

## CSCI 5080 Assignment 3

Use Microsoft **WORD** to write your answer and submit it to the Dropbox in D2L.  
Please indicate **how much time** you spend on each problem.

### Part I (60 points)

1. (30 points) Suppose that a data warehouse for *Big-University* consists of the following four dimensions: *student*, *course*, *semester*, and *instructor*, and two measures *count* and *avg grade*. When at the lowest conceptual level (e.g., for a given student, course, semester, and instructor combination), the *avg grade* measure stores the actual course grade of the student. At higher conceptual levels, *avg grade* stores the average grade for the given combination.

(a) Draw a *snowflake schema* diagram for the data warehouse.

(b) Starting with the base cuboid [*student*, *course*, *semester*, *instructor*], what specific *OLAP operations* (e.g., roll-up from *semester* to *year*) should one perform in order to list the average grade of CS courses for each *Big-University* student.

(c) If each dimension has five levels (including all), such as “*student* < *major* < *status* < *university* < all”, how many cuboids will this cube contain (including the base and apex cuboids)?

2. (30 points) Suppose that a base cuboid has three dimensions, *A*, *B*, *C*, with the following number of cells:  $|A| = 100,000$ ,  $|B| = 100$ , and  $|C| = 10,000$ . Suppose that each dimension is evenly partitioned into 10 portions for *chunking*.

(a) Assuming each dimension has only one level, draw the complete lattice of the cube.

(b) If each cube cell stores one measure with 4 bytes, what is the total size of the computed cube if the cube is *dense*?

(c) State the order for computing the chunks in the cube that requires the least amount of space, and compute the total amount of main memory space required for computing the 2-D planes.

### Part II (40 Points)

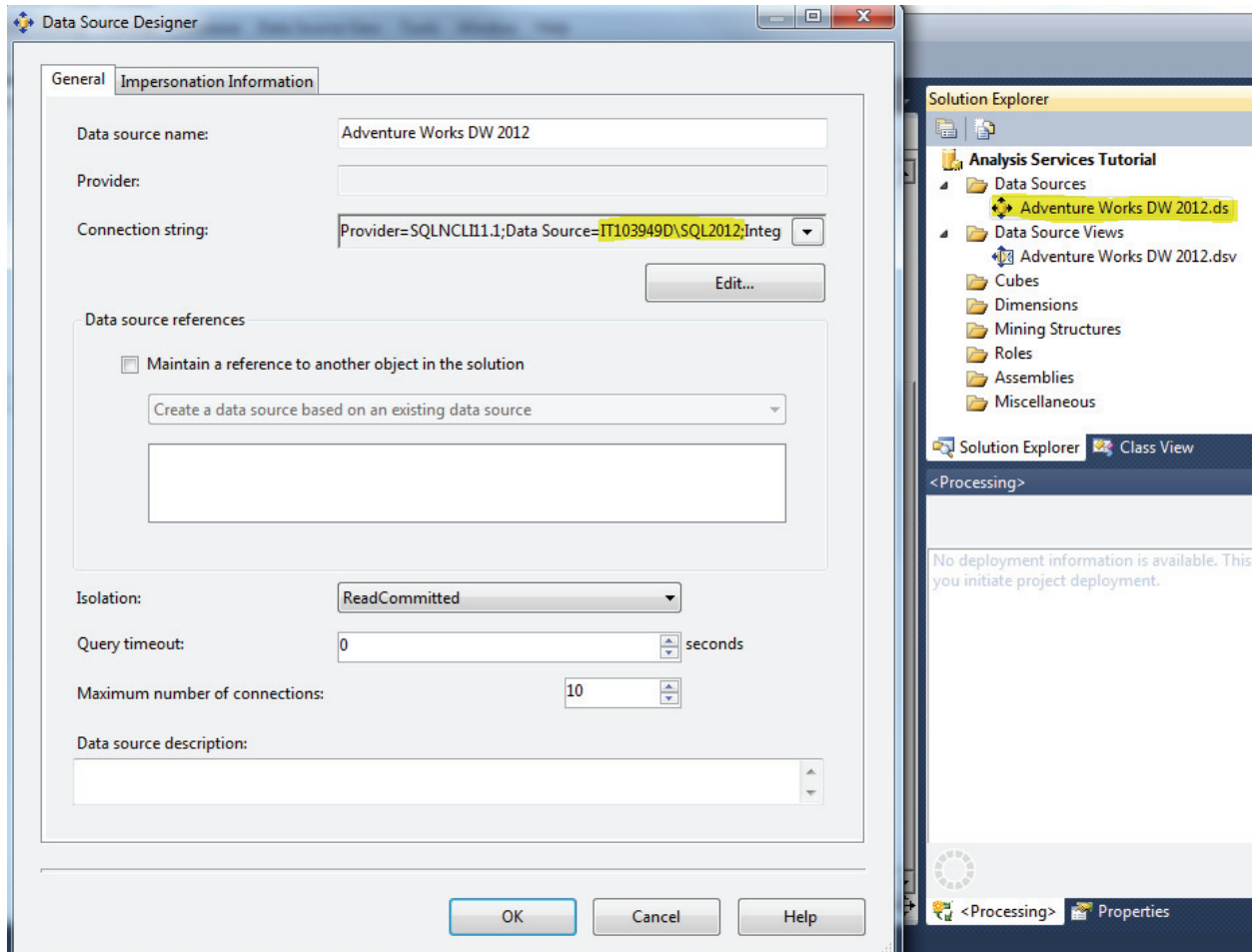
1. Review SQL Server 2012 [Analysis Services Tutorial Scenario](#).

