


Microsoft®
SQL Server® 2008 Tutorial 4:
OLAP

IT 4153
Advanced Database

J.G. Zheng
Spring 2012



**SPSU SOUTHERN
POLYTECHNIC**
STATE UNIVERSITY

Overview

- ◆ OLAP
 - Use SQL Server Analysis Service
 - Use SQL Server BI Development Studio
 - Use Excel and Visio

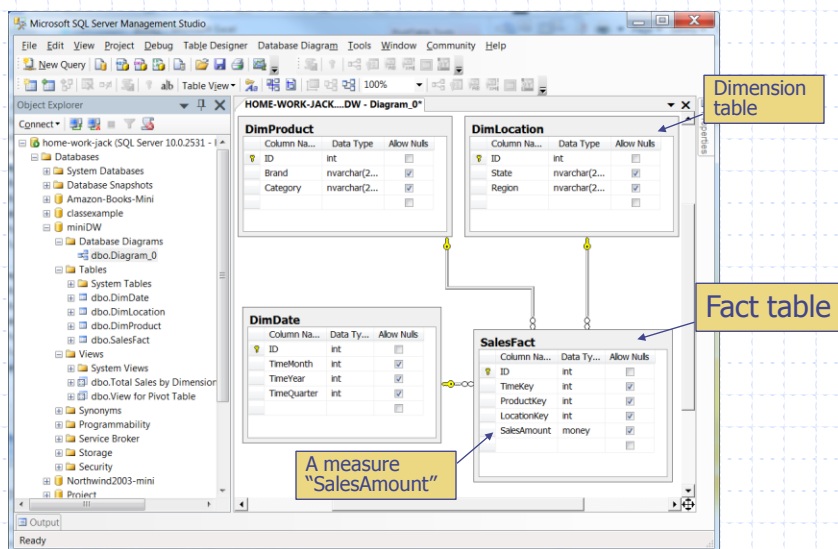
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SQL Server 2008 Database

- ◆ Download the “miniDW” sample database from the course schedule website
- ◆ Attach it to SQL Server
 - Don't forget to “Run as Administrator” when opening the Management Studio

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Sample Database Structure



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The View with Aggregation

Fact table in the center

Create a view of aggregation with groups. One such view already exists in the sample database. You can also create additional views.

Check this button to bring out aggregation settings.

"Sum" on the measure column; and "Group By" on chosen dimensions.

Column	Alias	Table	Output	Sort Type	S...	Group By
SalesAmount	[Total Sales]	SalesFact	<input checked="" type="checkbox"/>			Sum
TimeYear		DimDate	<input checked="" type="checkbox"/>			Group By
TimeQuarter		DimDate	<input checked="" type="checkbox"/>			Group By
TimeMonth		DimDate	<input checked="" type="checkbox"/>			Group By
Category		DimProduct	<input checked="" type="checkbox"/>			Group By
Brand		DimProduct	<input checked="" type="checkbox"/>			Group By
Region		DimLocation	<input checked="" type="checkbox"/>			Group By
State		DimLocation	<input checked="" type="checkbox"/>			Group By

```

SELECT SUM(dbo.SalesFact.SalesAmount) AS [Total Sales], dbo.DimDate.TimeYear, dbo.DimDate.TimeQuarter, dbo.DimDate.TimeMonth,
dbo.DimProduct.Brand, dbo.DimLocation.Region, dbo.DimLocation.State
FROM SalesFact INNER JOIN DimProduct ON
SalesFact.ProductKey = DimProduct.ID
INNER JOIN DimLocation ON
SalesFact.LocationKey = DimLocation.ID
INNER JOIN DimDate ON
SalesFact.TimeKey = DimDate.ID
GROUP BY DimDate.TimeMonth, DimDate.TimeYear,
DimDate.TimeQuarter, DimProduct.Brand,
DimProduct.Category, DimLocation.Region,
DimLocation.State;

```

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Complete SQL for the View

```

SELECT SUM(dbo.SalesFact.SalesAmount) AS [Total Sales],
DimDate.TimeYear, DimDate.TimeQuarter,
DimDate.TimeMonth, DimProduct.Category,
DimProduct.Brand, DimLocation.Region, DimLocation.State
FROM SalesFact INNER JOIN DimProduct ON
SalesFact.ProductKey = DimProduct.ID
INNER JOIN DimLocation ON
SalesFact.LocationKey = DimLocation.ID
INNER JOIN DimDate ON
SalesFact.TimeKey = DimDate.ID
GROUP BY DimDate.TimeMonth, DimDate.TimeYear,
DimDate.TimeQuarter, DimProduct.Brand,
DimProduct.Category, DimLocation.Region,
DimLocation.State;

