

Designing SQL Server 2012 Analysis Services Cubes using Samsclub_Star Dataset

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Using Microsoft's Business Intelligence Suite to Design Cubes from REMOTE

Once you receive your University of Arkansas MEC account, access will be via remote desktop connection. Remote access documentation is at the following link:

http://enterprise.waltoncollege.uark.edu/Remote_Desktop_MEC_GW.pdf

Microsoft's Business Intelligence Suite provides tools that assist in all phases of business intelligence from building the data warehouse, creating and analyzing cubes to data mining. The following provides a cube designing example using the UA_Samsclub_Star database.

Click Start \rightarrow All Program \rightarrow Microsoft SQL Server 2012 \rightarrow SQL Server Data Tools as shown below.



SQL Server Data Tools (formerly Business Intelligence Development Studio) uses Microsoft Visual Studio (VS) as the Integrated Development Environment which will be familiar to VB.NET or C# users. When VS opens, most likely the top will include the menu and tool bar with the Start Page tab active. Along the left of the Start page are three windows: Recent Projects, if any; Getting Started and Visual Studio Headlines.

As usual, when you work within VS, many tabs will be created toward the top; these tabs can be closed by right-clicking and selecting Close including the Start page.



The name of the SQL Server 2012 Analysis Services Server is **ENT-ASRS.waltoncollege.uark.edu**. This is also the server where the data source for these exercises is located as well.

A Cube building project requires using SQL Server Analysis Services. Thus, assuming that the data from which the cube is to be built is in an accessible SQL Server 2012 database, the first step is to connect to Analysis Services database where you will create the BI objects. You will do this in an Analysis Services (AS) database already created for you. The AS database will have the same name as your user name with AS at the end. Example, a user with a user name ES90000 will have an AS database named ES90000AS. To connect to/access the database, click File -> Open -> Analysis Services Database...

File	Edit View Debug Tools	Window Help		
	New	•	- 🛛 🗟 🏷	🔁 🖳 🛌 🖕
	Open	•	🎯 Analysis Services Database	
	Close		noject/Solution	Ctrl+Shift+O
Ē	Close Project		😤 🛛 Web Site	Shift+Alt+O
	Save Selected Items	Ctrl+S	💕 File	Ctrl+O
	Save Selected Items As		Convert	

The Connect To Database screen comes up. Enter the Server name as ENT-ASRS.waltoncollege.uark.edu. Use the drop down list box to select a database where you will put your Analysis Services objects. You will only see database/s you have access to.

ľ	Connect To Database		×
	Database		7
	 Connect to existing datab 	ase	
	Server:	ent-asrs.waltoncollege.uark.edu	
	Database:	ES90000AS	
	Server	Database	

Click the OK button. Visual Studio opens – and the default location for Solution Explorer is the top right. You may need to use the horizontal scroll bar to scroll to the right to see the Solution Explorer. If it is not there, then click View on the menu and then click Solution Explorer. The name of your project should be visible with a number of other entries as shown below. The name of your project may be different from the name used in this example (doesn't matter). Your project will have the same name as the AS database you selected.



Steps required to design a Cube include:

Create Data Source Create Data Source View Create a Cube Wizard Browse the Cube Managing Dimensions (attributes and hierarchies) Customizing Cube Functionality

Create Data Source

The next step requires creating a data source to be used for cube designing. Thus, right-click Data Sources in the Solution Explorer and Click New Data Source... Clicking the new Data Source option, the Data Source Wizard opens to its Welcome page.





Click the Next button.

The Data Source Wizard then allows the creation of a connection by clicking the New... button.

