OLAP Operations

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. This chapter cover the types of OLAP, operations on OLAP, difference between OLAP, and statistical databases and OLTP.

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 .

- Roll-up
- Drill-down
- Slice and dice
- Pivot (rotate)

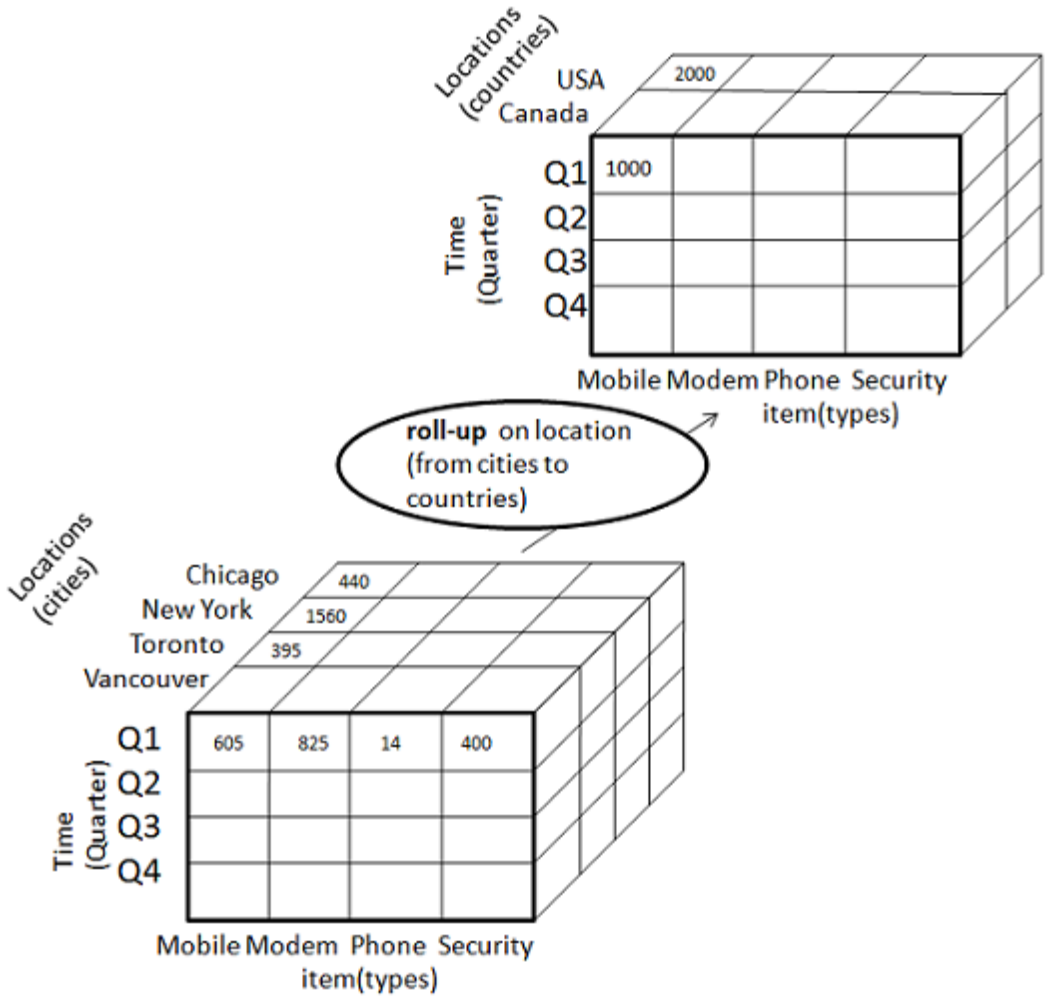
Roll-up

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

- By climbing up a concept hierarchy for a dimension
- By dimension reduction

The following diagram illustrates how roll-up works.

