OLAP Operations

Dr. Shalini Gambhir

Definition

- Online Analytical Processing Server (OLAP) is based on the multidimensional data model.
- It allows managers, and analysts to get an insight of the information through fast, consistent, and interactive access to information.
- OLAP (Online Analytical Processing) is the technology behind many Business Intelligence (BI) applications.
- OLAP is a powerful technology for data discovery, including capabilities for limitless report viewing, complex analytical calculations, and predictive “what if” scenario (budget, forecast) planning.

Types of OLAP Server

- We have four types of OLAP servers:

1. Relational OLAP (ROLAP)
2. Multidimensional OLAP (MOLAP)
3. Hybrid OLAP (HOLAP)
4. Specialized SQL Servers

OLAP Operations

- Since OLAP servers are based on multidimensional view of data, we will discuss OLAP operations in multidimensional data.
- Here is the list of OLAP operations:
  1. Roll-up
  2. Drill-down
  3. Slice and dice
  4. Pivot (rotate)

1. Roll - up

- Roll-up performs aggregation on a data cube in any of the following ways:

1. By climbing up a concept hierarchy for a dimension
2. By dimension reduction
3. Roll-up is performed by climbing up a concept hierarchy for the dimension location.
4. Initially the concept hierarchy was "street < city < province < country".
5. On rolling up, the data is aggregated by ascending the location hierarchy from the level of city to the level of country.
6. The data is grouped into cities rather than countries.
7. When roll-up is performed, one or more dimensions from the data cube are removed.

Diagram

- The following diagram illustrates how roll-up works:

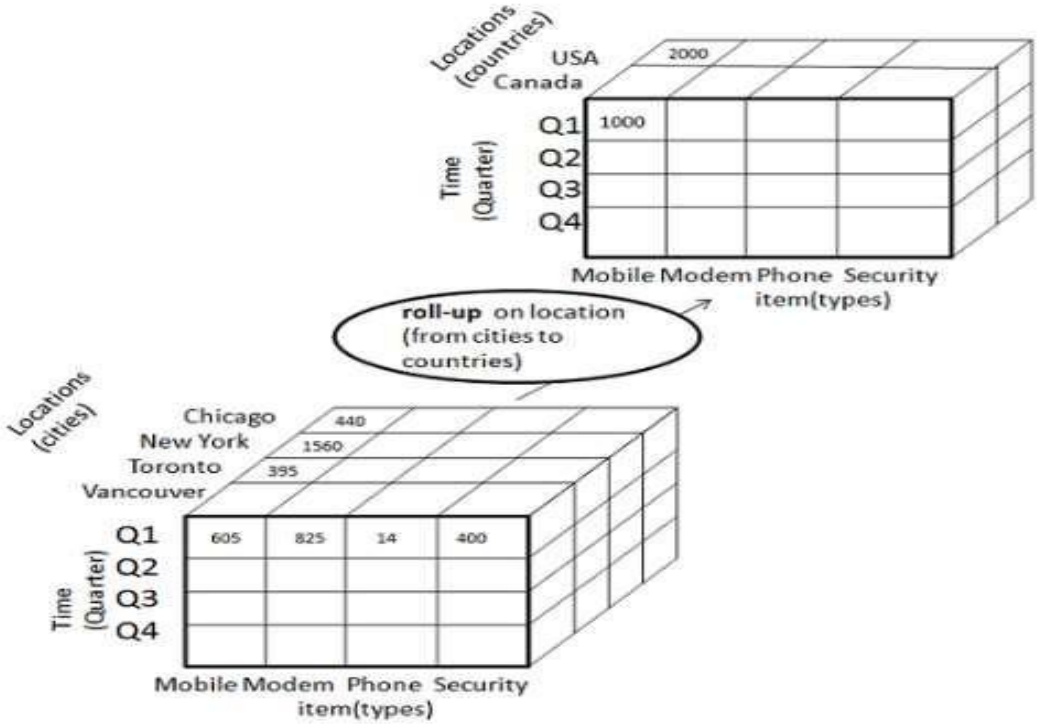

Figure 1: Roll - Up

2. Drill - Down

- Drill-down is the reverse operation of roll-up. It is performed by either of the following ways:

1. By stepping down a concept hierarchy for a dimension
2. By introducing a new dimension.
3. Drill-down is performed by stepping down a concept hierarchy for the dimension time.
4. Initially the concept hierarchy was "day < month < quarter < year."
5. On drilling down, the time dimension is descended from the level of quarter to the level of month.
6. When drill-down is performed, one or more dimensions from the data cube are added.
7. It navigates the data from less detailed data to highly detailed data.

