What is Business Intelligence and Analytics?

Business intelligence (BI) and analytics refers to the collective infrastructure, tools, applications, and other resources that generate data and insights, which in turn inform how businesses make decisions, uncover revenue opportunities, and evaluate performance. The core benefits of BI and analytics are speed and agility, allowing businesses to process multiple data streams faster through an intuitive dashboard. The resulting information can be used for identifying trends and opportunities and monitoring performance in real time. By providing stakeholders and users with these detailed insights and forecasts, BI and analytics enable more informed business decisions. BI and analytics also create transparency and visibility across networks within and outside an organization, meaning data isn't limited to one department or location. And all departments and offices can access the same information at once.

How information hierarchy can be improved/introduced, understanding Business Analytics?

Every business owner or entrepreneur wants their business to grow and scale. Gartner says “Today, 90% of professional analytics and business gurus say that data-driven decisions are an integral key to their organisation’s growth. Taking the right decisions and developing efficient processes, using business analytics and data would transform your business from gold to diamond. When it comes to improving business processes and decisions, hierarchy management is a game-changer concept. It’s the hidden secret for every MNC's success in the long run.

Hierarchy management is one of such fabulous concepts with a long list of advantages.

1. Visualise Data at Multiple Levels And Organisation:- One of the best parts about adopting hierarchy management is getting an advantage to visualise data at multiple levels of your company. Visualisation of data means gathering the right data for making efficient business decisions and processes. A CRM with a hierarchy management facility is 10x profitable and advantageous for your business, compared to a CRM without it.
2. Control And Monitor Data Sharing Between Teams: -Another great part about having hierarchy management is getting complete control over the data sharing among teams. With hierarchy management features in your CRM, you can check the shared data or reports in real-time. When managers have control over the data sharing process, they can define what data and information has to be shared and what not. In other words, managers can provide the teams with data precise to their tasks, at each step of the work process. When the right data is provided at the right step, the chances of misinterpretation or confusion about 'what needs to be done' is minimal. Besides this, Hierarchy management features give you clarity about what’s actually happening inside your firm.
3. Scale Business With Proper Team Management: - For better sales and revenue, managing the employees the right way, is an integral task. However, for managers, managing multiple teams of various departments isn’t an easy job. That’s when the hierarchy management in your CRM gets into play. The feature allows you to manage multiple teams from various branches and departments, using just one single dashboard. In other words, this facility enhances your CRMs capabilities to manage multiple teams. Managers can assign daily objectives and tasks to each team and monitor their process, all through one CRM. When you have a hierarchy management feature installed in your CRM, you get an amazing advantage known as - “Performance check of employees”. Since every employee is integrated into one system, their progress is automatically recorded by the CRM. The administration can use hierarchy management to govern the performance of departments and teams throughout various branches. With proper records of [progress reports](https://visme.co/blog/progress-report-template/), it’s easy to work towards enhancing employee efficiency - because you are aware of their lacking areas and pain points. All this is possible because of the presence of the hierarchy management feature.
4. Define Privileges And Roles For Each User: - The hierarchy management feature allows managers and administrations to define dedicated roles and privileges for each employee. When every employee is aware of their duties and responsibilities, their efforts will be centred on achieving those goals only. In other words, the hierarchy management feature reduces the amount of employee efforts spent on reading or learning about duties and roles that weren’t meant for them.
5. Enable Separate Dashboard For Different Departments And Teams:- Every department manager has their dedicated and separate dashboards, where they have to work. With a separate dashboard, user convenience increases as the managers will not encounter information or tasks of other departments, reducing the risk of misinterpretations and wrongful assignment of tasks to their team.

Different types of Hierarchical Models are: -

**Functional Model**

A functional model of hierarchy starts with positions of highest level authorities and goes down to others with fewer responsibilities. In this model, the employees are organised based on their specific skill sets and corresponding role in the firm. Each department is managed differently.

**Horizontal Model**

This model is perfect for businesses with few levels between staff employees and top management. Once your firm is scaled to an extensive level, you can opt for wide models to accommodate an increased number of employees. This model fosters open communication and gives more responsibilities to employees.

