



Database and data mining group, Politecnico di Torino 

SQL Server 2005

Analysis Services

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Analysis Services

- OLAP engine of SQL Server 2005
- Every source is associated to an external database
- The source is the relational database where the fact and dimension tables are present
 - Relational data warehouse
- Analysis Services exploits data from sources to feed the cubes

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Cubes

- The cubes
 - Are similar to the materialized views of the relational model
 - Are stored in an OLAP database which exploits proper data structures to save multidimensional data
- Every cube can be associated to
 - A complete fact
 - A portion of a fact
 - To optimize specific queries

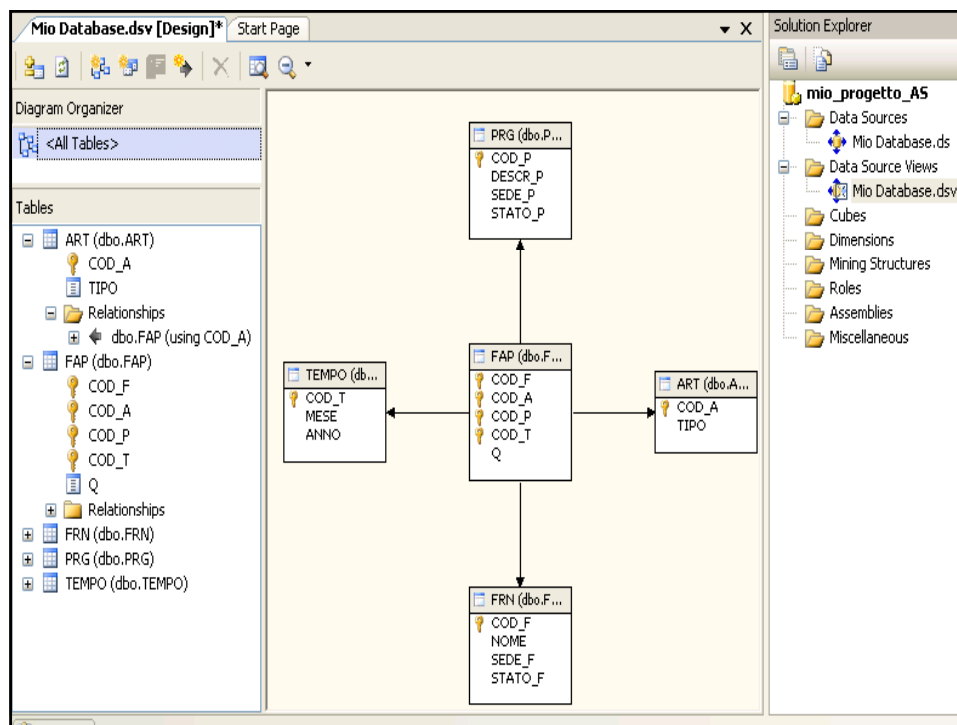


Creating the data source

- The first step is to define the data source
 - Indicating the following parameters
 - Remote (or local) computer network address
 - User
 - Authentication method
 - Username/password
 - Windows user
 - Database to be used

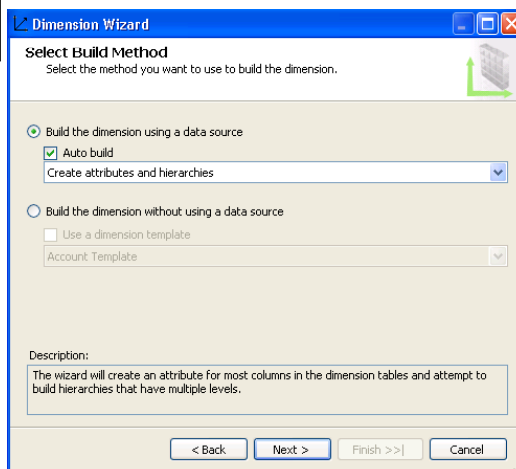
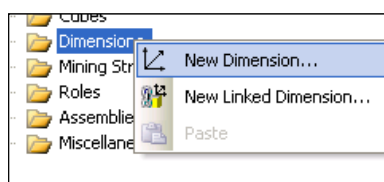
Creating dimensions and cubes