Diagram

- The following diagram illustrates how drill down works:

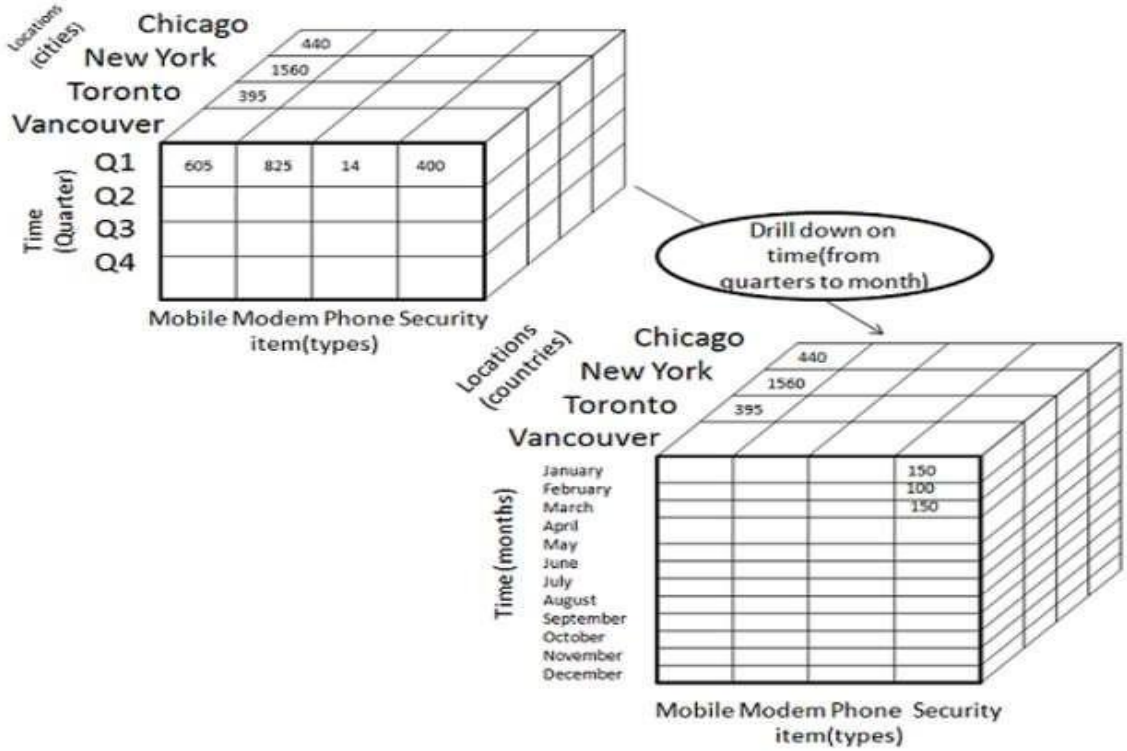

Figure 2: Drill - Down

3. Slice

- The slice operation selects one particular dimension from a given cube and provides a new sub-cube.
- In the following diagram diagram(Figure 3) Slice is performed for the dimension "time" using the criterion time = "Q1".
- It will form a new sub-cube by selecting one or more dimensions.

Diagram

- The following diagram illustrates how Slice works:

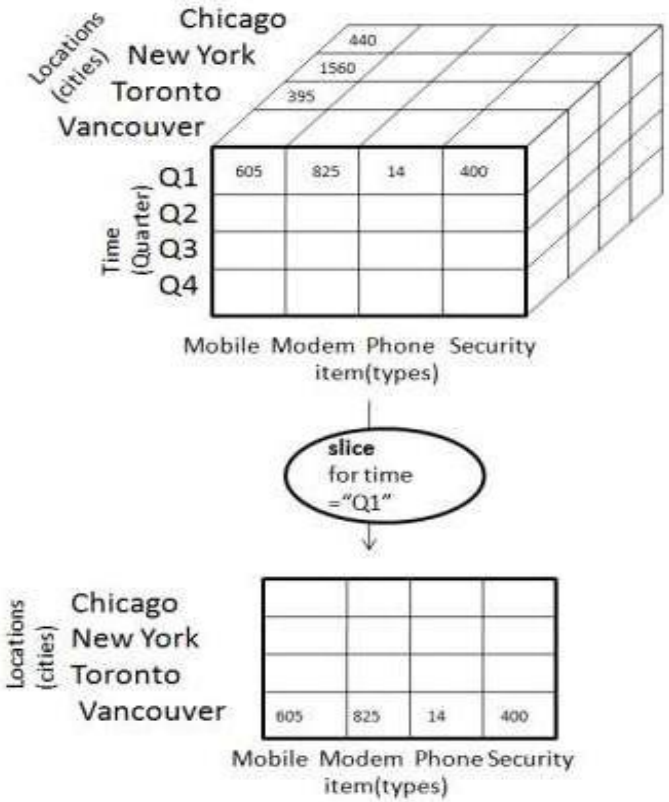

Figure 3. Slice

4. Dice

- Dice selects two or more dimensions from a given cube and provides a new sub-cube.
- This is shown in the following diagram (Figure 4) Dice is shown .
- The dice operation on the cube based on the following selection criteria involves three dimensions.
  1. (location = "Toronto" or "Vancouver")
  2. (time = "Q1" or "Q2")
  3. (item =" Mobile" or "Modem")

Diagram

- The following diagram illustrates how dice works:

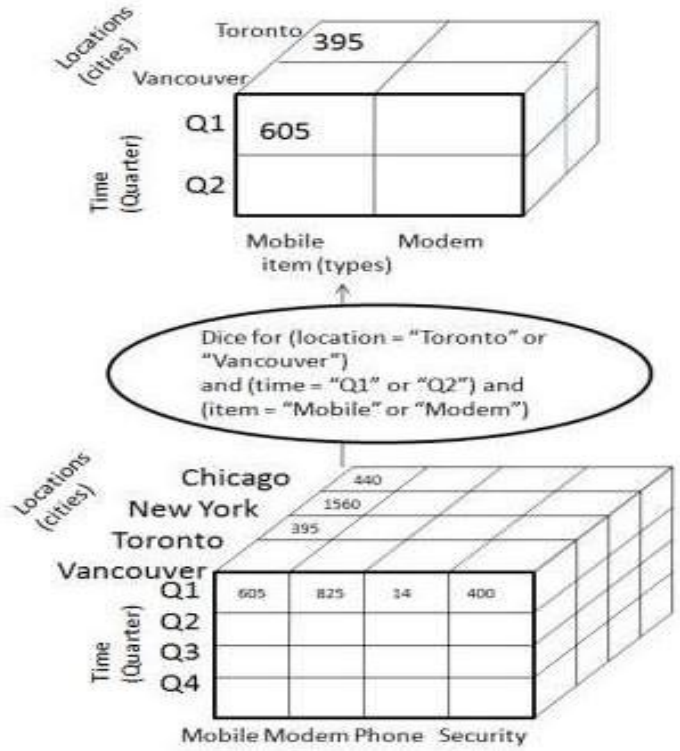

Figure 4 : Dice

5. Pivot

- The pivot operation is also known as rotation(Figure 5). It rotates the data axes in view in order to provide an alternative presentation of data.

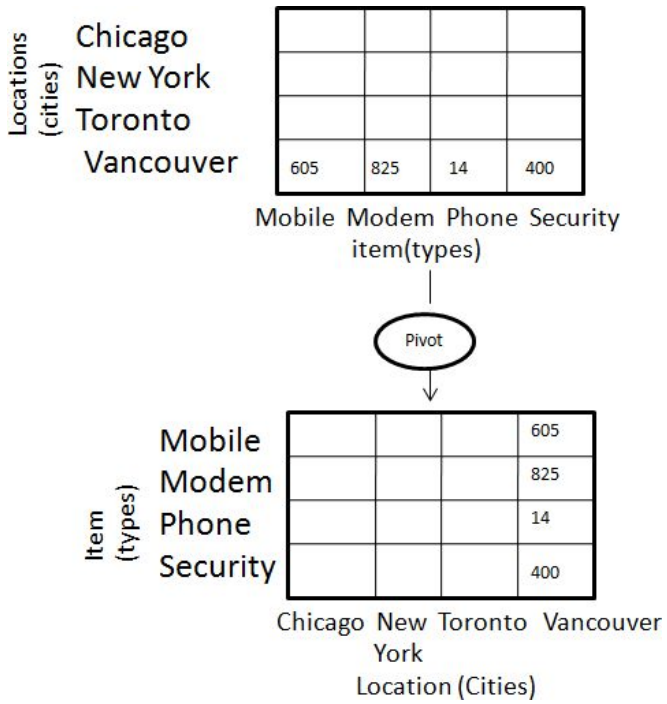

Figure 5: Pivot