Create a (data source based on an existing or	new connection
Data conr	ections:	Data connection properties:
		Property Value
		New Delete
A valid	connection must be selected.	
	< Back	Next > Finish >> Cancel
	< Back	Next > Finish >> Cancel
mastian	< Back	Next > Finish >> Cancel
nection	Anager	Next > Finish >> Cancel
vider: N	A Back Manager ative OLE DB\SQL Server Native Client 1	Next > Finish >> Cancel
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nnection vider: N	A Back Manager ative OLE DB\SQL Server Native Client 1 Server name: ent-asrs1	Next > Finish >> Cancel
vider: N	Server name: ent-asrs1 Log on to the server	Next > Finish >> Cancel
nnection vider: N. U. nnection	Server name: ent-asrs1 Log on to the server © Use <u>W</u> indows Authentication	Next > Finish >> Cancel
nnection vider: N.	<back 1="" ative="" authentication="" authentication<="" client="" db\sql="" ent-asrs1="" log="" manager="" name:="" native="" ole="" on="" server="" sql="" td="" the="" to="" use="" windows=""><td>Next > Finish >> Cancel</td></back>	Next > Finish >> Cancel
nnection vider: N nnection	Server name: ent-asrs1 Comparison Cuse Windows Authentication Cuse SQL Server Authentication Use SQL Server Authentication	Next > Finish >> Cancel
nnection vider: N nnection	Server name: ent-asrs1 Log on to the server © Use <u>Windows Authentication</u> © Use SQL Server Authentication © Use rame: Bassword;	Next > Finish >> Cancel
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nnection vider: N nnection	Server name: ent-asrs1 Connect to a database	Next > Finish >> Cancel
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nnection vider: N nnection	Anager Ative OLE DB\SQL Server Native Client 1 Server name: ent-asrs1 Log on to the server ① Use Windows Authentication ① Use SQL Server Authentication ① Use SQL Server Authentication ② Use rname: Password: Password: Pave my pa Connect to a database ③ Select or enter a database na JA_SAMSCLUB_STAR	Next > Finish >> Cancel
nnection vider: N nnection	Server name: Ent-asrs1 Log on to the server Use Windows Authentication Use SQL Server Authentication Use SQL Server Authentication Use SQL Server Authentication Use SQL Server Authentication Server my particular server Connect to a database Select or enter a database na JA_SAMSCLUE_STAR Attach a database file:	Next > Finish >> Cancel
nnection vider: N nnection	< Back	Next > Finish >> Cancel
nnection vider: N nnection	Anager Server name: ent-asrs1 Log on to the server Use Windows Authentication Use SQL Server Authentication Use SQL Server Authentication Use rame: Password: Sever my particular Connect to a database Select or enter a database na JA_SAMSCLUE_STAR Attach a database file: Logical name:	Next > Finish >> Cancel

Click the New... button.

Leave the default Provider: as Native OLEDB\SQL Native Client. Enter the Server name ent-asrs1. Also, leave the default security as Windows Authentication.

Use the drop down list box to select a database (UA_SAMSCLUB_STAR) that is to be used for designing the cube and click the Test Connection button (lower left) to ensure a connection exists to the database. Click OK.

Then, click Next and Select Use a specific user name and password (user name and password is the one provided to you by the University of Arkansas) in the Impersonation Information page and Finish after you give name to your Data Source (in this case UA SAMSCLUB STAR).

🏮 Data Source Wizard	_ 🗆 🗵	🜻 Data Source Wizard	
Impersonation Information You can define what Windows credentials Analysis Services will use to connect to the data source.		Completing the Wizard Provide a name and then click Finish to create the new data source.	
Use a specific Windows user name and password		Data source name:	
User name: WALTON\ES90000		LIA SAMSCLUB STAR	
Password: *******		Preview:	
C Use the service account		Connection string:	
O Use the credentials of the current user		Provider=SQLNCLI10.1;Data Source=ent-asrs1.walton.uark.edu;Integrated Security=SSPI;Initial Catalog=UA_SAMSCLUB_STAR	
C Inherit			
< Back Next > Finish >> C	Cancel //	< Back Next > Finish	Cancel //

Create Data Source View

Next, a Data Source View will be needed. The Data Source View is sort of an abstract client view of the data. Rightclick Data Source Views in the Solution Explorer and click New Data Source View to open the Data Source View Wizard. Click the Next button on the Welcome page (not shown).

