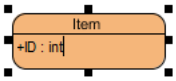
4. Select **Entity** from the diagram toolbar. Then, click on the diagram to create an entity. Name it *Item* and press **Enter** to confirm.



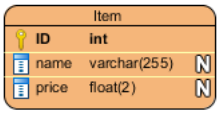
5. Right-click on the *Item* entity and select **New Column** from the popup menu.



6. Enter *+ID : int* and press **Enter** to create a primary key column 'ID' with the type int.

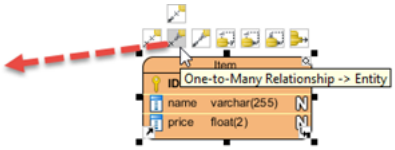


7. By default, a new column will be created and enter editing mode after you confirm the previous one. Now, enter *name : varchar(255)* and *price : float(2)* for the next two columns.

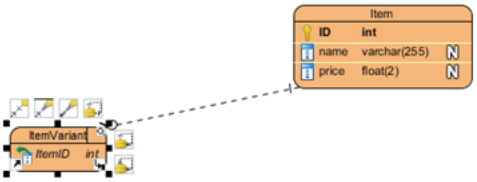


8. Press the **Esc** key on your keyboard to stop editing the *Item* entity.

9. Every *Item* may have various variations; for instance, a bike jersey will have different sizes and colors. Let's create an *ItemVariant* entity from the *Item* entity with a one-to-many relationship. Move the mouse pointer over the *Item* entity. Press on **One-to-Many Relationship -> Entity** and drag it out.



10. Release the mouse button and name the new entity *ItemVariant*.

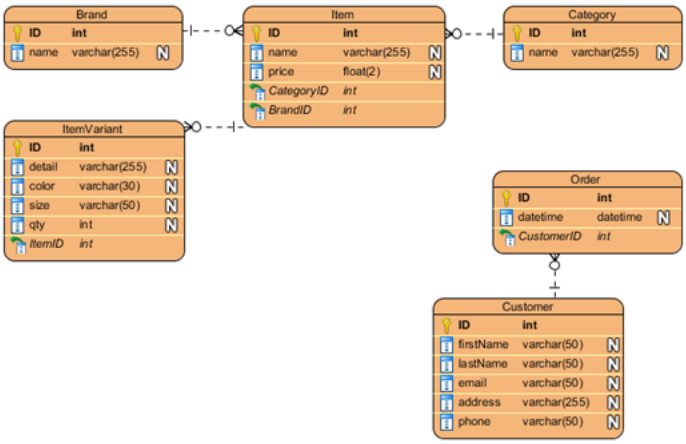


11. Right-click on the *ItemVariant* entity, select **New Column** from the popup menu, and then enter the following columns:

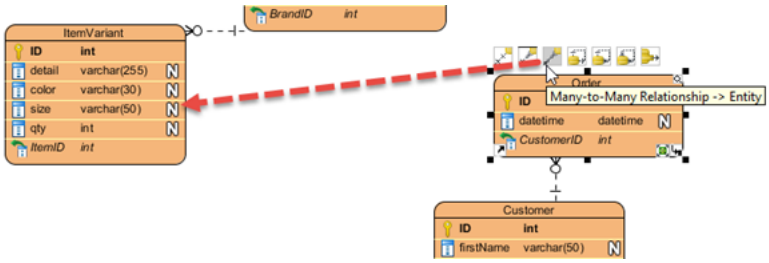
Column Name	Type
+ID	int
detail	varchar(255)
color	varchar(30)

size	varchar(50)
qty	int

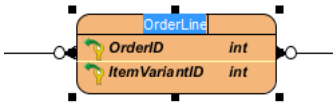
12. Repeat the steps above to create the ERD as below.



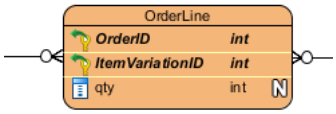
13. Finally, we have to store the items purchased in each order. We should relate the *Order* entity with *ItemVariant* instead of *Item*, since *ItemVariant* is the entity storing the actual item variant. As each *Order* can have multiple *ItemVariants*, and each *ItemVariant* can be involved in multiple *Orders*, a many-to-many relationship should be created. Move the mouse pointer over the *Order* entity. Press on **Many-to-Many Relationship -> Entity**, drag it out, and drop it on the *ItemVariant* entity.