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



Roll up Operation

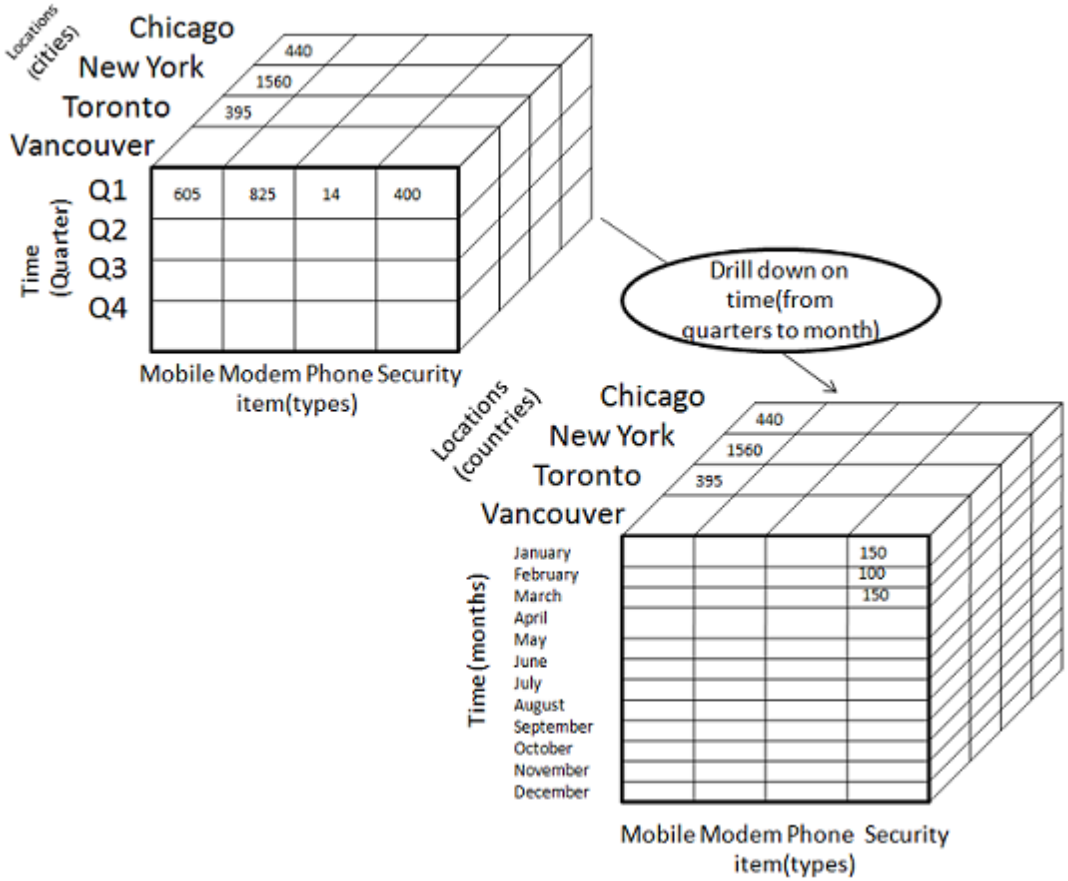
Drill-down

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

- By stepping down a concept hierarchy for a dimension
- By introducing a new dimension.