🏮 Data Source Wizard				
Select how to define the connection You can select from a number of ways in which your data source will define its connection string.				
Create a data source based on an existing or n	ew connection			
Data connections:	Data connection properties:			
ent-asrs1.walton.uark.edu.UA_SAMSCLUB_S	Property Value			
	Data Source ent-asrs1.walton.uark			
	Initial Catalog UA_SAMSCLUB_STAR			
	Provider SOLNCI 110.1			
X	Ngw Delete			
< <u>B</u> ack	Next >Einish >> Cancel			

Note that the Relational data source is the one just created (UA SAMSCLUB STAR). Actually, this page allows creating a new data source in case one hasn't yet been created. Because the desired data source exists, click the Next button and accept the defaults.

From the Available objects of the Select Tables and Views dialog, locate and click the desired data sources in **Available objects** and click the > to move them to the list of **Included objects**. In this example, seven of the tables in the UA SAMSCLUB STAR database will be used for cube designing and thus will be selected and moved to the **Included objects** list. See the screen shot below to see which tables are included and which are not. Click the Next button.

🏨 Data Source View Wizard					
Select Tables and Views Select objects from the relational database to be included in the data source view.					
<u>A</u> vailable objects:	Included objects:				
Name Type dbo.Membership_E Table dbo.Membership_F Table	Name Type ¹				
Filter: Image: Comparison of the second se	Add <u>R</u> elated Tables				
< <u>B</u> ack	Next > Enish >> Cancel				

The last page of the Data Source View Wizard allows you to enter a Name for the Data Source View. Accept the default name - UA SAMSCLUB STAR in this example and click Finish.

🕱 Data Source ¥iew Wizard	_ 🗆 🗙
Completing the Wizard Provide a name, and then click Finish to create the new data source view.	a da
Name:	
UA SAMSCLUB STAR	
Preview:	
 UA SAMSCLUB STAR dbo.Item_Scan_Fact dbo.Member_Dimension dbo.Scan_Type_Dimension dbo.Item_Dimension dbo.Store_Dimension dbo.Store_Dimension dbo.Ate_Dimension dbo.Time_Dimension 	
	Cancel

The Data Source View is displayed as shown below. Note in the Solution Explorer, the two entries created -a data source and a data view -a re shown. All the seven tables with their columns are shown because the Data Source View is

selected in the Solution Explorer. Data Source View is a very important component of the process where you can do all kind of changes and additions to your tables.

In the data source view below, we can see that four of the tables have formed a star schema - have relationship with the fact table based on the selection (Same as primary key) of 'Foreign key Matches' above. We can manually create the relationship of the two unrelated tables (see screen shot below) in the data source view.



In the screen shot above, we can see the design of the underlying data store. But, if the design doesn't completely support the Analysis Services (AS) solution we intend to build, we can always modify the data source view to provide more useful logical view of the data. Multiple diagrams can be created to simplify the presentation of the data source view with large numbers of objects.

Note that you cannot build cubes out of tables that are not related. Here you can see that some of the relationships (four tables) are automatically created for us based on the (Same as primary key) selection of 'Foreign key matches' we made above. However, the relationship can be edited by right clicking the relationship link and click Edit Relationship; or we can create a new relationship and specify the primary and foreign keys. As an example, we will create the relationship of the two (Date_Dimension and Time_Dimesnion) tables currently unrelated to the fact table in the data source view (see screen shot above).

First, relate the Item_Scan_Fact fact table and the Time_Dimension table...... Right click the Transaction_Store_Time_Key column in the Item_Scan_Fact table and select New Relationship... (shown below)

Item_Scan_Fact (dbo.Item Visit_Number Store_Key Item_Key Member_Key Transaction_Type_Key Transaction_Date_Key	Time_Dimensi Time_Key Time_Description AM_PM
Transaction_Store_T Transaction_Base_Tir	Set Logical Primary Key .I
Total_Scan_Amount	New Relationship
	Delete Logical Primary Key

In the Create Relationship screen, select the source (foreign key) table and column and the destination (primary key) table as shown below.... and click OK.