```

Excel Pivot Table and Chart

- ◆ Excel has rich analysis tools, and can be used as an data analysis front end to SQL Server databases
- ◆ Task
 - Creating a pivot table based on the "miniDW" database
- ◆ More about pivot tables in Excel
 - <http://office.microsoft.com/en-us/excel-help/CH010064848.aspx>
 - <http://www.dummies.com/how-to/content/how-to-create-a-pivot-table-in-excel-2007.html>
 - <http://office.microsoft.com/en-us/excel-help/pivottable-i-get-started-with-pivottable-reports-in-excel-2007-RZ010205886.aspx>

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Start a PivotTable Task

Go to the "Insert" tab and select PivotTable

Choose "external data source" and click the button. Then skip to slide #11.

Book2 - Microsoft Excel

Home Insert Page Layout Formulas Data Review View Load Test Team

PivotTable Table Picture Clip Art Columns Line Pie Bar Area Scatter Other Charts Hyperlink Text Box - Signature Line - Header & Footer Object WordArt - Symbol Text

Illustrations

Calibri 11

Insert PivotTable

Summarize data using a PivotTable.

PivotTables make it easy to arrange and summarize complicated data and drill down on details.

Press F1 for more help.

Create PivotTable

Choose the data that you want to analyze

Select a table or range

Table/Range: []

Use an external data source

Choose Connection...

Connection name:

Choose where you want the PivotTable report to be placed

New Worksheet

Existing Worksheet

Location: Sheet2!\$A\$1

OK Cancel

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Another Way to Select a Data Source

Access can also be used as a data source.

To use an existing data source, select "Existing Connections". Then go to slide #11.

Go to the "Data" tab, select "Get External Data". To create a new SQL Server data source, choose "From SQL Server" and follow the setup in slide #10.

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Create a New Data Source

Server name

Select the database

Select the view just created.

Name	Owner	Description	Modified	Created	Type
Total Sales by Dimensions	dbo			4/12/2010 2:54:52 PM	VIEW
View for Pivot Table	dbo			4/12/2010 3:01:48 PM	VIEW
DimDate	dbo			4/12/2010 2:48:58 PM	TABLE
DimLocation	dbo			4/12/2010 2:48:58 PM	TABLE
DimProduct	dbo			4/12/2010 2:48:58 PM	TABLE
SalesFact	dbo			4/12/2010 2:48:58 PM	TABLE
sysdiagrams	dbo			4/12/2010 2:49:13 PM	TABLE

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Import Table

The image shows two overlapping dialog boxes in Microsoft Excel. The background dialog is 'Existing Connections', which lists various data sources. A yellow callout box points to the list with the text 'Choose an existing connection'. The foreground dialog is 'Import Data', which allows the user to select how to view the data (Table, PivotTable Report, PivotChart and PivotTable Report, or Only Create Connection). A yellow callout box points to the 'PivotTable Report' and 'PivotChart and PivotTable Report' options with the text 'Choose PivotTable (or PivotChart)'. Another callout points to the 'Existing worksheet' radio button and the cell reference '\$A\$1' with the text 'Where do you want to put the data? Existing worksheet: =\$A\$1'. A third callout points to the 'Browse for More...' button in the 'Existing Connections' dialog with the text 'To create a new connection, click this button.' The page number '11' is in the bottom right corner.

Pivot Table Design

The image shows the Microsoft Excel interface with a PivotTable and the 'PivotTable Field List' task pane. A yellow callout box points to the 'Report Filter' and 'Column Labels' sections of the task pane with the text 'These are the columns from the view.' Another callout points to the 'Row Labels' and 'Values' sections with the text 'This is for the chart, optional.' A third callout points to the 'PivotTable Design' task pane on the left with the text 'Click any where within the design panel to bring up the setting panel on the right.' The page number '12' is in the bottom right corner.

Drag Columns

More options and design settings here.

Column Labels

Format them to a money style

Drag a dimension column to "column Labels" or "row labels"

Row Labels

Drag the measure "Total Sales" here.

