

What is OLAP (Online Analytical Processing)?

OLAP stands for **On-Line Analytical Processing**. OLAP is a classification of software technology which authorizes analysts, managers, and executives to gain insight into information through fast, consistent, interactive access in a wide variety of possible views of data that has been transformed from raw information to reflect the real dimensionality of the enterprise as understood by the clients.

OLAP implement the multidimensional analysis of business information and support the capability for complex estimations, trend analysis, and sophisticated data modeling. It is rapidly enhancing the essential foundation for Intelligent Solutions containing Business Performance Management, Planning, Budgeting, Forecasting, Financial Documenting, Analysis, Simulation-Models, Knowledge Discovery, and Data Warehouses Reporting. OLAP enables end-clients to perform ad hoc analysis of record in multiple dimensions, providing the insight and understanding they require for better decision making.

Who uses OLAP and Why?

OLAP applications are used by a variety of the functions of an organization.

Finance and accounting:

- Budgeting
- Activity-based costing
- Financial performance analysis
- And financial modeling

Sales and Marketing

- Sales analysis and forecasting
- Market research analysis
- Promotion analysis
- Customer analysis

- Market and customer segmentation

Production

- Production planning
- Defect analysis

OLAP cubes have two main purposes. The first is to provide business users with a data model more intuitive to them than a tabular model. This model is called a Dimensional Model.

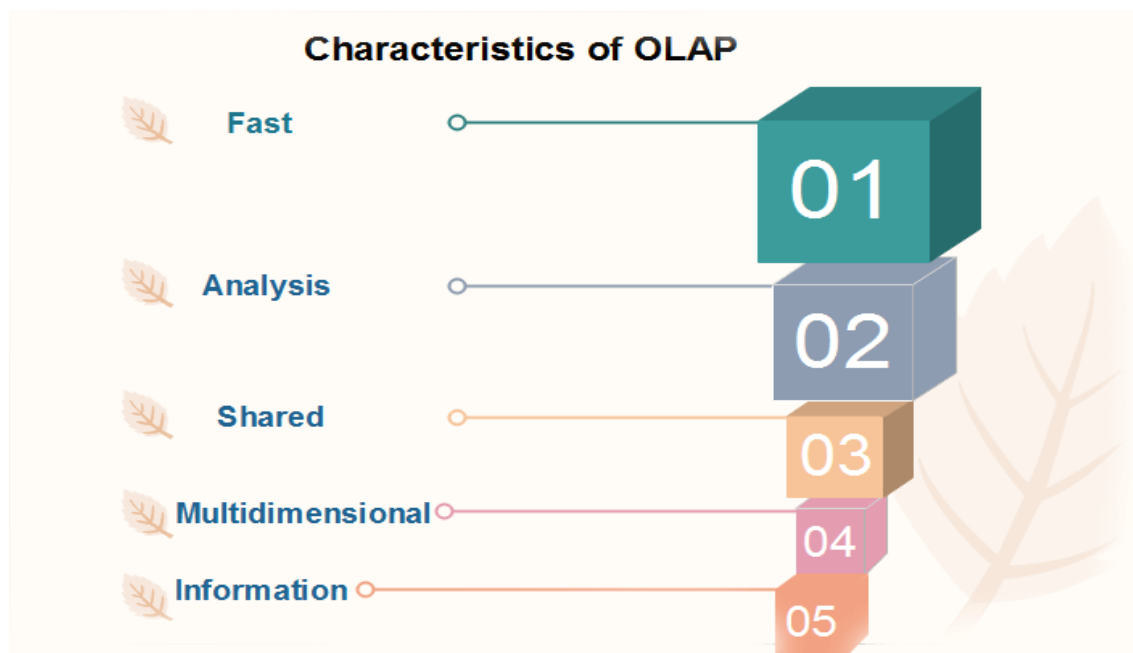
The second purpose is to enable fast query response that is usually difficult to achieve using tabular models.

How OLAP Works?