🆏 Create Relationship	
Source (foreign key) table: dbo.Item_Scan_Fact	Destination (primary key) table: dbo.Time_Dimension
Source Columns	Destination Columns
Transaction_Store_Time_Key	Time_Key
	Reverse
Description:	
	OK Cancel Help

Now relate the fact table and the Date_Dimension table. Right click the Transaction_Date_key column in the fact table and select New Relationship...

Item_Scan_Fact (dbo.Item_Sca) Date_Dim Visit_Number Store_Key Item_Key Member_Key Transaction_Type_Key	cription Week cription _Flag
Transaction_Da Transaction_Sto Example Content Set Logical Primary Key	nth ar
Item_Quantity New Relationship Total_Scan_Am	iear cript

In the Create Relationship screen, select the source (foreign key) table and column and the destination (primary key) table as shown on the next page.... and click OK.

Create Relationship			
Source (foreign key) table:		Destination (primary key) table	
dbo.Item_Scan_Fact	•	dbo.Date_Dimension	•
Source Columns		Destination Columns	
Transaction_Date_Key		Date_Key	
			<u>R</u> everse
Description:			
Description:			

Now you can see that all of our tables are related and have formed star diagram (schema) as can be seen in the data source view (see below)



Along the way, it is always a good idea to click the Save all icon (multiple blue disks) on the tool bar. If you try to close a tab that hasn't been saved, it should prompt you to save your work for that part of the project. Create a Cube Wizard

Last updated 5/18/2012 10:01 AM

A Named Query

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🛅 Data Source Views

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New Cube...

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Now that a data source view is available, the next step is to design a cube. To do that, right click Cubes in the Solution Explorer and select New Cube... to start the Cube Wizard as shown in the screen shot below.

🗳 Cube Wizard	
Select Creation Method Cubes can be created by using existing tables, creating an empty cube, or generating tables in the data source.	
How would you like to create the cube?	
O Use existing tables	
○ <u>Create an empty cube</u>	
Generate tables in the data source	
<u>T</u> emplate:	
(None)	~
Description:	
Create a cube based on one or more tables in a data source.	
< <u>Back</u> <u>Next</u> > Einish >>	Cancel

Select the Use existing tables option from the Select Creation Method screen and click Next. The Select Measure Group Tables page appears.

The Item_Scan_Fact table is identified as a fact table or measure group table (because it contains the numerical facts not because of the table name) and the rest of the tables as dimension tables. Select "Item_Scan_Fact" as the measure group table and click Next.

问 Cube Wizard	
Select Measure Group Tables Select a data source view or diagram and then select the tables that w used for measure groups.	ill be
Data source view:	
SAMS STAR	~
Measure group tables:	<u>S</u> uggest
Date_Dimension	
<u>Back</u> <u>Next</u> > Einish >>	> Cancel

Check the Measures checkbox to include all the facts in the cube and then deselect the Transaction Base Time Key and Visit Number which are not useful to be used as measures. Click Next.

🥥 Cube Wizard	
Select Measures Select measures that you want to include in the cube.	
Measure Visit Number Transaction Base Time Key Visit Regulation Total Scan Amount Visit Total Scan Fact Count	
< <u>B</u> ack <u>N</u> ext > <u>Finish >></u>	Cancel

The next screen shows the Select New Dimensions page of the Cube Wizard. Select all to include all the dimensions as shown below. Click Next.



Provide a name for the cube (say, UA SAMSCLUB STAR) and click Finish to complete the wizard.



You can now look at the Solution Explorer, top right of the page, to see the cubes and dimensions that have been added to your project. Screen shot above on the right.

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	UA_	SAMSCLUB_STAR			
÷	<u> </u>	ata Sources			
	•	DA SAMSCLUB STAR.	ds		
÷	(<u>)</u>	ata Source Views			
	•	🛐 UA SAMSCLUB STAR.	ds	v	
Ė) 🦳	lubes			
	i 1	CAMECIND CTAD	~	ha.	
	Ĩ	Open			
	€	Process			
	Q	Browse			
	Y	View Code			
	-8	View Designer			

Save all the changes made by clicking the Save All button. The next step is to process the cube. Right click the cube and click the Process... button as shown below. Click Run and this will give you an error complaining that some of the tables have duplicate keys. This is due to data integrity issues in some tables of the UA_SAMSCLUB_STAR database. To ignore these errors, right click Process... click Change Settings... (bottom right of the screen/process page).