- Basic steps
 - Define the data source
 - Define a data source view to select the needed tables
 - Define the dimension structures
 - Define the cube dimensions



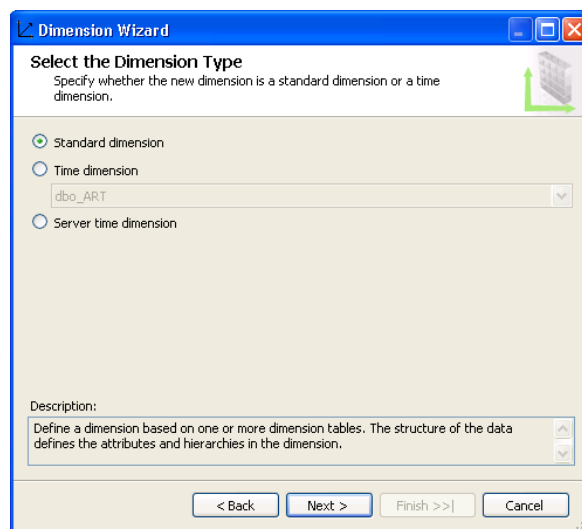
Creating a dimension

- Use the “New dimension” command
 - Select the “auto build” option if you want SQL Server to automatically define attributes and hierarchies



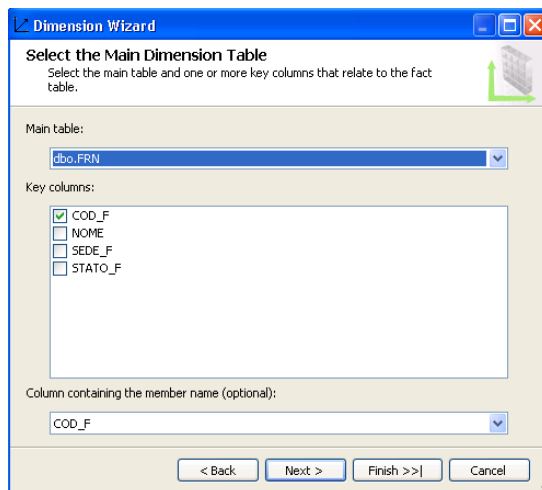
Creating a dimension (2)

- Choose the type of the dimension
 - Standard
 - Temporal
 - Automatic managing of the time dimension



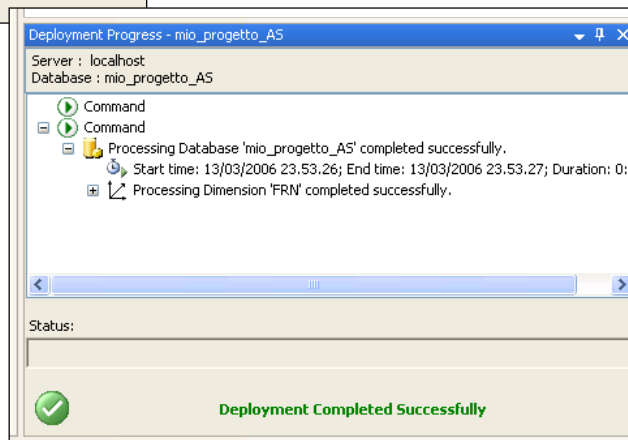
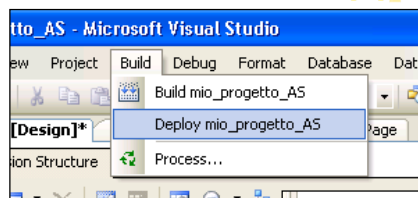
Creating a dimension (3)

- Choose the table to be used as data source for the dimension
- Choose the primary key of the table



Project deploy

- Transfer the created structures on the OLAP server
 - SQL Server automatically creates a new OLAP database for the project
- During the deploy phase
 - the dimension is processed
 - the data are loaded