14. A link entity between *Order* and *ItemVariant* is created. Rename this link entity to *OrderLine*.



15. Right-click on *OrderLine*, select **New Column** from the popup menu, and then enter *qty : int*.

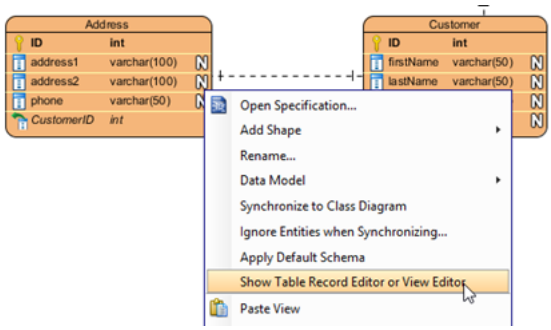


Now our ERD is ready, and we can start to define the sample data for our database.

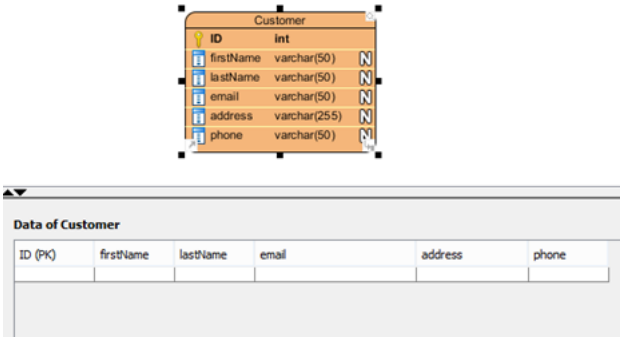
Define Sample Data

Defining sample data for your ERD will help you to better understand how your database works. The sample data will also be generated in the database, which saves you time in preparing sample data to test your database. To define sample data for your ERD:

1. Right-click on the blank area of your ERD and select **Show Table Record Editor or View Editor**.



2. Select the *Customer* entity in the diagram. You will now see the **Table Record Editor** showing the columns of the *Customer* entity.

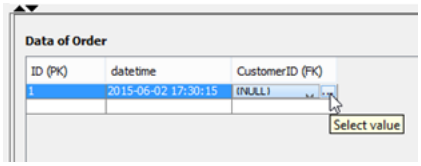


3. Enter the following customer details into the Table Record Editor.

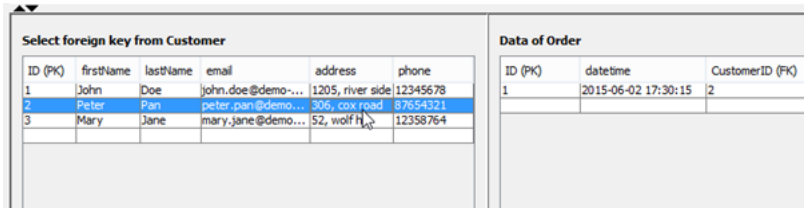
ID (PK)	firstName	lastName	email	address	Phone
1	John	Doe	john.doe@demo-vp.com	1205, river side	12345678

2	Peter	Pan	peter.pan@demo-vp.com	306, cox road	87654321
3	Mary	Jane	mary.jane@demo-vp.com	52, wolf hill	12358764

4. Let's move on to the *Order* entity. Since an *Order* must be placed by someone, we can pick a *Customer* record when filling in the sample data for *Order*. Click the **...** button in the foreign key (FK) cell in the **Table Record Editor**.



5. This will bring up the sample data you defined for *Customer*. Choose the record for *Peter* from the list, and the FK value for *Peter* will be filled in for you in the *Order* record.