Fundamentally, OLAP has a very simple concept. It pre-calculates most of the queries that are typically very hard to execute over tabular databases, namely aggregation, joining, and grouping. These queries are calculated during a process that is usually called 'building' or 'processing' of the OLAP cube. This process happens overnight, and by the time end users get to work - data will have been updated.

Characteristics of OLAP

In the **FASMI characteristics of OLAP methods**, the term derived from the first letters of the characteristics are:



Fast

It defines which the system targeted to deliver the most feedback to the client within about five seconds, with the elementary analysis taking no more than one second and very few taking more than 20 seconds.

Analysis

It defines which the method can cope with any business logic and statistical analysis that is relevant for the function and the user, keep it easy enough for the target client. Although some preprogramming may be needed we do not think it acceptable if all application definitions have to be allow the user to define new Adhoc calculations as part of the analysis and to document on the data in any desired method, without having to program so we excludes products (like Oracle Discoverer) that do not allow the user to define new Adhoc calculation as part of the analysis and to document on the data in any desired product that do not allow adequate end user-oriented calculation flexibility.

Share

It defines which the system tools all the security requirements for understanding and, if multiple write connection is needed, concurrent update location at an appropriated level, not all functions need customer to write data back, but for the increasing number which does, the system should be able to manage multiple updates in a timely, secure manner.

Multidimensional

This is the basic requirement. OLAP system must provide a multidimensional conceptual view of the data, including full support for hierarchies, as this is certainly the most logical method to analyze business and organizations.

Information

The system should be able to hold all the data needed by the applications. Data sparsity should be handled in an efficient manner.

The main characteristics of OLAP are as follows:

1. **Multidimensional conceptual view:** OLAP systems let business users have a dimensional and logical view of the data in the data warehouse. It helps in carrying slice and dice operations.

2.**Multi-User Support:** Since the OLAP techniques are shared, the OLAP operation should provide normal database operations, containing retrieval, update, adequacy control, integrity, and security.

3.**Accessibility:** OLAP acts as a mediator between data warehouses and front-end. The OLAP operations should be sitting between data sources (e.g., data warehouses) and an OLAP front-end.

4.**Storing OLAP results:** OLAP results are kept separate from data sources.

5.**Uniform documenting performance:** Increasing the number of dimensions or database size should not significantly degrade the reporting performance of the OLAP system.

6.OLAP provides for distinguishing between zero values and missing values so that aggregates are computed correctly.

7.OLAP system should ignore all missing values and compute correct aggregate values.

8.OLAP facilitate interactive query and complex analysis for the users.

9.OLAP allows users to drill down for greater details or roll up for aggregations of metrics along a single business dimension or across multiple dimension.

10.OLAP provides the ability to perform intricate calculations and comparisons.

11.OLAP presents results in a number of meaningful ways, including charts and graphs.

Benefits of OLAP

OLAP holds several benefits for businesses: -

1.OLAP helps managers in decision-making through the multidimensional record views that it is efficient in providing, thus increasing their productivity.

2.OLAP functions are self-sufficient owing to the inherent flexibility support to the organized databases.

3.It facilitates simulation of business models and problems, through extensive management of analysis-capabilities.

4. In conjunction with data warehouse, OLAP can be used to support a reduction in the application backlog, faster data retrieval, and reduction in query drag