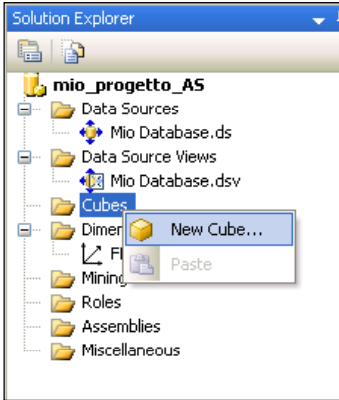
Browsing a dimension

- Using the “browser”
 - an attribute or a hierarchy can be selected
 - its data can be read

Creating a cube

- Choose the “New Cube” command
 - Use the wizard
- Choose the fact table
- Choose the cube measures
 - Numerical attributes
- Choose the cube dimensions
 - Create the dimensions if needed
 - Use previously created dimensions

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The screenshot shows the Solution Explorer window for a project named 'mio_progetto_AS'. The tree view includes folders for Data Sources, Data Source Views, Cubes, Dimer, Mining, Roles, Assemblies, and Miscellaneous. The 'Cubes' folder is selected, and a context menu is displayed over it, showing 'New Cube...' and 'Paste' options.

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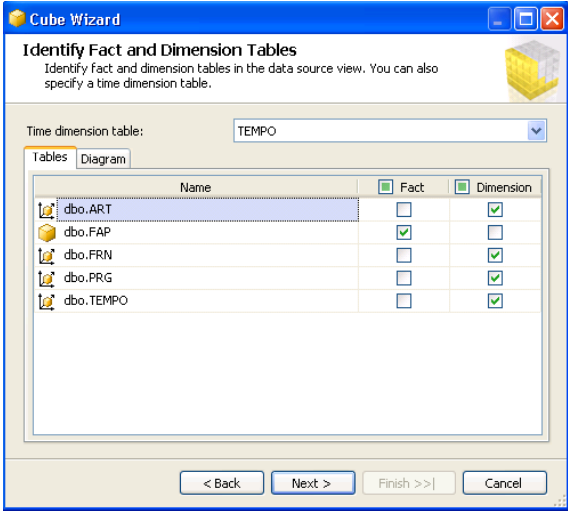
Creating a cube (2)

- Choose the data source
 - Data source view
- Choose the fact and dimension tables
 - Identify the fact table
 - Identify the tables associated to the desired dimensions

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Cube Wizard
Identify Fact and Dimension Tables
Identify fact and dimension tables in the data source view. You can also specify a time dimension table.

Time dimension table: TEMPO

Name	Fact	Dimension
dbo.ART	<input type="checkbox"/>	<input checked="" type="checkbox"/>
dbo.FAP	<input checked="" type="checkbox"/>	<input type="checkbox"/>
dbo.FRN	<input type="checkbox"/>	<input checked="" type="checkbox"/>
dbo.PRG	<input type="checkbox"/>	<input checked="" type="checkbox"/>
dbo.TEMPO	<input type="checkbox"/>	<input checked="" type="checkbox"/>