Process Cube - UA SAMSCLU	B STAR			_ 0
Object list:				
Object Name	Туре	Process Option	ns	Settings
UA SAMSCLUB STAR	Cube	Process Full		
		Remove	Impa	ct Analysis
Batch Settings Summary				
Processing order:				
Parallel				
Transaction mode:				
(Default)				
Dimension errors:				
(Default)				
Dimension key error log path	:			
(Default)				
Process affected objects:				
Do not process			_	
		(Chur	an Cathings
			Qnan	ge secongs
			R <u>u</u> n	Close

Then, click on the Dimension Key Errors tab and click the Use custom error configuration radio button and leave everything as default. (see the screen below) Click OK.

ese settings apply to the entire processing batch.	
rocessing options Dimension key errors	
C Use default error configuration	
Use custom error configuration	
Key error action:	Convert to unknown
Processing error limit:	
C Ignore errors count	
Stop on error	
Number of errors:	0
On error action:	Stop processing
Specific error conditions:	
Key not found:	Report and continue
Dyplicate key:	Ignore error
Null key con <u>v</u> erted to unknown:	Ignore error
Null key not allowed:	Report and continue
Error log p <u>a</u> th:	Browse

Once processing is finished, we are ready for slicing and dicing the cube for business decision making.

🛷 Process Progress	
 Command Processing Dimension 'Date Dimension' completed. Processing Dimension 'Item Dimension' completed. Processing Dimension 'Member Dimension' completed. Processing Cube 'SAMS STAR' completed. Start time: 11/4/2008 11:08:46 AM; End time: 11/4/2008 11:15:45 AM; Duration: 0:06:59 Image: Processing Dimension 'Scan Type Dimension' completed. Processing Dimension 'Scan Type Dimension' completed. Processing Dimension 'Store Dimension' completed. Processing Dimension 'Store Dimension' completed. Processing Dimension 'Store Dimension' completed. Processing Dimension 'Time Dimension' completed. 	
Status:	
Stop Reprocess View Details	Сору
Qose	Help

Browse the Cube

Review the top left of Visual Studio. The row below the Tabs is referred to as the Cube Designer which includes:

- Cube Structure (to build or edit the measures and measure groups of the cube),
- Dimensions (to define how dimensions are used in the cube),
- Calculations (to build or edit calculations for the cube),
- KPIs (to build or edit Key Performance Indicators for the cube),
- Actions (to build or edit actions for the cube),
- Partitions (to build or edit partitions of the cube),
- Perspectives (to build or edit perspectives of the cube or sub cubes),
- Translations (to build or edit translations of the cube), and
- Browser (to browse the deployed cube).

Review the UA SAMSCLUB STAR in the left pane. It contains Measures and Dimensions. Expand each of those to locate desired measures and dimension values.

To browse the cube, click on the Browser tab. The cube must have been successfully deployed to the server and processed to browse it. Drag and drop items from the cube (dimensions and facts) onto the viewing area. This is very similar to using a pivot table client to view a cube.

Example: What was the Total Scan Amount of the items sold in the Dallas, TX stores of Sam's Club?

Expand the Item Scan Fact folder (under Measures) and drag the Total Scan Amount measure to the middle of the pivot table and drag the State and then the City attributes from the Store Dimension. See the screenshot below. Locate where the City of Dallas by expanding TX and find the value, which in this case is 3,652,925.70.