The following diagram illustrates how drill-down works

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

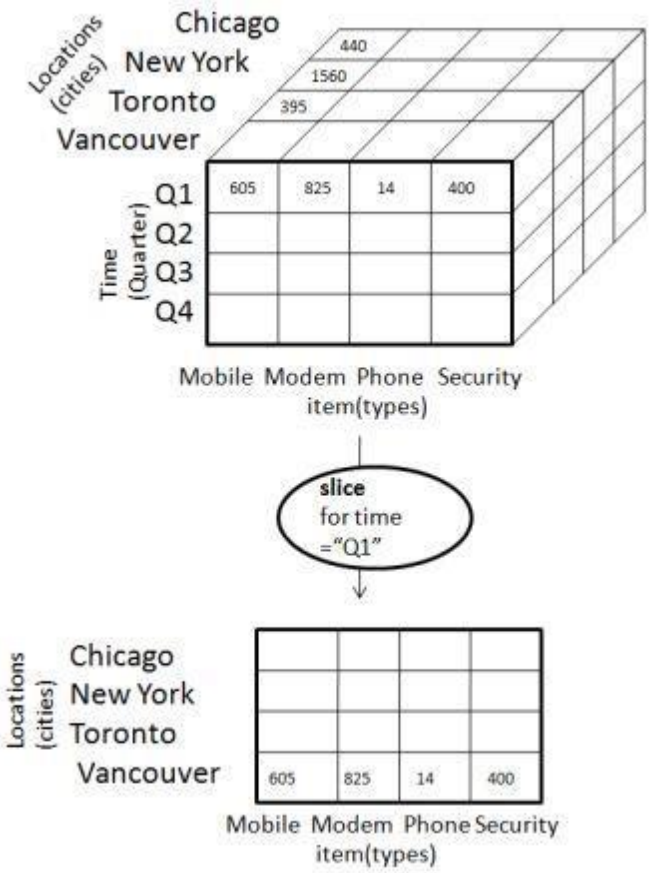


Drill-down Operation

Slice

The slice operation selects one particular dimension from a given cube and provides a new sub-cube. Consider the following diagram that shows how slice works.

- Here 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.

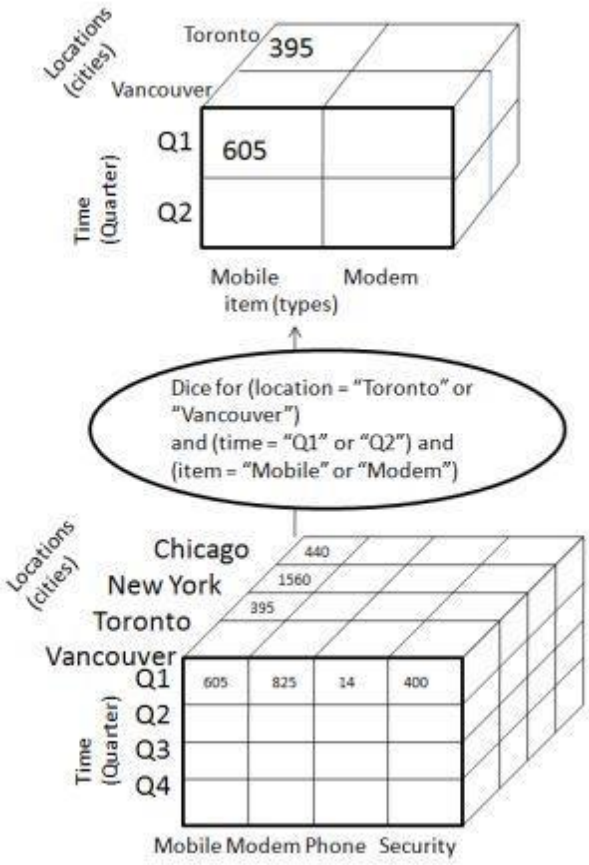


Slice Operation

Dice

Dice selects two or more dimensions from a given cube and provides a new sub-cube. Consider the following diagram that shows the dice operation. The dice operation on the cube based on the following selection criteria involves three dimensions.

