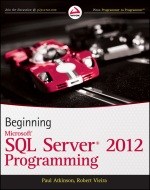
**I have tried to make the actual “you must do” steps orange.**

Much of the mechanics have changed from 2012, but the basic ideas are the same.

**Building Your First Data Cube**

11 May 2012 | by [Dan Maharry](http://www.developerfusion.com/profile/danm/) | Filed in

*Ed’s Note: This is an extract from the book Beginning Microsoft SQL Server 2012 Programing by Paul Atkinson and Robert Vieira copyright John Wiley & Sons 2012. For Source Code, Sample Chapters, the Author Forum and other resources, go to*[*the book’s homepage on wrox.com*](http://www.wrox.com/WileyCDA/WroxTitle/Beginning-Microsoft-SQL-Server-2012-Programming.productCd-1118102282.html)



**Building Your First Cube**

You can get a feel for what it takes to use SQL Server Analysis Services by building a cube based on the AdventureWorks data warehouse. Once you’ve had a chance to poke around there, you can take a look at some of the other ways of providing BI reporting.

*.*

### Try It Out: Creating an SSAS Project in VS Community 2019

You’ll build a cube in SSAS, which gives you high-speed multidimensional analysis capability. This one will use UDM, but you’ll get a chance to use BISM in a little bit. (Two different model representations, see <http://sqlblog.com/blogs/marco_russo/archive/2010/11/15/the-microsoft-bi-roadmap-bids-udm-and-beyond.aspx>

If you care about the differences, we will just use UDM)

Building your cube will require several steps: You’ll need to build

\* a data source,

\* a data source view,

\* some dimensions,

\*and some measures before your cube can be realized.

**To Start a New Project**

**Unless you have done something special, you first have to install a package into VS 2019.**

Close VS 2019. Use the file in Canvas: Microsoft.DataTools.AnalysisServices.ZIP

Download it, unzip, and then run that file. Reboot your computer!

**Start VS 2019, click create new project, then in the search box, enter: Analysis**

Select first one, Click next

A screenshot of a cell phone

Description automatically generated

1. Name your project **FirstCube** and click OK.

You’re now presented with an empty window, which seems like a rare beginning to a project with a template; really, you have nothing to start with, so it’s time to start creating. The first component you’ll need is somewhere to retrieve data from: a data source. (We would connect to our Data Warehouse and then select the subset of data we want to use in this cube).

### **Building a Data Source**

To create the data source you’ll use for your first cube, follow these steps:

1. Navigate to the Solution Explorer pane on the right, right-click Data Sources, and click New Data Source. This will bring up the Data Source Wizard, which will walk you through the creation process just as you’d expect. The first time, you will need to click “new” to create a new connection to your database, after that, you can use the one you previously create.

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If it is new, then you will see….

Select your server, and then the Adventure WorksDW

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Then it will ask for the account information that has rights to your database:

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Then give it a name:

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Success:

A picture containing screenshot

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### Next Building a Data Source View (subset all the DW data into just the data we need)

Now that you’ve created a data source, you’ll need a data source view (as the Data Source Wizard suggested). Follow these steps:

* Right-click Data Source Views and choose New Data Source View. Predictably, up comes the Data Source View Wizard to walk you through the process. Click Next.
* We only have one Source, use it:

A screenshot of a cell phone

Description automatically generated

For our Fact (Measure) we will add FactInternetSales under Available objects and then click the right arrow to move it into the Included Objects column on the right. (You might want to stretch this menu box out so that the names of the tables are fully visible, may sure you do not pick **FactInternetSalesReason** )

Then to add its related dimensions, click the **Add Related Tables** button as shown and then click Next.

Note that one of the related tables is a fact, not a dimension. There’s no distinction made at this level. Later, you will be able to select and edit dimensions individually. Remove FactInternetSalesReason, then click **OK**

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The next screen shows you what you have selected, change the name to be **Adventure Works DW Views** and click Finish

If you click on your new Adventure Works DW Views in the top right list, it will show you a diagram:

A close up of text on a white background

Description automatically generated

This shows you the subset of the full DW that you have imported into this system, next we will pick specific tables and fields that match our desired list of queries.

### Creating Your First Cube

Now for the exciting part…you get to create your first cube.

1. Right-click Cubes in the Solution Explorer and select New Cube to bring up the Cube Wizard. This will walk you through choosing measure groups (which you currently know as fact tables), the measures within them, and your dimensions for this cube. Don’t worry about the word “cube” here and think you just have to stick with three dimensions, either; cube is just a metaphor, and you can create a four-dimensional hypercube, a tesseract, or an unnamed higher-dimensional object if you want (and you’re about to do so!). To begin, click Next.
2. On the Select Creation Method screen, make sure **Use Existing Tables** is selected, and click Next.
3. The wizard will now want you to tell it where to find measure groups. You could help it out by telling it those are in your fact tables, but never mind — it’s smart enough to figure it out. If you **click Suggest**, it will automatically select the correct tables. Do so (the result is shown) and **then click Next**.