< Back Next > Finish >> | Cancel

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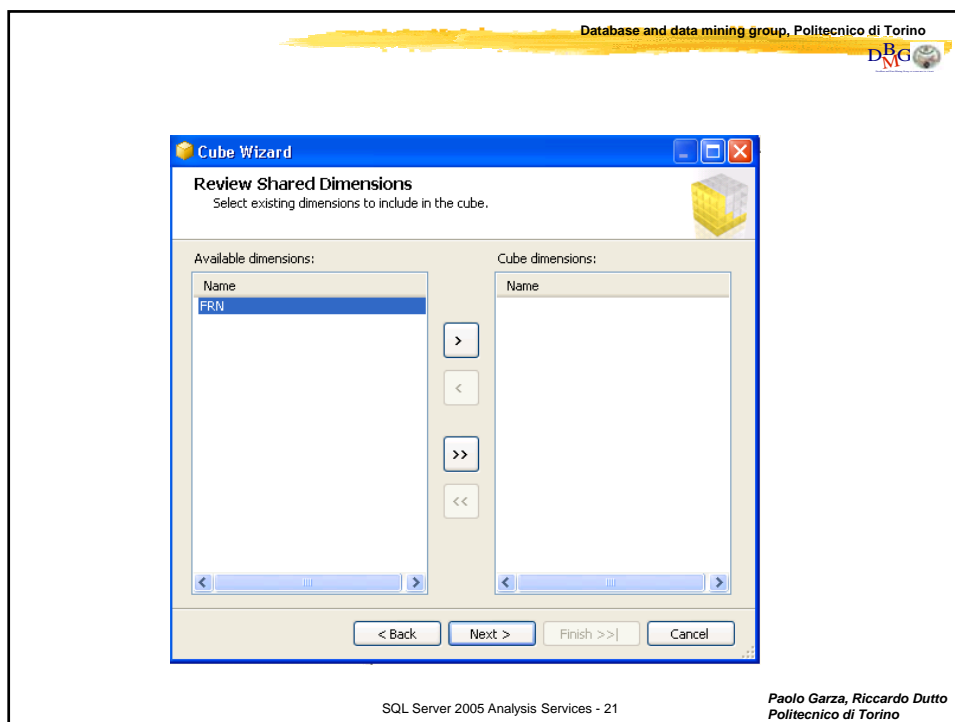
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Creating a cube (3)

- Choose the dimensions to be used
 - The SQL Server wizard presents a list of existing dimensions

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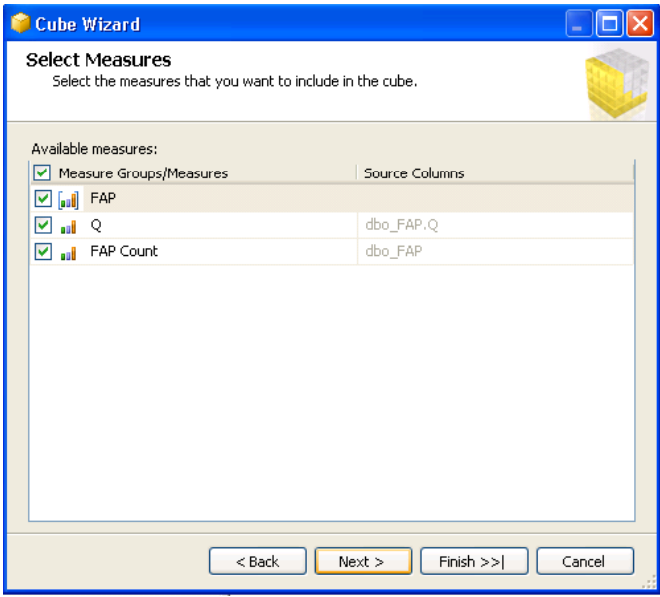
Creating a cube (4)

- Choose the measures of the cube
 - Besides the measures of the fact table, SQL Server provides additional measures
 - Example: COUNT, the number of tuples of every rollup operation

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Cube Wizard
Select Measures
 Select the measures that you want to include in the cube.


Available measures:

Measure Groups/Measures	Source Columns
<input checked="" type="checkbox"/> FAP	
<input checked="" type="checkbox"/> Q	dbo_FAP.Q
<input checked="" type="checkbox"/> FAP Count	dbo_FAP

< Back **Next >** Finish >>| Cancel

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Cube processing

- Before using the cube, we need to “compute” its content
 - Loading the data inside the cube
- Execute the cube deploy and processing
 - If new structures have been introduced, SQL Server deploys the new ones and then processes the cube (updates the cube data)

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The screenshot shows a file explorer view of a cube named 'Mio cubo.cube'. A context menu is open over the cube, listing several actions: 'Open', 'Process...', 'Browse', 'View Code', 'View Designer', 'Add Business Intelligence', and 'Exclude From Project'. The 'Process...' option is currently selected and highlighted in blue.