Q (ube Structure	Dimension Usag	e 😭 (Calc	ulations	F KPIs	🥵 Actions 🛛
4월	🛱 🛛 🕭 🛃 🗿 🛃 🏹 🛅 🗃 📲 📾 💷 🐺 🖉 🚰 🛛 Perspective: 🛛 UA SAMS(
🎯 U/	A SAMSCLUB ST	AR	Dimens	ion			Hierarchy
Ξ 💵	Measures		-Soloo	F die			
E	📄 Item Scar	n Fact	Coelec	c uii	nension>		
	📲 Item	Quantity					
	📲 Item	Scan Fact Count					
	📊 Total	Scan Amount					
🗉 🗖	Date Dimensi	on	Drop Filt	or F	iolde Horo		
E İ	Item Dimensio	n			ICIUS LICI C		Drop Colump Fie
E T i	Member Dime	nsion	State	-	City	•	Total Scan Amo
🕀 🗖	Scan Type Di	mension	EIX		CHESAPEA	KE	4,645,497.32
	Store Dimensi	ion			CHESTERF	IELD	3,083,055.10
	🚦 Annarel 7	'one			CICERO		2,740,793.32
	Beg Effer	tive Date			CINCINNA'	TI	11,626,776.22
	Deg Enrec				CITY OF IN	IDUSTRY	3,578,099.28
	City Delivery 1				CLARKSVIL	LE	4,827,295.20
	Delivery	iype			CLEARWAT	FER	4,067,987.80
+	District Ni	umber			COLUMBUS	5	2,300,612.56
E	End Effec	tive Date			CONCORD		4,436,103.32
+	Geograph	nic Zone					2,228,588.00
E E	Manager	Name			CORAL SPE	KINGD AME	3,291,040.04
- E	MDSE Maj	jor Zone		ſ		ANE	3,400,942.00
Đ	🚦 MDSE Sub	o Zone		Ľ		BEACH	3.373.266.96
- E	🚦 Open Dat	e Key			Total	DEFICIT	59.259.589.62
E E	🛯 🚦 Open Sur	nday	I WI		ANCHORA	GE	2,346,091.54
Ð	Phone Nu	imber	I ⁻		APPLETON		2,033,837.24
Ð	Region N	umber			ARVADA		3,362,084.26
+	Sales Cla:	55			Total		7,742,013.04
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L L	State		I				
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By the way, you can change a measure's format by selecting the Measure from the list of measures in the left pane (in the Cube Structure tab) and going to the properties window (right bottom by default) and change the FormatString field to the appropriate type as shown on the next page.



You can also browse the cube in by Transaction Type Description (Purchase or Return) and Store location. Just drag and drop the appropriate attributers to the data pane as shown below. You can further filter your results by any dimension just by clicking <select dimension> in your browse page and selecting appropriate dimension, hierarchy, operator and filter expression.