Sum of Total Sales	Column Labels	2007	2008	Grand Total
CA	\$	192,205.54	\$ 175,531.55	\$ 367,737.09
FL	\$	184,598.38	\$ 180,432.87	\$ 365,031.25
GA	\$	140,276.80	\$ 165,515.50	\$ 305,792.30
NV	\$	188,945.79	\$ 182,238.63	\$ 371,184.41
Grand Total	\$	706,026.51	\$703,718.54	\$1,409,745.05

Total sales by the chosen dimensions

Drilling Up/Down

Click on these expand/collapse buttons to adjust the view. A pivot table is now ready. Change row or column labels to generate different totals and views.

Putting more than one dimension columns will arrange the data in hierarchical grouping levels, which enables drilling up/down.

Sum of Total Sales	Column Labels	2007	2008	Grand Total
Southeast		324875.18	345948.37	670823.55
Computer		158191.79	181649.8	339841.59
MacAir		74260.85	95433.16	169694.01
MacBook		83930.94	86216.64	170147.58
Electronics		166683.39	164298.57	330981.96
iPod		83081.15	100870.86	183952.01
iTune		83602.24	63427.71	147029.95
West		381151.33	357770.17	738921.5
Computer		186349.69	172333.7	358683.39
MacAir		86928.95	90655.26	177584.21
MacBook		99420.74	81678.44	181099.18
Electronics		194801.64	185436.47	380238.11
iPod		90810.49	81613.34	172423.83
iTune		103991.15	103823.13	207814.28
Grand Total	\$	706026.51	\$703718.54	\$1409745.05

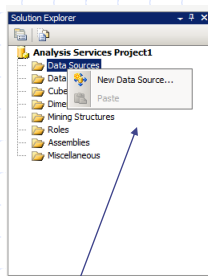
Use BI Development Studio

- ◆ The BI Development Studio is a part of the Visual Studio.
 - Installed as a component of SQL Server.
 - You don't need to install the full edition of Visual Studio.

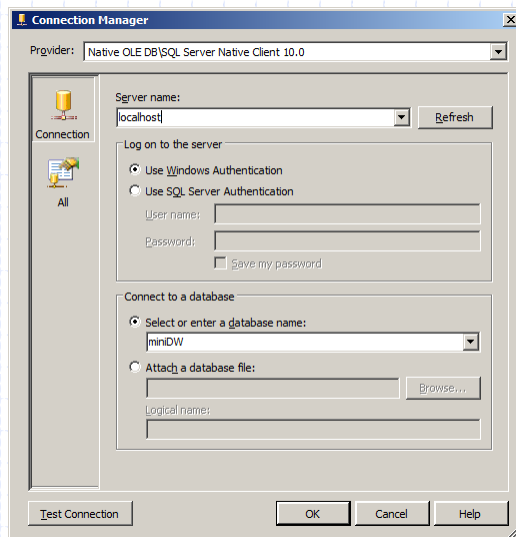
- ◆ Make sure you have started the Analysis Service (SSAS) before you go on.

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Create a Connection



Create a new project and a connection to the SSAS



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Select Connection

The screenshot shows two overlapping windows from the Data Source Wizard. The background window, titled "Data Source Wizard", is at the "Select how to define the connection" step. It lists "localhost.miniDW" as a data connection. The foreground window, also titled "Data Source Wizard", is at the "Impersonation Information" step, where the "Use the service account" option is selected.

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Create a Data Source View

◆ Select tables first

The screenshot shows the "Data Source View Wizard" at the "Select Tables and Views" step. On the left, the Solution Explorer shows the project structure. The wizard window has two panes: "Available objects" and "Included objects".

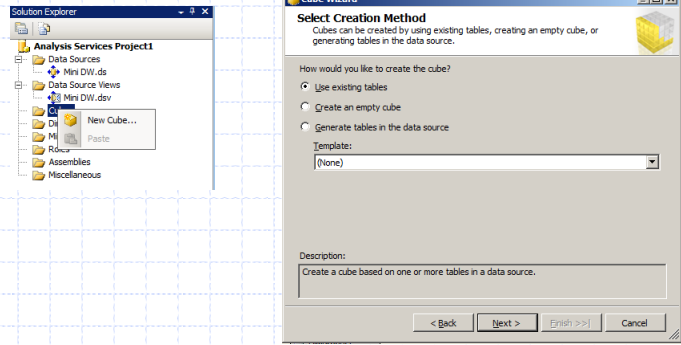
Name	Type
sysdiagrams (dbo)	Table
Total Sales by Dimensio...	View