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Cube processing (2)

- Cube processing types
 - Full Process
 - Creates the physical structure of the cube and computes its content (aggregated measures)
 - Refresh update
 - Delete the data of the cube and recomputes the aggregated measures
 - Incremental update
 - Updates the cube content by adding new data from data sources

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Cube processing (3)

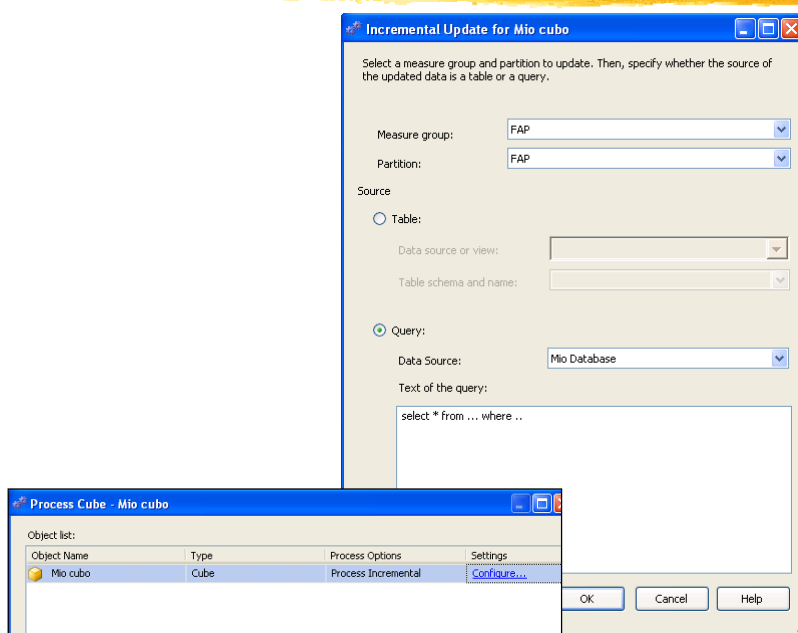
- Full Process option
 - It is the only option available when the content is computed for the first time



Object Name	Type	Process Options
Mio cubo	Cube	Process Full

Cube processing (4)

- Incremental Update option
 - Updates the content of the cube with data from data sources
 - Selects the data which satisfy the query



Incremental Update for Mio cubo

Select a measure group and partition to update. Then, specify whether the source of the updated data is a table or a query.

Measure group: FAP

Partition: FAP

Source

Table:

Data source or view: []

Table schema and name: []

Query:

Data Source: Mio Database

Text of the query:

select * from ... where ..

Process Cube - Mio cubo

Object Name	Type	Process Options	Settings
Mio cubo	Cube	Process Incremental	Configure...


OK Cancel Help

Querying a cube

- The content of a cube can be browsed
 - With the graphic browser of SQL Server BI Development Studio
 - MDX queries
 - Ad-hoc Microsoft language
 - Excel
 - Third party reporting tools

Graphic browser

- Select the cube and choose the “Browser” tab
- Drag and drop the information to show on the schema
 - Select the measures
 - Select the dimensions
 - Select the filters

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Cube Structure | Dimension Usage | Calculations | KPIs | Actions | Partitions | Perspectives | Translations | Browser

Perspective: Mio cubo | Language: Default

Mio cubo

- Measures
 - FAP
 - FAP Count
 - Q
- ART
 - ART
 - TIPO
- FRN
 - FRN
 - NOME
 - SEDE F
 - STATO F
 - PRG
- TEMPO
 - ANNO
 - COD_T
 - MESE


Dimension	Hierarchy	Operator	Filter Expression
ART	TIPO	Equal	{ Chiodo, Bullone, Cacciavite }
<Select dimension>			

Rilasciare qui i campi filtro

NOME	ANNO		Totale complessivo
	2005	2006	
Adams	4000	1200	5200
Blake		1000	1000
Jones	100	200	300
Smith	900	1100	2000
Totale complessivo	5000	3500	8500