A screenshot of a cell phone

Description automatically generated

It will then show you a menu with all the fields in our fact table. We could de-select some if we didn’t want them, but we will take them all this time. Click Next and it lets you pick which Dimensions you want to build into your cube., we will take them all, so click Next

A screenshot of a cell phone

Description automatically generated

The wizard is now ready to complete. Verify you have something that looks like this. If everything appears to be in order, change the name to **Adventure Works DW Cube** and click Finish.

A screenshot of a cell phone

Description automatically generated

You should not see something like:

A screenshot of a social media post

Description automatically generated

### Making Your Cube User-Friendly

Right about now, you’re probably expecting something like “congratulations, you’re done!” After all, you’ve built up the connection, designated the measures and dimensions, and defined your cube, so it would be nifty if you could just start browsing it, but you’re not quite there yet. First you’ll want to make some of your dimensions a little friendlier; they’re currently just defined by their keys because SSAS doesn’t know which fields in your dimension tables to use as labels. Once you’ve settled that, you’ll need to deploy and process your cube for the first time before it’s ready to use.

1. In the Solution Explorer under Dimensions, double-click **DimDate**. The Dimension Editor will come up, allowing you to make this dimension a bit more useable.
2. To make the date attributes available, highlight all of them in the **Data Source View** (except DateKey, which as you can see is already in the attribute list) and drag them to the **Attribute pane**. (Then click somewhere in the white space in that pane, so that that entire set is not still selected.) Now click and select all the other language items and delete them. (Or, you can be more clever when you select them, to only drag over the ones you want)

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Description automatically generated

1. Date, of course, is a dimension that can be naturally defined as a hierarchy. Drag **Fiscal Quarter** from the Attributes pane to the Hierarchies pane to start creating a hierarchy.
2. Drag **Month Number of Year** to the tag under Fiscal Quarter, and **DateKey** similarly below that.
3. Finally, rename the hierarchy (right-click it and choose Rename) to FiscalQuarter–Month The result should look something like

A picture containing screenshot

Description automatically generated

1. Save the DimDate dimension and close the dimension editor. You will be prompted to save changes to your cube along with the new dimension changes; do so.
2. Like you just did for one dimension, do for the other ones. For each of the other dimensions, don’t create hierarchies for now, but drag all the interesting text columns **(not ones marked with a key)** into the Attributes pane (I suggest also leaving out all the other languages, and just including the English ones to keep things a bit smaller.)
   1. But don’t add the Large Photo column in the Products table
   2. And don’t add the SalesTerritoryImage in the SalesTerritory table

Close and save each one.

### Deploying the Cube

There’s more you can do to create useful hierarchies, but for now it’s time to build, deploy, and process the cube. This process can be started by following these steps.

1. Select Deploy First Cube on the Build menu. You’ll see a series of status messages as the cube is built, deployed, and processed for the first time. You’ll receive a few warnings when you deploy FirstCube, and if they’re warnings and not errors, you can safely ignore them for now.
2. When it’s done and you see Deployment Completed Successfully in the lower right, your first cube is ready to browse.

NOTE When you set up a user in your data source view, you chose the service user — this is the user that’s running the Analysis Services service. If that user doesn’t have a login to your SQL Server, you’re going to receive an error when you try to process your cube. If you have that problem, double click on your Data Source, click the Impersonation tab, and fix he account info:

A screenshot of a cell phone

Description automatically generated

In addition, this example bypasses a step that’s important for processing hierarchies in cubes with large amounts of data: creating attribute relationships. The cube will still successfully process (though you will receive a warning), and for the data volumes in the AdventureWorksDW database it will perform adequately. For larger data volumes, you will need to address this warning. For more information on how to do that, consult the more complete SSAS text.

### How It Works

That was a lot of setup, but the payoff is pretty good too. What you’ve done is to build your first cube, and under the hood you’ve created a UDM-based semantic model queryable through the MDX language. This cube isn’t fully complete — you’d probably want to add some aggregations(Aggregations are precalculated summaries of data from leaf cells. Aggregations improve query response time by preparing the answers before the questions are asked), attribute relationships, and other elements, but it’s enough to get started.

Once you had your project put together, you had a few components to create on the way to browsing your cube. Let’s call a few out.

* **Data source**: Your data source is a connection to an individual place where data for your BI reporting can be found. While this one was a SQL Server data source, you can use any number of providers, both included and third-party. Nothing here should surprise you too much; this is a similar kind of list to what you’d find in SSIS, for example.
* **Data source views**: A data source view is a much more interesting animal. Using a data source, the data source view contains a set of tables or views, and defines the relationships among them. Each DSV is usually built around a business topic, and contains any tables related to that topic.
* **Cubes**: While the next thing you proceeded to create was a cube, the Cube Wizard went ahead and built measure groups and dimensions for you along the way. Without those, you haven’t got much of a cube. The cube isn’t a pass-through directly to your source data. To update the data in the cube, you must process the cube; you can do this through a regularly scheduled job with SQL Agent or, of course, manually. In this case, the wizard took care of a lot of the details for you, but you’ll read more about what the cube really is in a few minutes.