6. Repeat the above steps to define the following sample data.

Order

ID (PK)	datetime	CustomerID (FK)
1	2015-06-02 17:30:15	2
2	2015-06-02 18:20:22	1

Brand

ID (PK)	name
1	3R
2	Red Line

Category

ID (PK)	name

1	Components
2	Cloths

Item

ID (PK)	name	price	CategoryID (FK)	BrandID (FK)
1	Handle Bar	799	1	1
2	Head Set	999	1	2
3	Jersey	299	2	1
4	Shoes	1599	2	1

ItemVariant

ID (PK)	detail	color	size	qty	ItemID (FK)
1	full carbon	black	NA	50	1
2	NA	black	NA	40	2
3	NA	pink	NA	40	2
4	short sleeve	white	M	150	3
5	short sleeve	white	L	150	3
6	short sleeve	white	XL	50	3
7	short sleeve	white	S	100	3
8	short sleeve	blue	M	150	3
9	short sleeve	blue	L	150	3
10	short sleeve	blue	XL	50	3
11	short sleeve	blue	S	80	3

12	short sleeve	blue	XS	20	3
13	road	black	39	40	4
14	road	white	39	20	4

OrderLine

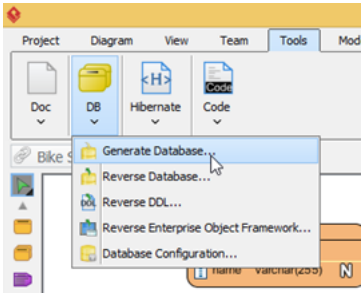
OrderID (PK)	ItemVariantID (PK)	qty
1	1	1
1	4	1
2	13	1
2	9	1
2	3	1

Once everything is ready, we can then move on to generating the database.

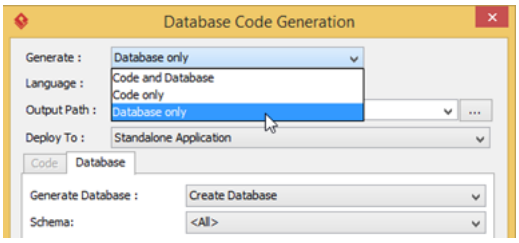
Generate Database

Now that everything is ready, let's generate the database. To generate the database:

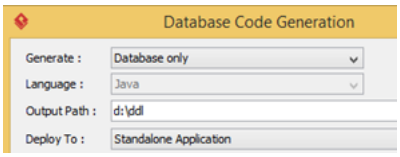
1. Go to **Tools > DB > Generate Database...**



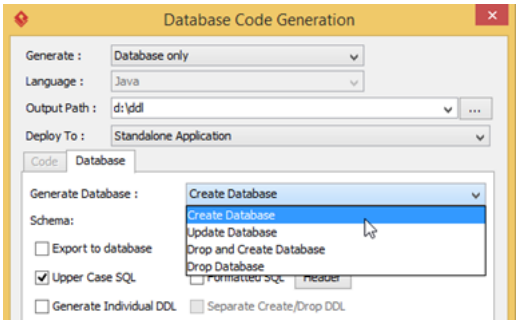
2. Select **Database only** under **Generate**.



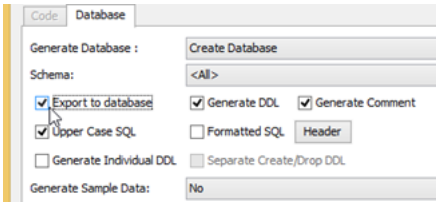
3. Specify the **Output Path** if you wish to keep the DDL file for your database.



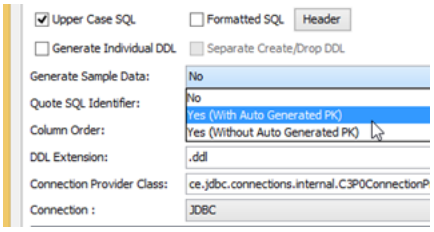
4. In the **Generate Database** field, select **Create Database**.



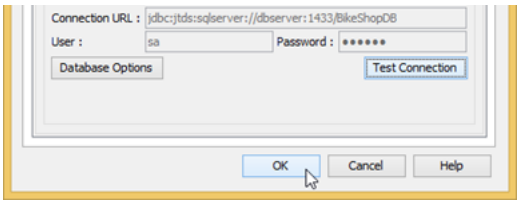
5. Select **Export to database** to have Visual Paradigm directly execute the DDL script on your database.