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Aggregations in cubes

- Many queries use only a portion of the cube
 - They perform aggregations on the cube
- Response time can be optimized by pre-computing aggregations
 - Aggregations are chosen by SQL Server according to
 - User preferences
 - Frequent queries

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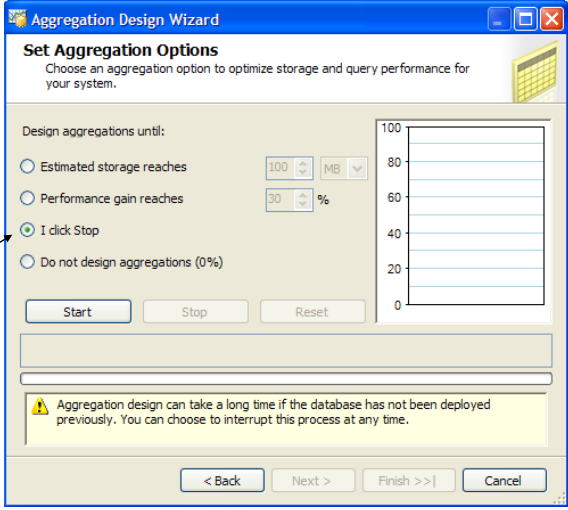
Aggregations in cubes (2)

- The user can choose some parameters
 - The maximum available disk space
 - The desired percentage of performance gain in terms of time
 - An interactive choice can be performed based on a graph showing
 - the performance gain vs used disk space
 - No aggregations

Aggregations in cubes (3)

- To start the aggregations choice
 - Select the desired cube
 - Select the “Partitions” tab
 - Choose the “Design Aggregations” wizard

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Option chosen by the user

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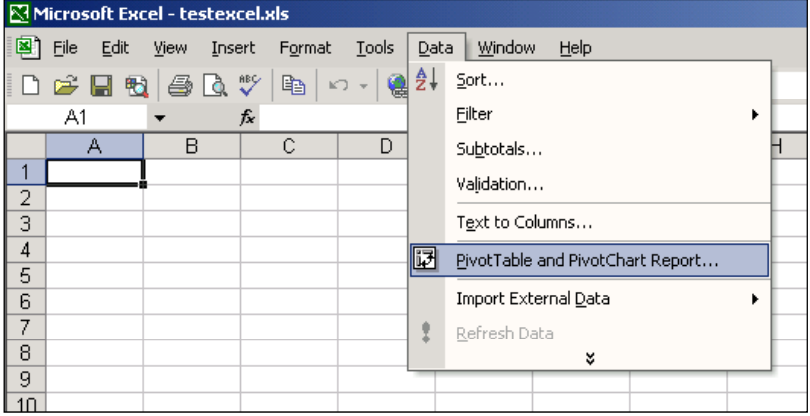
Using Excel to query a cube

- Open Excel
- Use the command
 - Data menu
 - Pivot Table
 - PivotChart Report

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The screenshot shows the Microsoft Excel application window titled 'Microsoft Excel - testexcel.xls'. The menu bar includes File, Edit, View, Insert, Format, Tools, Data, Window, and Help. The Data menu is open, displaying options: Sort..., Filter, Subtotals..., Validation..., Text to Columns..., PivotTable and PivotChart Report... (highlighted), Import External Data, and Refresh Data. The spreadsheet grid shows columns A, B, C, and D, and rows 1 through 10. Cell A1 is selected.