2. Review handout on SQL Server Analysis Services Tutorials (updated with two more screenshots).

3. Complete the following SQL Server 2012 Analysis Services Tutorial Lessons.

(5 points) [Lesson 1: Defining a Data Source View within an Analysis Services Project](#)

Turn in the screenshot that shows the Data Source with the server name on your computer.



(15 points) Lesson 2: Defining and Deploying a Cube

Turn in the screenshot that shows (1) Server name (2) Deployment Completed Successfully (3) Measures (4) Dimensions, and (5) Data Source View.

The screenshot displays the Microsoft Visual Studio interface for the Analysis Services Tutorial. The main window shows the 'Analysis Services Tutorial.cube [Design]' view, which includes a 'Measures' list on the left, a 'Data Source View' diagram in the center, and a 'Dimensions' list on the right. The 'Measures' list includes 'Internet Sales' and 'Order Quantity'. The 'Data Source View' diagram shows a central 'InternetSales' table connected to 'Geography', 'Customer', and 'Product' tables. The 'Dimensions' list includes 'Order Date', 'Calendar Date', 'Attributes', 'Customer', 'Due Date', 'Ship Date', and 'Product'. The 'Solution Explorer' on the right shows the project structure, including 'Data Sources', 'Data Source Views', 'Cubes', 'Dimensions', 'Mining Structures', 'Roles', 'Assemblies', and 'Miscellaneous'. The 'Deployment Progress' window at the bottom right shows the deployment status for the 'Analysis Services Tutorial' cube, indicating that the deployment is completed successfully. The status bar at the bottom of the window also displays 'Deployment Completed Successfully'.

Analysis Services Tutorial - Microsoft Visual Studio

File Edit View Project Build Debug Format Database Data Source View Cube Tools Window Help

Development

Analysis Services Tutorial.cube [Design]

Measures

- Analysis Services Tutorial
- Internet Sales
- Order Quantity
- Unit Price
- Extended Amount
- Unit Price Discount Percentage
- Discount Amount
- Product Standard Cost
- Total Product Cost
- Sales Amount
- Tax Amount
- Freight
- Internet Sales Count

Dimensions

- Analysis Services Tutorial
- Order Date
- Calendar Date
- Attributes
- Customer
- Due Date
- Ship Date
- Product

Data Source View

Geography

- GeographyKey
- City
- StateProvinceCode
- StateProvinceName
- CountryRegionCode
- EnglishCountryRegionName
- SpanishCountryRegionName
- FrenchCountryRegionName
- PostalCode
- SalesTerritoryKey

Customer

- CustomerKey
- GeographyKey
- CustomerAlternateKey
- Title
- FirstName
- MiddleName
- LastName
- NameStyle
- BirthDate
- MaritalStatus

InternetSales

- SalesOrderNumber
- ProductKey
- OrderDateKey
- DueDateKey
- ShipDateKey
- CustomerKey
- PromotionKey
- CurrencyKey
- SalesTerritoryKey

Product

- ProductKey
- ProductAlternateKey
- ProductSubcategoryKey
- WeightUnitMeasureCode
- SizeUnitMeasureCode
- EnglishProductName
- SpanishProductName
- FrenchProductName
- StandardCost
- FinishedGoodsFlag

Solution Explorer

- Analysis Services Tutorial
- Data Sources
- Data Source Views
- Cubes
- Dimensions
- Mining Structures
- Roles
- Assemblies
- Miscellaneous