Name	Type
DimDate (dbo)	Table
DimLocation (dbo)	Table
DimProduct (dbo)	Table
SalesFact (dbo)	Table

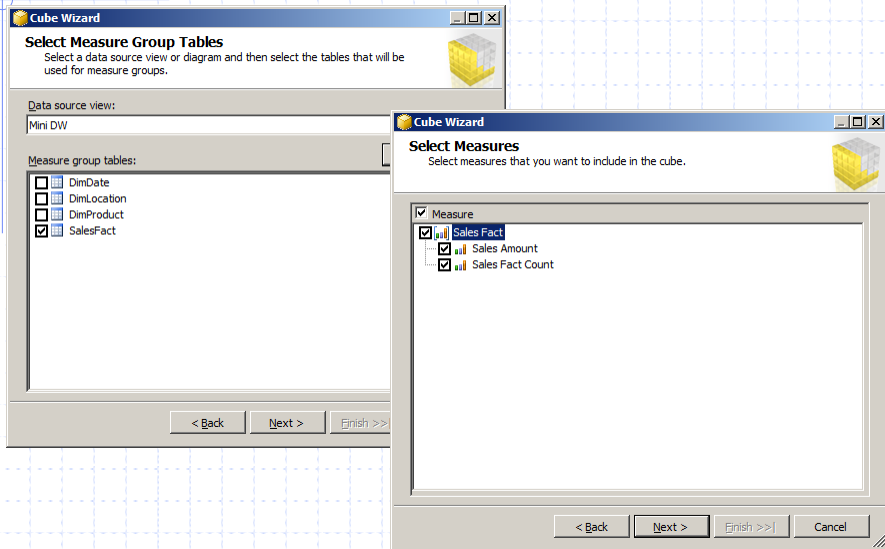
At the bottom of the wizard, there is a "Filter:" field, a "Show system objects" checkbox, and an "Add Related Tables" button.

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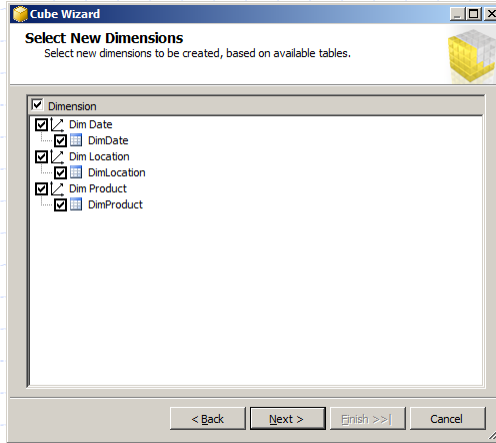
Create a Cube



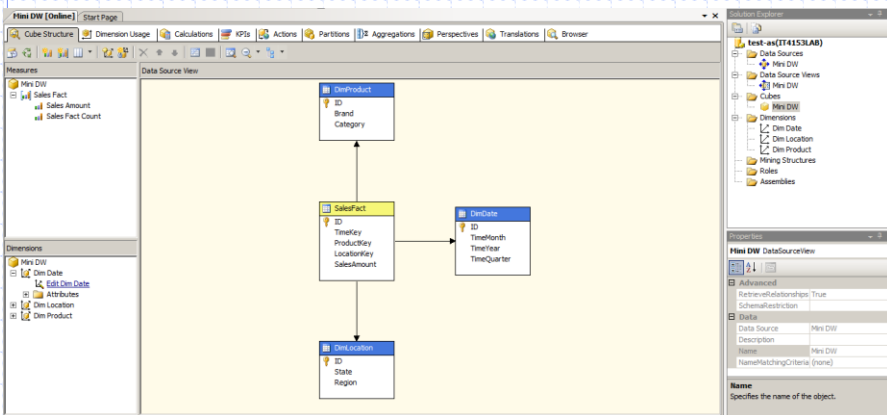
Select Fact Tables (Measures)



Select Dimension Tables



A Cube



Define Dimensions

The screenshot shows the SQL Server Enterprise Architect interface. On the left, the 'Attributes' pane lists 'Dim Date' with sub-attributes: ID, Time Month, Time Quarter, and Time Year. The 'Hierarchies' pane shows a hierarchy for 'Dim Date' with levels: Time Year, Time Quarter, Time Month, and a placeholder '<new level>'. A yellow callout box contains the following text: 'Double click the Date dimension in the solution explorer. Select and drag more attributes from the right panel to the left, and then from the left to the middle. Make sure the hierarchy is correct. Repeat this to all three dimension tables.' A blue arrow points from the callout to the 'Time Year' level in the hierarchy pane. On the right, a preview of the 'DimDate' table is shown with columns: ID, TimeMonth, TimeYear, and TimeQuarter.