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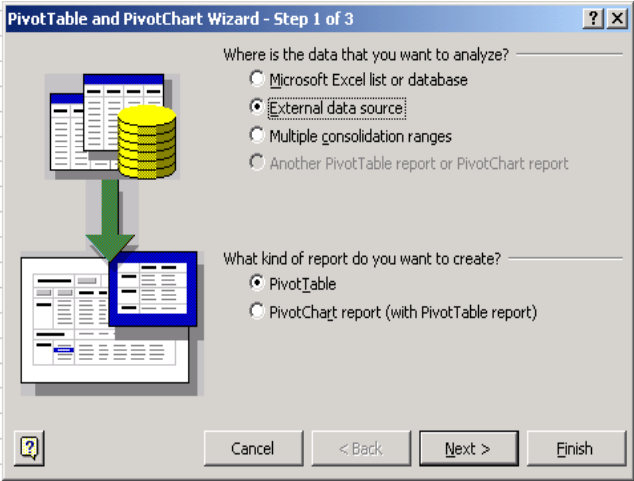
Using Excel to query a cube (2)

- Choose the “External data source” option

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PivotTable and PivotChart Wizard - Step 1 of 3

Where is the data that you want to analyze?

- Microsoft Excel list or database
- External data source
- Multiple consolidation ranges
- Another PivotTable report or PivotChart report

What kind of report do you want to create?

- PivotTable
- PivotChart report (with PivotTable report)

Cancel < Back Next > Finish

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Using Excel to query a cube (3)

- Choose the connection to the desired OLAP cube
 - Get Data
- The first time, the connection has to be created
 - Get Data
 - Olap Cubes -> New data source -> OK

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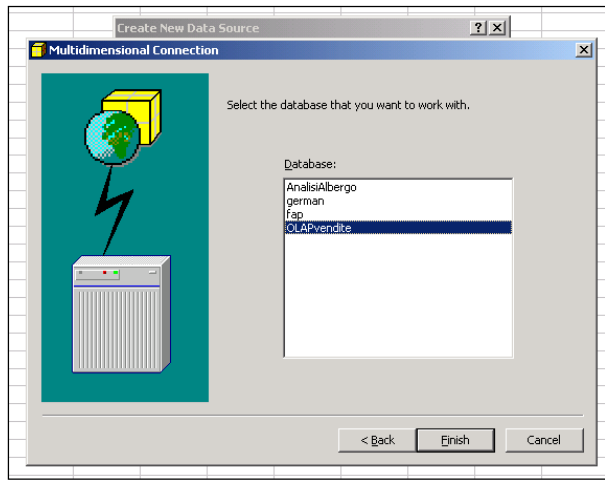
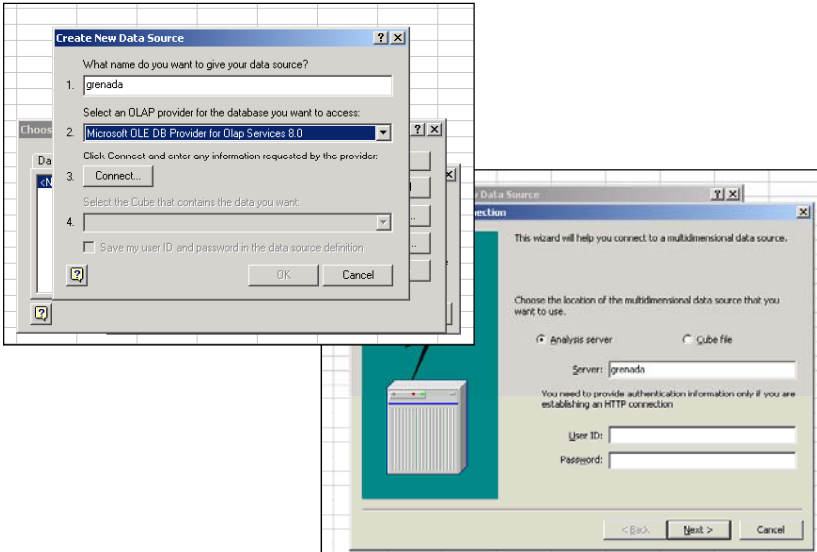
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Using Excel to query a cube (4)

- Creating a new connection
 - Choose a name for the connection
 - Choose the provider to connect to
 - Choose “Analysis server” and write the name of the OLAP server
 - Choose the name of the desired OLAP database
 - Choose the name of the desired cube