Deployment Progress - Analysis Services Tutorial

Server: IT103949D\SQL2012

Database: Analysis Services Tutorial

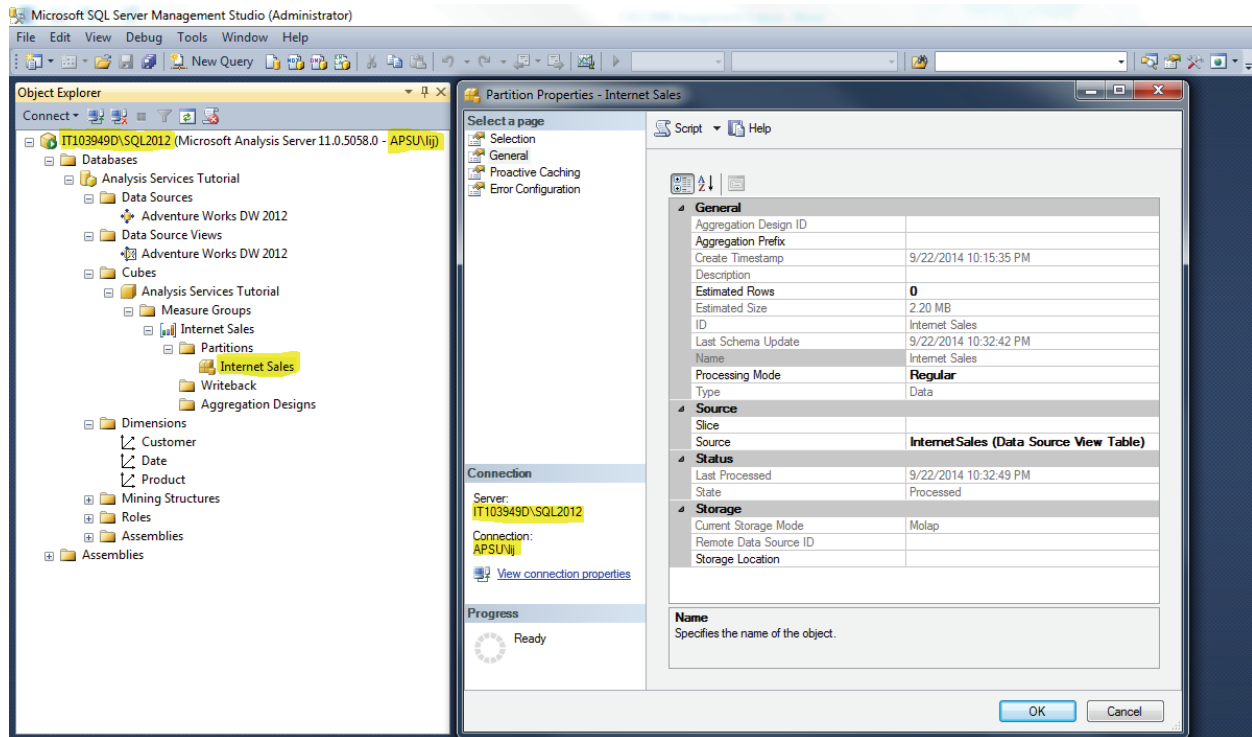
Command

- Processing Database 'Analysis Services Tutorial' completed.
- Processing Cube 'Analysis Services Tutorial' completed.
- Processing Measure Group 'Internet Sales' completed.
- Processing Dimension 'Customer' completed.
- Processing Dimension 'Date' completed.
- Processing Dimension 'Product' completed.

Status:

Deployment Completed Successfully

Turn in the screenshot in SQL Server Management Studio that shows (1) Connection and Server name and (2) The properties of Internet Sales partition.



(20 points) [Lesson 3: Modifying Measures, Attributes and Hierarchies](#)

Turn in the screenshot of your Excel Pivot table that shows Internet sales by region and product line for the month of August, 2007.

The screenshot displays the Microsoft Excel interface with a PivotTable and the PivotTable Fields task pane. The PivotTable is located in the range A1:F11 and shows Internet sales by region and product line for the month of August, 2007. The PivotTable Fields task pane is open on the right side of the screen, showing the following configuration:

- Filters:** Order Date.Calendar Date
- Columns:** Product Model Lines
- Rows:** Customer Geography
- Values:** Sales Amount

The PivotTable data is as follows:

Order Date.Calendar Date	August 2007				
Sales Amount	Column Labels				
Row Labels	Accessory	Mountain	Road	Touring	Grand Total
Australia	\$7,485.37	\$27,342.88	\$117,694.18	\$35,591.30	\$188,113.73
Canada	\$7,934.53	\$29,810.55	\$10,499.12	\$13,257.63	\$61,501.83
France	\$3,984.33	\$41,520.13	\$25,759.59	\$15,700.91	\$86,964.96
Germany	\$3,587.43	\$32,325.77	\$28,862.05	\$28,470.98	\$93,246.23
United Kingdom	\$3,941.10	\$49,562.71	\$60,307.93	\$10,331.05	\$124,142.79
United States	\$14,727.55	\$155,383.83	\$76,510.63	\$46,821.96	\$293,443.97
<b>Grand Total</b>	<b>\$41,660.31</b>	<b>\$335,945.87</b>	<b>\$319,633.50</b>	<b>\$150,173.83</b>	<b>\$847,413.51</b>