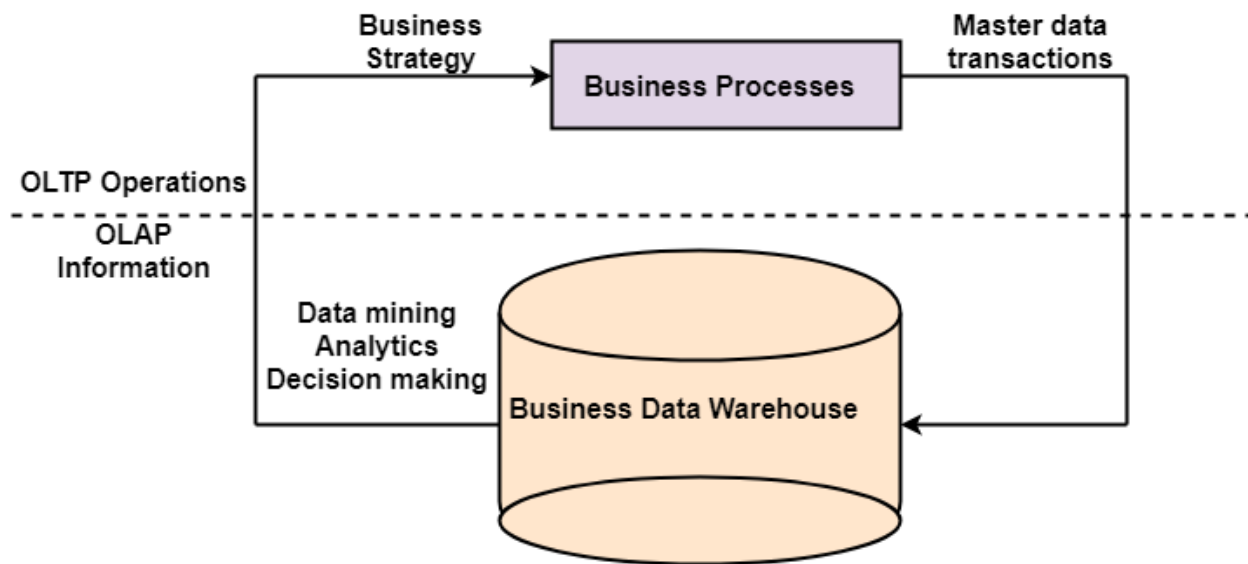
Steps in the OLAP Creation Process



Difference between OLTP and OLAP

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).

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).



Following are the difference between OLAP and OLTP system.

1) Users: **OLTP** systems are designed for office worker while the OLAP systems are designed for decision-makers. Therefore while an OLTP method may be accessed by hundreds or even thousands of clients in a huge enterprise, an OLAP system is suitable to be accessed only by a select class of manager and may be used only by dozens of users.

2) Functions: **OLTP** systems are mission-critical. They provide day-to-day operations of an enterprise and are largely performance and availability driven. These operations carry out simple repetitive operations. **OLAP** systems are management-critical to support the decision of enterprise support tasks using detailed investigation.

3) Nature: Although **SQL** queries return a set of data, OLTP methods are designed to step one record at the time, for example, a data related to the user who may be on the phone or in the store. OLAP system is not designed to deal with individual customer records. Instead, they include queries that deal with many data at a time and provide summary or aggregate information to a manager. OLAP applications include data stored in a data warehouses that have been extracted from many tables and possibly from more than one enterprise database.

4) Design: **OLTP** database operations are designed to be application-oriented while **OLAP** operations are designed to be subject-oriented. OLTP systems view the enterprise record as a collection of tables (possibly based on an entity-relationship model). **OLAP** operations view enterprise information as multidimensional).

5) Data: OLTP systems usually deal only with the current status of data. For example, a record about an employee who left three years ago may not be feasible on the Human Resources System. The old data may have been achieved on some type of stable storage media and may

not be accessible online. On the other hand, OLAP systems needed historical data over several years since trends are often essential in decision making.

6) Kind of use: OLTP methods are used for reading and writing operations while OLAP methods usually do not update the data.

7) View: An **OLTP** system focuses primarily on the current data within an enterprise or department, which does not refer to historical data or data in various organizations. In contrast, an **OLAP** system spans multiple version of a database schema, due to the evolutionary process of an organization. OLAP system also deals with information that originates from different organizations, integrating information from many data stores. Because of their huge volume, these are stored on multiple storage media.

8) Access Patterns: The access pattern of an OLTP system consist primarily of short, atomic transactions. Such a system needed concurrency control and recovery techniques. However, access to OLAP systems is mostly read-only operations because these data warehouses store historical information.