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What name do you want to give your data source?
1. grenada

Select an OLAP provider for the database you want to access:
2. Microsoft OLE DB Provider for OLAP Services 8.0

Click Connect and enter any information requested by the provider:
3. Connect... OLAPvendite

Select the Cube that contains the data you want:
4. Anticoli_Fornitori_Quantita

Save my user ID and password in the data source definition

OLAP Cubes

OK
Cancel
Browse...
Options...
Delete

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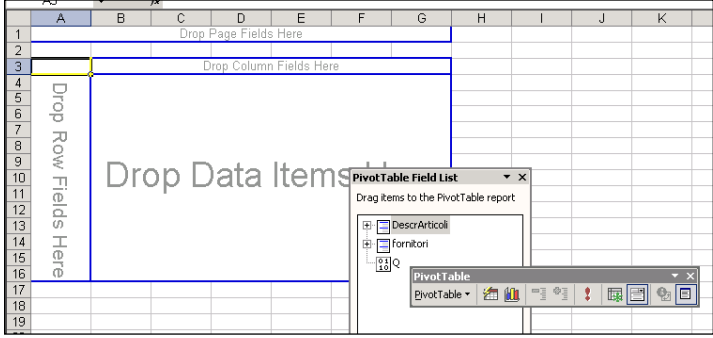
Using Excel to query a cube (5)

- Place the desired dimensions and measures on the Excel spreadsheet

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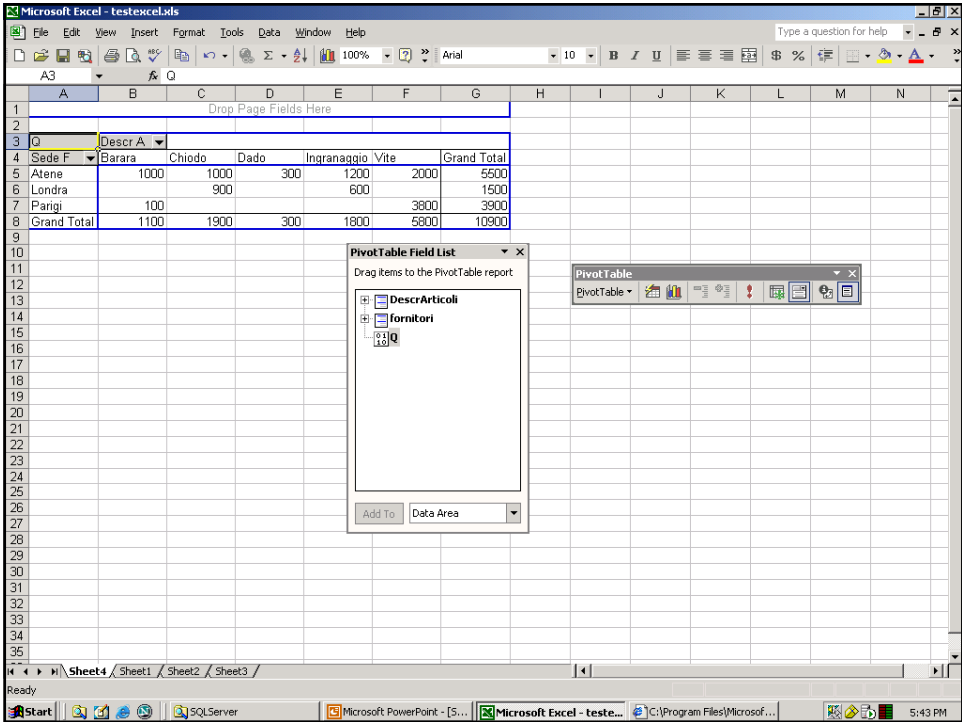
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Sede F	Barara	Chiudo	Dado	Ingranaggio	Vite	Grand Total
Atene	1000	1000	300	1200	2000	5500
Londra		900		600		1500
Parigi	100				3800	3900
Grand Total	1100	1900	300	1800	5800	10900