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IT3021- Data Warehousing & Business Intelligence

Assignment 2 -Report

IT20237554

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# Step 1: Data source for the assignment 2

I had used the Data Warehouse (SuperStore\_DW) from the assignment 1 which I had created earlier.This Data Warehouse was created using some sales information from year 2011 to 2014 of an online store

That was my data source which had been used in the assignment 2 for create and deploy the cubes.

Graphical user interface, application

Description automatically generated with medium confidenceMy Data Warehouse consists of 5 dimension and 1 fact table as shown below.

* DimCustomer
* DimDate(Common)
* DimProduct
* DimProductCategory
* DimProductSubCategory
* FactOrder

Diagram, schematic

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Description automatically generated

# Step 2: SSAS Cube implementation

Multidimension data cube is as structure where it contains information for analytical processes. The main part of a cube is Dimensions and measures.

* Dimensions: Define the structure of the cube that we used to slice and dice over
* Measures: Provide an aggregated numerical value of interest of the end users.

## Creating Data Source

First, I had Created my Data Source for the cube implementation by connecting the previously (in assignment 1) created Data Warehouse through SQL server management studio.

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### Creating Data Source View

Next, I had created the Data Source Views, here this includes getting the relations and views of our dataset. I had used the above created data source to create the data source view.

Diagram, schematic

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### Graphical user interface, text, application Description automatically generatedCreating the Cube

* Selected the previously created Data Source View. In here I had selected all the Measure group tables. In my case only FactOrder table is consists of measures that required for analytical process.

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* Select all the measures is FactOrder Fact table.

Graphical user interface, application, Word

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* Select all the Dimensions

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* We can view all the selected Measures and Dimension from here completing the cube wizard.

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Implemented Cube

### Creating Hierarchies

We use Hierarchies in SSAS to reduce the complexity between attributes and lead users into the drill down behaviors.

* Graphical user interface, application, email

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Created a Hierarchy for the customer dimension using customer address details.

Region 🡪 Country 🡪 State 🡪 City

* Graphical user interface

  Description automatically generatedHierarchy\_ProductName /Hierarchy\_Product

Created 2 hierarchies for product name and product id

Product Category Name 🡪 Product Sub Category Name 🡪 Product Name

Procut Category SK 🡪 Product Sub Category SK 🡪 Product SK

* Graphical user interface, application

  Description automatically generatedHierarchy\_Date

Year 🡪 Quarter Name 🡪 Month Name 🡪 Date

### Creating KPI’s

In SSAS we can add Key Performance Indicators to our database cube to evaluate the business performance. KPI’s associated with a a measure group, and this will depend on what the organization want to monitor and measure. So, I had created 3 KPI’s based on the business requirement

* Graphical user interface, application

  Description automatically generatedKPI\_Sales
* A screenshot of a computer

  Description automatically generatedKPI\_Quantity
* Graphical user interface, text, application

  Description automatically generatedKPI\_Profit

### Deploying the implemented Cube

After creating roles and providing the necessary permission to access the data of the cube finally we need to deploy the data cube.

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# Step 3: Demonstration of OLAP operations

Both business users and IT teams benefit from a successful OLAP system. This is an important aspect of Business Intelligence since it provides sophisticated data mining and trend analysis capabilities. OLAP allows you to quickly evaluate large volumes of data from several viewpoints.

For the demonstration to connect for the excel workbook and to get data from the semantic layer we can use MDX query, we can build MDX query through SSAS project by browsing data from the tables. But here I had not used this MDX query for that I had used the data tab for connecting my SSAS Cube.

## Connecting to the SSAS cube

### Step 1

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### Step 2

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### Step 3

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Description automatically generated

### Graphical user interface, text, application, email Description automatically generatedStep 4

## Excel Report for OLAP Demonstration

### Roll - up

A picture containing table

Description automatically generatedClimbing up a hierarchy of a dimension to aggregate data means the Roll up OLAP operation in cubes.

Table

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Description automatically generated

Graphical user interface, application

Description automatically generated

* This report Shows the totals Sales amount, Total Order Quantity and Total Profit using the KPI\_Profit value of the customer
* Here we can Roll-up Months to years from this we can easily view the yearly sale amount and the profit for a particular region. (Months 🡪 Years)
* We can also Roll-up City to Region from this we can easily analyze the Total Sales amount and the total profit gain for a particular year according to Region Wise. (City 🡪 Region)
* Date, Customer Hierarchies were used in the above report.

Table

Description automatically generated

Graphical user interface, application

Description automatically generated

* This pivot table Shows us the Total cost per item, and the total quantity using the KPI\_Quantity value from the customer
* Here we can get all the Product Category wise details.
* We can Roll -up Product to Product category easily to make the analysis. (Product 🡪 Product Category)
* ProductName hierarchy were used to create the above report

### Drill - Down

Graphical user interface, application, table, Excel

Description automatically generatedStepping down a hierarchy of a dimension allowing navigation through details means the Drill down OLAP operation in cubes.

* Here for the columns, I had used the Customer hierarchy (Region 🡪 Country 🡪State 🡪City) from that we can view the address details of the customer Region wise, Country wise, State wise and City wise this it the drill-down used for the columns
* For the Rows I had used Date Hierarchy (Year 🡪 Quarter 🡪 Month🡪Date) from that we can view the Annually Sales, quarterly Sales, Monthly Sales, and Daily Sales
* Table

  Description automatically generatedFrom the above pivot table we can view the Profit Reports for annually, monthly, quarterly, and daily, and also Region Wise, Country Wise, State Wise and City Wise

Graphical user interface, table

Description automatically generated

* For the above Pivot table I used the Product Hierarchy where it will be helpful to analyse the most selling products and the total quantity of the sold products, Here we can drill down the products using (Product Category Name 🡪 Product Sub Category Name 🡪 Product Name).