**Divisional Model**

In the model, the powers are divided among divisions and departments of a company, and the managers of whom will assign the employees with their respective roles. All the chain is directly under the control of top management, as they overlook and present timely updates.

**Dual Reporting Models**

In this model, the administration delegates the powers and duties to mid-level hierarchy, i.e managers. The difference here is, one employee can get action from multiple managers.

## What is online analytical processing?

Online analytical processing (OLAP) is software technology you can use to analyze business data from different points of view. Organizations collect and store data from multiple data sources, such as websites, applications, smart meters, and internal systems. OLAP combines and groups this data into categories to provide actionable insights for strategic planning. For example, a retailer stores data about all the products it sells, such as color, size, cost, and location. The retailer also collects customer purchase data, such as the name of the items ordered and total sales value, in a different system. OLAP combines the datasets to answer questions such as which color products are more popular or how product placement impacts sales.

Importance of OLAP

### **Faster decision making**

Businesses use OLAP to make quick and accurate decisions to remain competitive in a fast-paced economy. Performing analytical queries on multiple relational databases is time consuming because the computer system searches through multiple data tables. On the other hand, OLAP systems precalculate and integrate data so business analysts can generate reports faster when needed.

### **Non-technical user support**

OLAP systems make complex data analysis easier for non-technical business users. Business users can create complex analytical calculations and generate reports instead of learning how to operate databases.

### **Integrated data view**

OLAP provides a unified platform for marketing, finance, production, and other business units. Managers and decision makers can see the bigger picture and effectively solve problems. They can perform what-if analysis, which shows the impact of decisions taken by one department on other areas of the business.

What is OLTP?

**On-Line Transaction Processing (OLTP) System** refers to the system that manage transaction oriented applications. These systems are designed to support on-line transaction and process query quickly on the Internet.  
**For example:** POS (point of sale) system of any supermarket is a OLTP System.

Every industry in today’s world use OLTP system to record their transactional data. The main concern of OLTP systems is to enter, store and retrieve the data. They covers all day to day operations such as purchasing, manufacturing, payroll, accounting, etc.of an organization. Such systems have large numbers of user which conduct short transaction. It supports simple database query so the response time of any user action is very fast.

The data acquired through an OLTP system is stored in commercial RDBMS, which can be used by an OLAP System for data analytics and other business intelligence operations.

Some other examples of OLTP systems include order entry, retail sales, and financial transaction systems.

**Advantages of an OLTP System:**

* OLTP Systems are user friendly and can be used by anyone having basic understanding
* It allows its user to perform operations like read, write and delete data quickly.
* It responds to its user actions immediately as it can process query very quickly.
* This systems are original source of the data.
* It helps to administrate and run fundamental business tasks
* It helps in widening customer base of an organization by simplifying individual processes

**Challenges of an OLTP system:**

* It allows multiple users to access and change the same data at the same time. So it requires concurrency control and recovery mechanism to avoid any unprecedented situations
* The data acquired through OLTP systems are not suitable for decision making. OLAP systems are used for the decision making or “what if” analysis.

**Type of queries that an OLTP system can Process:**  
An OLTP system is an online database modifying system. So it supports database query like INSERT, UPDATE and DELETE information from the database. Consider a POS system of a supermarket, Below are the sample queries that it can process –

* Retrieve the complete description of a particular product
* Filter all products related to any particular supplier
* Search for the record of any particular customer.
* List all products having price less than Rs 1000.

**Type of queries that an OLTP system can not Process:**  
An OLTP system supports simple database query like INSERT, UPDATE and DELETE only. It does not support complex query. Reconsider the POS system of the supermarket, Below are the sample queries that it can not process –

* How much discount should they offer on a particular product?
* Which product should be introduced to its customer ?

OLAP stands for Online Analytical Processing. OLAP systems have the capability to analyze database information of multiple systems at the current time. The primary goal of OLAP Service is data analysis and not data processing.

OLTP stands for Online Transaction Processing. OLTP has the work to administer day-to-day transactions in any organization. The main goal of OLTP is data processing not data analysis.

## Online Analytical Processing (OLAP)

Online Analytical Processing (OLAP) consists of a type of software tool that is used for data analysis for business decisions. OLAP provides an environment to get insights from the database retrieved from multiple database systems at one time.