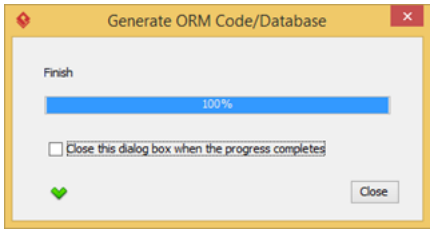
6. In the **Generate Sample Data** field, select **Yes (With Auto Generated PK)**.



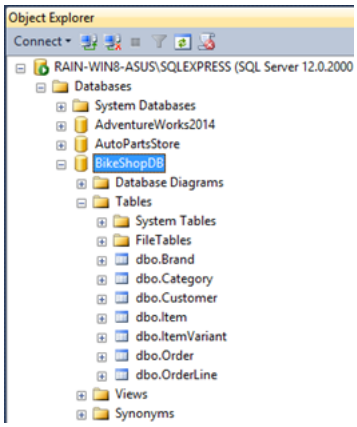
7. Click **OK** to proceed.



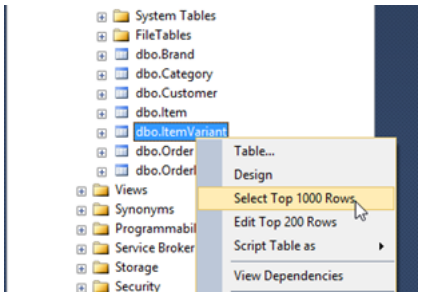
If everything is correct, you will see a progress dialog showing "100% complete".



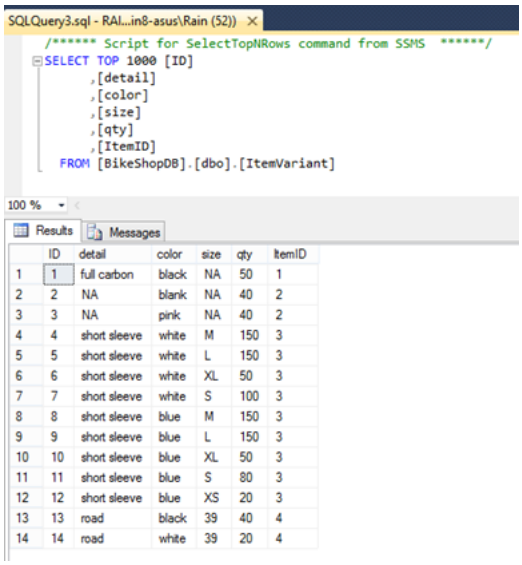
Now, let's go to **SQL Server Management Studio** to review our database.



Let's try to see what's inside the *ItemVariant* table. Right-click on it and choose **Select Top 1000 Rows** from the popup menu.



And you can see the sample data is there.



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SQLQuery3.sql - RAI...in8-asus\Rain (52))
/****** Script for SelectTopNRows command from SSMS  ******/
SELECT TOP 1000 [ID]
      ,[detail]
      ,[color]
      ,[size]
      ,[qty]
      ,[ItemID]
  FROM [BikeShopDB].[dbo].[ItemVariant]
```

100 %

Results | Messages

	ID	detail	color	size	qty	ItemID
1	1	full carbon	black	NA	50	1
2	2	NA	blank	NA	40	2
3	3	NA	pink	NA	40	2
4	4	short sleeve	white	M	150	3
5	5	short sleeve	white	L	150	3
6	6	short sleeve	white	XL	50	3
7	7	short sleeve	white	S	100	3
8	8	short sleeve	blue	M	150	3
9	9	short sleeve	blue	L	150	3
10	10	short sleeve	blue	XL	50	3
11	11	short sleeve	blue	S	80	3
12	12	short sleeve	blue	XS	20	3
13	13	road	black	39	40	4
14	14	road	white	39	20	4

Related Links

- What is Entity Relationship Diagram (ERD)?
- How to Produce Database Specification
- How to Reverse Database Schema into Entity Relationship Diagram without connecting to Database
- Provide Default Data for Database Design

Visual Paradigm home page
(https://www.visual-paradigm.com/)

Visual Paradigm tutorials
(https://www.visual-paradigm.com/tutorials/)