### Slice

In a multidimensional array, a slice is a column of data that corresponds to a single value for one or more-dimension members. It aids the user in seeing and collecting data unique to a dimension.

Graphical user interface

Description automatically generated

* For the above pivot chart and the pivot table reports shows that the Total Sales, Shipping cost and the total cost per item, here I had used a slicer to filter the details from a product category. Here are shows the details for the Furniture Product category. I can use more than one slicer to filter the results.

Graphical user interface, application, table, Excel

Description automatically generated

* The above pivot charts and the table shows the Sales amount for a particular year using the region I had used a slicer here as the region, so that it shows the related details for the region named “AFRICA”.

### Dice

Dicing is similar to slicing; however, it operates in a slightly different way. Filtering is done to focus on a certain property when thinking of slicing. Dicing, on the other hand, is more of a zoom feature that picks a subset of all the dimensions for certain values.

A screenshot of a computer

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* Here in the pivot table and the chart it represents the Total profit for a selected Categories by its Subcategory and the product name. first, I had used the Product Category slicer and selected product categories and next used a product subcategory slicer and last used a product name slicer to get the above details.

Graphical user interface, chart, application

Description automatically generated

* Here the above pivot pie chart represents the Total sales according to its region for that I had used a Region Slicer to get a particular region and next a country slicer to get the countries that in the selected region and finally used the state slicer to select the states of the countries.

### Pivot

#### Graphical user interface Description automatically generatedBefore Pivot

Table

Description automatically generated

#### Chart, timeline Description automatically generatedA screenshot of a computer Description automatically generatedAfter Pivot

# Step 4: SSRS Reports

SQL Server Reporting Service (SSRS) is a reporting tool that lets you create structured reports that include tables, pictures, graphs, and charts. These reports are stored on a server and may be run at any time using user-defined parameters.

A report server's web portal is a web-based experience. You may see reports, mobile reports, KPIs, and browse through the features of your report server instance through the site. You may also manage a single report server instance using the web interface.

Graphical user interface, application

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Graphical user interface

Description automatically generated

To generate these reports, I had used Report Builder app.

## Report Builder app Environment Setting up

### Creating a data source

We connected our Data Warehouse (SuperStore\_DW) to our source data in the report builder.

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Graphical user interface, application

Description automatically generatedGraphical user interface, application

Description automatically generated

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### Creating Datasets

Graphical user interface, application

Description automatically generatedHere we import the necessary data set for our report builder using the query which can also be assigned according to the requirements

Graphical user interface, application

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### Creating a Matrix or a Table

Crate a table or a matrix to represent data where that can be used to generate reports.

Graphical user interface

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Description automatically generated

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## Reports

### Report1 -Report with a matrix : Annual Sales Report

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* Matrix is comparable to a table in SSRS, but it is designed to display data organized by columns and rows, with aggregate data at the intersection. A pivot table in a spreadsheet is similar to this.
* We can view the Annual Sales report of all the products categories which was sold on the specific regions
* Here for the table design I had used an Expression;

=IIf(IsNothing(Sum(Fields!Sales.Value)) =True, 0, Sum(Fields!Sales.Value) )

Where this check the column fields if there is any null values replace those null values into digit 0.

### Report 2: Report with more than one parameter (Multiparameter) : Product Category wise annual sales report

Graphical user interface

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Graphical user interface, application, table, Excel

Description automatically generated

* The above report is based on the Product wise annul sales report, where 2 parameters were passe here

Graphical user interface, application

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Graphical user interface, application

Description automatically generatedProduct Category parameter and Product Subcategory parameter in here you can filter the report by one or multiple product categories and one or multiple product Subcategories.

* For design this table I had used some expressions.
* =IIf(IsNothing(Sum(Fields!OrderQuantity.Value)) =True, 0, Sum(Fields!OrderQuantity.Value) )
* =IIf(IsNothing(Sum(Fields!Sales.Value)) =True, 0, Sum(Fields!Sales.Value) )

Where these 2-expression search if there is any null value in the column and replace that null value with digit 0

### Report 3: SSRS drill-down report: Annual Country Wise TotalCostPerItem report

Graphical user interface, application, table

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Graphical user interface, application, table, Excel

Description automatically generated

* The above reports show us the Annual Country wise totalcostperItem report where we can find out the total cost per item after shipping to a specific country
* The drill down used here is Country 🡪State 🡪City
* Where we can see the total for a country or total for a specific state or a specific city
* For design this table I had used some expression
* =IIf(IsNothing(Sum(Fields!TotalCostPerItem.Value)) =True, 0, Sum(Fields!TotalCostPerItem.Value) )

Where this check the column fields if there is any null values replace those null values into digit 0.

### Report 4 - SSRS drill-through report:RegionWiseCostDetails

**Table

Description automatically generated**

This report shows the Region wise summary report for the cost and sales here if you want to see a detailed report according to the region you can click on a specific region column cell to retrieve an detailed report.

Example: if you click on the Africa Region, you will display an details report as below

**Graphical user interface, application, table, Excel

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Here the button click action will be set for the main report on required text box.

Graphical user interface, application

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Graphical user interface, text, application

Description automatically generatedThen the parameter named Region will be passed to my second sub report (Detailed report).in there it will use that passed parameter to get the required data according to the passed Region.

Graphical user interface, application

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