### OLAP Examples

Any type of Data Warehouse System is an OLAP system. The uses of the OLAP System are described below.

* Spotify analyzed songs by users to come up with a personalized homepage of their songs and playlist.
* Netflix movie recommendation system.

### Benefits of OLAP Services

* OLAP services help in keeping consistency and calculation.
* We can store planning, analysis, and budgeting for business analytics within one platform.
* OLAP services help in handling large volumes of data, which helps in enterprise-level business applications.
* OLAP services help in applying security restrictions for data protection.
* OLAP services provide a multidimensional view of data, which helps in applying operations on data in various ways.

### Drawbacks of OLAP Services

* OLAP Services requires professionals to handle the data because of its complex modeling procedure.
* OLAP services are expensive to implement and maintain in cases when datasets are large.
* We can perform an analysis of data only after extraction and transformation of data in the case of OLAP which delays the system.
* OLAP services are not efficient for decision-making, as it is updated on a periodic basis.

## Online Transaction Processing (OLTP)

[Online transaction processing](https://www.geeksforgeeks.org/on-line-transaction-processing-oltp-system-in-dbms/) provides transaction-oriented applications in a [3-tier architecture](https://www.geeksforgeeks.org/introduction-of-3-tier-architecture-in-dbms-set-2/). OLTP administers the day-to-day transactions of an organization.

### OLTP Examples

An example considered for OLTP System is ATM Center a person who authenticates first will receive the amount first and the condition is that the amount to be withdrawn must be present in the ATM. The uses of the OLTP System are described below.

* ATM center is an OLTP application.
* OLTP handles the ACID properties during data transactions 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.

### Benefits of OLTP Services

* OLTP services allow users to read, write and delete data operations quickly.
* OLTP services help in increasing users and transactions which helps in real-time access to data.
* OLTP services help to provide better security by applying multiple security features.
* OLTP services help in making better decision making by providing accurate data or current data.
* OLTP Services provide Data Integrity, Consistency, and High Availability to the data.

### Drawbacks of OLTP Services

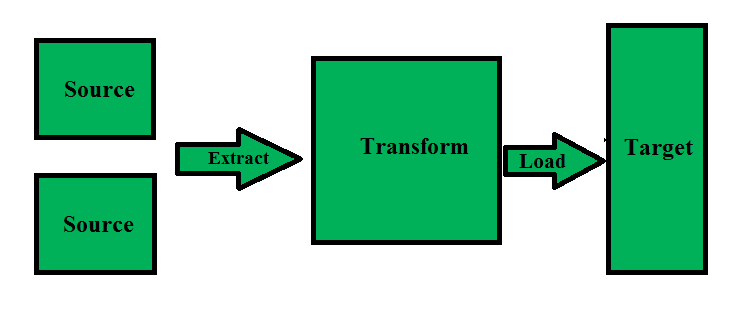
* OLTP has limited analysis capability as they are not capable of intending complex analysis or reporting.
* OLTP has high maintenance costs because of frequent maintenance, backups, and recovery.
* OLTP Services get hampered in the case whenever there is a hardware failure which leads to the failure of online transactions.
* OLTP Services many times experience issues such as duplicate or inconsistent data.

Difference betyween OLAP and OLTP?

| **Category** | **OLAP (Online Analytical Processing)** | **OLTP (Online Transaction Processing)** |
| --- | --- | --- |
| Definition | It is well-known as an online database query management system. | It is well-known as an online database modifying system. |
| Data source | Consists of historical data from various Databases. | Consists of only operational current data. |
| Method used | It makes use of a data warehouse. | It makes use of a standard [database management system (DBMS).](https://www.geeksforgeeks.org/introduction-of-dbms-database-management-system-set-1/) |
| Application | It is subject-oriented. Used for [Data Mining](https://www.geeksforgeeks.org/data-mining/), Analytics, Decisions making, etc. | It is application-oriented. Used for business tasks. |
| Normalized | In an OLAP database, tables are not normalized. | In an OLTP database, tables are [normalized (3NF)](https://www.geeksforgeeks.org/third-normal-form-3nf/). |
| Usage of data | The data is used in planning, problem-solving, and decision-making. | The data is used to perform day-to-day fundamental operations. |
| Volume of data | A large amount of data is stored typically in TB, PB | The size of the data is relatively small as the historical data is archived in MB, and GB. |
| Queries | Relatively slow as the amount of data involved is large. Queries may take hours. | Very Fast as the queries operate on 5% of the data. |
| Update | The OLAP database is not often updated. As a result, data integrity is unaffected. | The data integrity constraint must be maintained in an OLTP database. |

What Data Mining and Data Warehousing?