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<u>Eile E</u> dit <u>V</u>	iew <u>P</u> roject	<u>Build Debug</u> Database Cube	<u>T</u> ools <u>W</u> i	ndow <u>C</u> ommunit	y <u>H</u> elp							
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b	A & Q	· · · · · · · · · · · · · · · · · · ·	. 2 🔗	Perspective:	IA SAMSCLUB ST.		Default	_			UA_SAMSCLU	B_STAR(MSENTERPRISE
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	🗄 🗄 Qi	Jarter Of Year		CHESTERFIELD	3,110,953.28	146,660	-27,898.18	-1,362	3,083,055.10	145,298	Time Din	nension
		eekday Flag		CINCINNATI	2,757,295.32	631,994	-100.159.12	-1,386	2,740,793.32	624,998	Date Dir	nension pp.Fact
	H H Ye	ar Number		CITY OF INDUSTR	XY 3,617,879.82	168,308	-39,780.54	-2,540	3,578,099.28	165,768	12 Store Di	imension 1
		eekday Elag - Day Of Week		CLARKSVILLE	4,896,574.88	268,816	-69,279.68	-3,004	4,827,295.20	265,812	1/ Item Dir	nension 1
	E A Ve	ar Number - Quarter Description		CLEARWATER	4,101,104.86	233,772	-33,117.06	-1,662	4,067,987.80	232,110	- 🔀 Member	Dimension 1
	🕀 🚺 Item D	Dimension		CONCORD	4,460,534.74	246,084	-24,431.42	-1,634	4,436,103.32	244,450	📃 📃 💆 Scan Ty	pe Dimension 1
	🗉 😥 Memb	er Dimension		CONROE	2,255,661.62	110,428	-27,073.62	-1,002	2,228,588.00	109,426	- 📝 Time Din	nension 1
	🗉 📝 Scan 1	Type Dimension		CORAL SPRINGS	3,331,035.42	192,794	-39,389.38	-2,218	3,291,646.04	190,576	🔤 🗠 🟒 Date Dir	nension 1
	🕀 🖬 So	an Type Dimension			5,437,292.06	304,020	-30,349.26	-1,878	5,406,942.80	302,142	📄 🗁 🍃 Mining Struc	tures
	🗄 🗄 Tr	ansaction Type Code		DAYTONA BEACH	3,399,862.88	213,132	-26,595.92	-1,360	3,373,266.96	211,772	Store Di	mension
	E Tr	ansaction Type Description		Total	59,938,921.88	3,245,032	-679,332.26	-32,856	59,259,589.62	3,212,176	Coles	
	E 🗾 Store	Dimension	⊡ WI	ANCHORAGE	2,362,911.40	128,206	-16,819.86	-1,226	2,346,091.54	126,980	- Assemblies	
	E AL	n Effective Date		ARVADA	3.390.126.58	216.286	-28,042,32	-2,036	3.362.084.26	214.250		
		ty		Total	7,814,164.38	452,902	-72,151.34	-4,372	7,742,013.04	448,530		
	🕀 🗄 De	elivery Type	Grand Total		67,753,086.26	3,697,934	-751,483.60	-37,228	67,001,602.66	3,660,706		
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	E 50	ore Dimension									Name	UA SAMSCLUB STAR
		ore Name									🗆 Configurable	_
	E St	ore Number									Name	
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	🕀 🗄 St	reet Address										
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Ready												

Managing Dimensions (attributes and hierarchies)

We can also define hierarchies easily, to provide additional aggregations/views of the cube. Use the Dimension Structure pane to manage the hierarchies and levels for a currently selected dimension. To select a dimension, double click it from the list of Dimensions in the solution explorer (top right by default).

Example: To create a location (State > City > Zip Code) hierarchy in the Store Dimension, double click the Store Dimension which will take you to the Dimension Structure tab. Select the desired attributes to be added to the Dimension Structure from the Data Source View. Then, right-click on the selected attributes and click New Attribute from Column.



The attributes will be added to the attributes pane of the Dimension Structure as shown in the figure below:



We are now ready to create the location hierarchy. First, drag STATE from the Attributes list to the Hierarchies and Levels design surface, then drag CITY to the <new level> tag under STATE and drag ZIP to the <new level> tag under CITY.



You can rename or delete a hierarchy by right clicking at the top of the hierarchy. Rename the hierarchy to Location.



Note that there is a warning sign is shown in the title of the hierarchy. Hovering the mouse near the warning sign tells you what the reason is. In this case, it is because attribute relationships do not exist between the levels of this hierarchy.

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Attributes	Herarchies	Data Source View
Apparel Zone Beg Effective Date	Attribute relationships do not exist between one or more le	Store_Dimension vels of this hierarchy. This may result in decreased query performance. Store_Number
Delivery Type District Number	* ZIP Code	Store_Name
End Effective Date Geographic Zone		Subdivision_Number Region_Number

So, we need to create attribute relationships between the attributes by dragging one attribute under the other. Drag one attribute to the <new attribute relationship> tag under the other where you want to have attribute relationships. We do this in the Attributes pane of the Dimension Structure tab.

Note that all the attributes (State, City and Zip Code) have relationships with Store Key attribute. To create the attribute relationships, we first have to delete the relationships between State – Store Key and City – Store Key. To do this, right click on the relationship in the Attribute Relationships pane as shown in the figure below. Select Delete to delete the relationship. Click OK in the Delete Objects warning box. Repeat the same procedure for the Store Key – City relationship.



To create new attribute relationships, right click anywhere on the attribute relationships pane and select New Attribute Relationship. The Create Attribute Relationship window is opened as shown below. Set the Source attribute as Zip Code and Related Attribute as City. Leave the Relationship type as Flexible.