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Deploy/Process the Project

The screenshot shows the 'Solution Explorer' window for a project named 'test-as(IT4153LAB)'. A context menu is open over the project, listing several actions: Edit Database, Generate Relational Schema..., Validate Database..., Process..., Refresh, Add, Debug, Cut, Paste, and Properties. A yellow callout box with the text 'Deploy to SQL Server.' has a blue arrow pointing to the 'Process...' option in the menu.

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Preview the Cube

Use the browser tab to preview.

Drag attributes from the left to the result pane to view.

		Time Year			Time Quarter			Grand Total	
		2007	2008	Total	2007	2008	Total		
Category	Brand	Sales Amount	Sales Amount	Sales Amount	Sales Amount	Sales Amount	Sales Amount		
Computer	Laptop	86112.89	75076.91	161189.8	185088.42	347278.22			
	Netbook	94931.48	88420.2	183351.68	167895.08	351246.76			
	Total	181044.37	163497.11	344541.48	352983.5	695794.98			
Electronics	Pod	88462.19	85429.45	173891.64	182494.2	356375.84			
	Phone	100384.42	87208.97	187593.39	167230.84	354824.23			
	Total	188846.61	172638.42	361485.03	349725.04	711210.07			
Grand Total		369890.98	336135.53	706026.51	703718.54	1409745.05			

Use Management Studio

◆ Browse the Cube in Management Studio

Use the browser tab to preview.

Drag attributes from the left to the result pane to view.

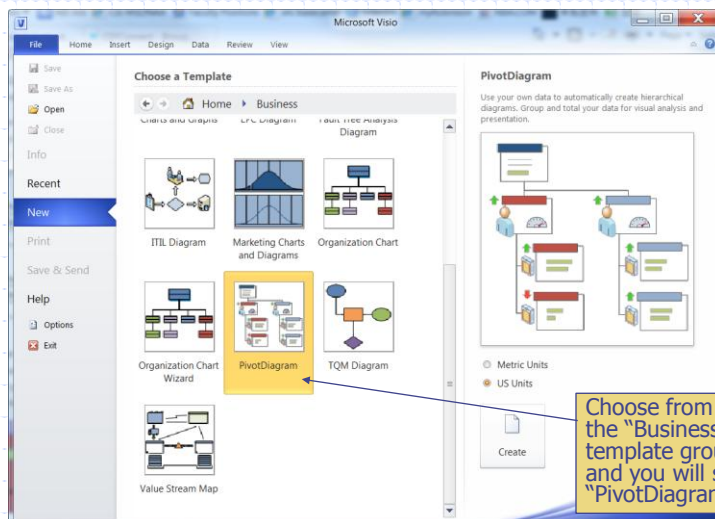
		Time Year			Time Quarter			Time Month			Grand Total	
		2007	2008	Total	2007	2008	Total	2007	2008	Total		
Category	Brand	Sales Amount	Sales Amount	Sales Amount	Sales Amount	Sales Amount	Sales Amount	Sales Amount	Sales Amount	Sales Amount		
Computer	Laptop	158191.79	166683.39	324875.18	8	7	27875.87	27065.67	54941.54			
	Netbook	27895.15	23799.43	51694.58	9	8	29232.93	25317.29	54550.22			
	Total	186086.94	190482.82	376569.76	17	15	57108.80	52382.96	109491.76			
Electronics	Pod	84203.95	78182.39	162386.34	10	11	35713.51	27527.92	63241.43			
	Phone	12716.62	11412.31	24128.93	12	12	34315.72	27175.95	61491.67			
	Total	96920.57	89594.70	186515.27	22	23	70029.23	54703.87	124733.10			
Grand Total		283007.51	280077.59	563085.10	39	38	127138.03	107086.83	234224.86			

Pivot Diagram in Visio 2010

- ◆ Visio can also connect to the SQL Server and display the pivot table in a dynamic diagram
- ◆ Task
 - Creating a pivot diagram based on the "miniDW" database
- ◆ For more about the pivot diagram, visit
 - <http://office.microsoft.com/en-us/visio-help/create-a-pivodiagram-HA010357089.aspx>