### Data Warehousing:

It is a technology that aggregates structured data from one or more sources so that it can be compared and analyzed rather than transaction processing. A **data warehouse** is designed to support the management decision-making process by providing a platform for data cleaning, data integration, and data consolidation. A data warehouse contains subject-oriented, integrated, time-variant, and non-volatile data. The Data warehouse consolidates data from many sources while ensuring data quality, consistency, and accuracy. [Data warehouse](https://www.geeksforgeeks.org/data-warehousing/) improves system performance by separating analytics processing from transnational databases. Data flows into a data warehouse from the various databases. A data warehouse works by organizing data into a schema that describes the layout and type of data. Query tools analyze the data tables using schema.

### Advantages of Data Warehousing:

* The data warehouse’s job is to make any form of corporate data easier to understand. The majority of the user’s job will consist of inputting raw data.
* The capacity to update continuously and frequently is the key benefit of this technology. As a result, data warehouses are perfect for organizations and entrepreneurs who want to stay current with their target audience and customers.
* It makes data more accessible to businesses and organizations.
* A data warehouse holds a large volume of historical data that users can use to evaluate different periods and trends in order to create predictions for the future.

### Disadvantages of Data Warehousing:

* There is a great risk of accumulating irrelevant and useless data. Data loss and erasure are other potential issues.
* Data is gathered from various sources in a data warehouse. Cleansing and transformation of the data are required. This could be a difficult task.

### https://media.geeksforgeeks.org/wp-content/cdn-uploads/d-2-1.pngData Mining:

It is the process of finding patterns and correlations within large data sets to identify relationships between data. Data mining tools allow a business organization to predict customer behavior.[Data mining](https://www.geeksforgeeks.org/data-mining/) tools are used to build risk models and detect fraud. Data mining is used in market analysis and management, fraud detection, corporate analysis, and risk management.

### Advantages of Data Mining:

* Data mining aids in a variety of data analysis and sorting procedures. The identification and detection of any undesired fault in a system is one of the best implementations here. This method permits any dangers to be eliminated sooner.
* In comparison to other statistical data applications, data mining methods are both cost-effective and efficient.
* Companies can take advantage of this analytical tool by providing appropriate and easily accessible knowledge-based data.
* The detection and identification of undesirable faults that occur in the system are one of the most astonishing data mining techniques.

### Disadvantages of Data Mining:

* Data mining isn’t always 100 percent accurate, and if done incorrectly, it can lead to data breaches.
* Organizations must devote a significant amount of resources to training and implementation. Furthermore, the algorithms used in the creation of data mining tools cause them to work in different ways.

Difference between Data Mining and Data Wareousing.

| **S. No.** | **Basis of Comparison** | **Data Warehousing** | **Data Mining** |
| --- | --- | --- | --- |
| **1.** | **Definition** | A data warehouse is a database system that is designed for analytical analysis instead of transactional work. | Data mining is the process of analyzing data patterns. |
| **2.** | **Process** | Data is stored periodically. | Data is analyzed regularly. |
| **3.** | **Purpose** | Data warehousing is the process of extracting and storing data to allow easier reporting. | Data mining is the use of pattern recognition logic to identify patterns. |
| **4.** | **Managing Authorities** | Data warehousing is solely carried out by engineers. | Data mining is carried out by business users with the help of engineers. |
| **5.** | **Data Handling** | Data warehousing is the process of pooling all relevant data together. | Data mining is considered as a process of extracting data from large data sets. |
| **6.** | **Functionality** | Subject-oriented, integrated, time-varying and non-volatile constitute data warehouses. | AI, statistics, databases, and [machine learning](https://www.geeksforgeeks.org/machine-learning/) systems are all used in data mining technologies. |