SAMS_STAR_AS - Microsoft Visual Studio		
File Edit View Project Build Debug Database Dimension Tools Window He	Screate Attribute Relationship	
File Edit View Project Build Debug Database Dimension Tools Window He Store Dimension.dim [Design]* Start Page Dimension Start Page Dimension Structure [] Attribute Relationships [] Translations [] Browser Dimension [] Store Key [] [] [] Store Key [] P Apparel Zone P [] ZIP Code P Divery Type P District Number P District Number P New Attribute Relationship	Create Attribute Relationship Source Attribute Name: ZIP Code Member count: 0 Key columns: - Store_Dimension.ZIP_Code	Related Attribute Ngme:
→ Geographic Zone → Manager Name → MDSE Major Zone → MDSE Sub Zone → Open Date Key → Open Sunday → Phone Number → Region Number	Relationship type: Flexible (may change over time)	OK Cancel Help

Repeat the same procedure to create a new attribute relationship between City and State. In this case, the source attribute value for the Create Attribute Relationship window will be City and the Related attribute will be State. Also, the relationship type is changed to Rigid. The attribute relationships will look as shown in the figure below:



Once you create the relationships, the warning sign next to Location should disappear.

Drag columns or attributes into an existing hierarchy to add a new level to that hierarchy. Drag columns or attributes onto the Hierarchies and Levels design surface to create a new hierarchy.

After a hierarchy is created, you can add levels by dragging additional columns from the Attributes pane into the hierarchy, or remove levels by dragging existing levels out of the hierarchy. To reorder levels within the hierarchy, drag the selected level to a different position within the hierarchy.



Once you have created the hierarchy/ies, save by clicking the Save all icon (multiple blue disks) on the tool bar. Then, you will be able to browse your hierarchy by clicking the Browse tab and selecting the hierarchy you would like to browse from the Hierarchy dropdown list and drill through. You may need to reconnect before you can browse by clicking the Reconnect link that will show at the bottom of your screen or by clicking the Reconnect icon on the toolbar – top left side of your screen



Further, you can browse the cube and see the hierarchies in relation with your measures. Now, go back to the Browse tab of your cube. Note that you now have a Location hierarchy added to the list... you can drag and drop the Location hierarchy (as shown in the screen shot below) instead of dragging state, city and zip code one by one.

Store Dimension [Online] Store Dimension	[Online] / U/	A SAMSCLUB STAR [Onli	ne] Start	Page	
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🖃 🗁 Item Scan Fact					
Item Quantity					
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Total Scan Amount					
Date Dimension	Drop Filter F	ields Here			
Item Dimension				Drop Colur	nn Fields
Member Dimension	State •	City	ZIP Code	Total Scan	Amount
E Scan Type Dimension	⊡ TX			4,645,497	.32
E 🧕 Store Dimension				3,083,055	. 10
Apparei Zone				2,740,793	.32
Beg Effective Date		CINCINNATI	50289	4,318,524	. 14
			56203	7,308,252	.08
Delivery Type District Number			Total	11,626,7	76.22
District Number			(3,578,099	.28
End Effective Date				4,827,295	.20
Manager Name				4,067,987	.80
MDSE Major Zope				2,300,612	.56
MDSE Sub Zone		E CONCORD		4,436,103	.32
Open Date Key				2,228,588	.00
Open Sunday				3,291,646	.04
Phone Number				5,406,942	.80
Region Number		DALLAS		3,652,925	.70
Sales Class		DAYTONA BEACH		3,373,266	.96
🛨 📕 Size Class		Total		59.259.5	89.62
🕀 🖬 State	Ξ WI			7,742,013	.04
🗉 🚦 Store Code	Grand Tota	al		67.001.6	02.66
🖅 📑 Store Dimension					
🖅 📑 Store Name					
🗄 📑 Store Number					
🗄 📑 Store Type					
🗄 📑 Street Address					
Subdivision Number					
🗄 🚦 ZIP Code					
🗄 🟥 Location	I				

In the same way, you can create Date Hierarchies that include Year-Quarter-Month-Day or Year-Week-Day.