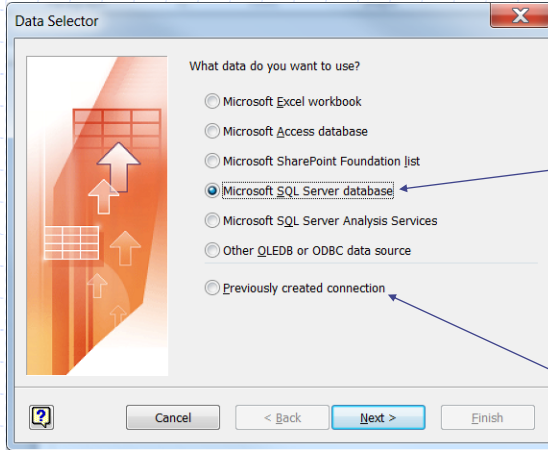
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Create a PivotDiagram



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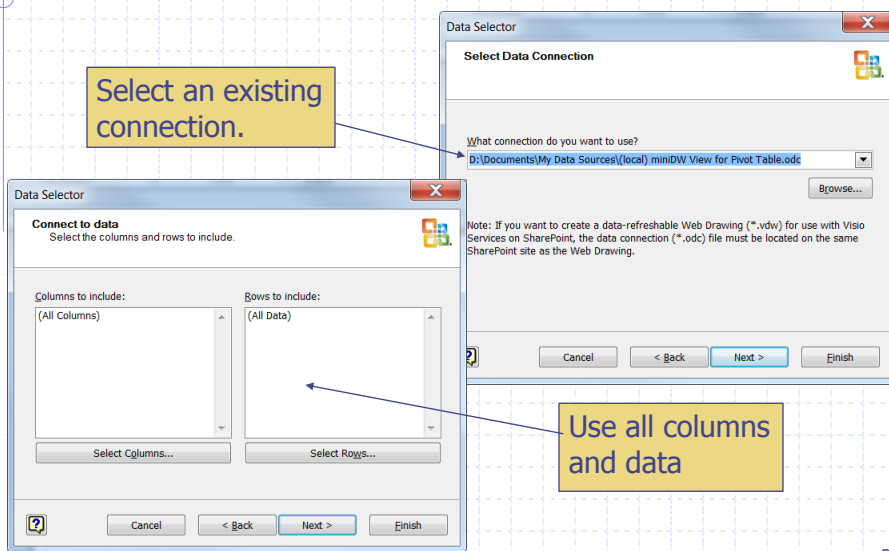
Connecting to the SQL Server



Select this one to create a new connection. See slide #10 and then go to the next slide.

Select an existing connection. Go to the next slide.

Choose a Connection



Select an existing connection.

Use all columns and data

Design PivotDiagram

The screenshot shows the Microsoft Visio interface with a PivotDiagram. The 'Add Category' pane on the left has 'TimeMonth' selected. The 'Add Total' pane has 'Total Sales(Sum)' checked. The main diagram area shows a 'Total' shape containing 'Total Sales \$1,409,745.05'. A callout box points to this shape with the text: 'Click on the shape and then choose a dimension to add under the root shape.' Another callout box points to the 'Total Sales(Sum)' option in the 'Add Total' pane with the text: 'For the "Total", check the "Total Sales" only.' A third callout box points to the 'Total' shape with the text: 'The grand total is put here for you.'

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PivotDiagram

The screenshot shows the Microsoft Visio interface with a PivotDiagram. The 'Add Category' pane on the left has 'Category' selected. The 'Add Total' pane has 'Total Sales(Sum)' checked. The main diagram area shows a hierarchical structure: a 'Total' shape at the top containing 'Total Sales \$1,409,745.05', which branches into two 'Category' shapes. The 'Computer' category shape contains 'Total Sales \$698,524.98' and the 'Electronics' category shape contains 'Total Sales \$711,220.07'. A callout box points to these category shapes with the text: 'Subtotals by "Category" are displayed.'

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Adding More Dimensions

Drag the "Pivot Node" shape to start another different tree.

Add more branches to see more subtotals (drill down). A pivot diagram is now ready.

Category	Subtotal	Total Sales
Total		\$1,409,745.05
Computer		\$698,524.98
Electronics		\$711,220.07
TimeYear		
2007		\$344,541.48
2008		\$353,983.50