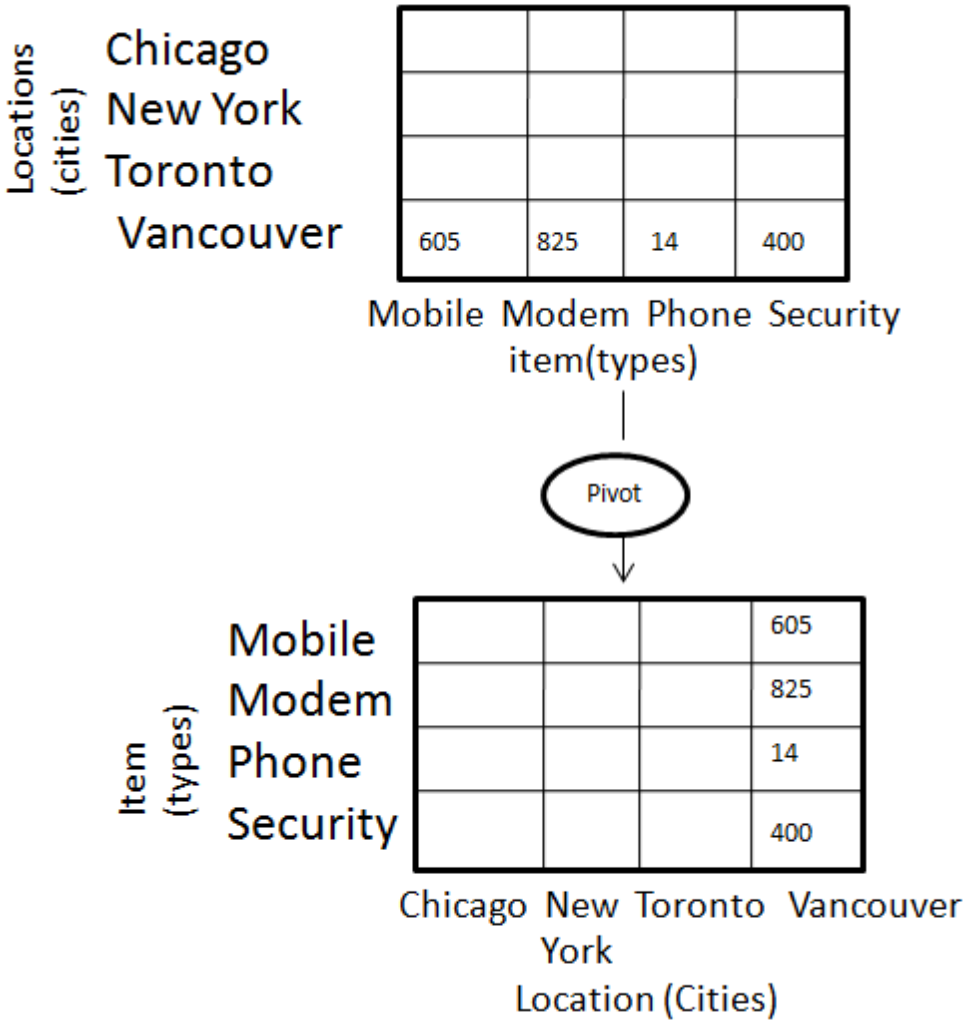
- (location = "Toronto" or "Vancouver")
- (time = "Q1" or "Q2")
- (item =" Mobile" or "Modem")



Dice Operation

Pivot

The pivot operation is also known as rotation. It rotates the data axes in view in order to provide an alternative presentation of data. Consider the following diagram that shows the pivot operation.



Pivot Operation

OLAP versus OLTP

OLAP

- OLAP (On-line Analytical Processing) is represented by a relatively low volume of transactions. Queries are very difficult and involve aggregations.
- For OLAP operations, response time is an effectiveness measure. OLAP applications are generally used by Data Mining techniques.
- In OLAP database there is aggregated, historical information, stored in multi-dimensional schemas (generally star schema).
- **Examples** – Any type of Data warehouse system is an OLAP system. Uses of OLAP are as follows:

❖ Spotify analyzed songs by users to come up with the personalized homepage of their songs and playlist.

❖ Netflix movie recommendation system.

OLTP

- OLTP (On-Line Transaction Processing) is featured by a large number of short on-line transactions (INSERT, UPDATE, and DELETE).
- The primary significance of OLTP operations is put on very rapid query processing, maintaining record integrity in multi-access environments, and effectiveness consistent by the number of transactions per second.
- In the OLTP database, there is an accurate and current record, and schema used to save transactional database is the entity model (usually 3NF).
- **Examples** – Uses of OLTP are as follows:

❖ ATM center is an OLTP application.

❖ OLTP handles the ACID properties during data transaction via the

❖ application.

❖ It's also used for Online banking, Online airline ticket booking, sending a text

❖ message, add a book to the shopping cart.