# Business Intelligence and Its Technical Architecture

Business intelligence (BI) is a term used to describe a comprehensive, cohesive, and integrated set of tools and processes used to capture, collect, integrate, store, and analyse data with the purpose of generating and presenting information used to support business decision making.

BI involves the following general steps:

• Collecting and storing operational data.

• Aggregating the operational data into decision support data.

• Analysing decision support data to generate information.

• Presenting such information to the end user to support business decisions.

• Making business decisions, which in turn generate more data that is collected, stored, etc. (restarting the process).

• Monitoring results to evaluate outcomes of the business decisions (providing more data to be collected, stored, etc.).

Business Intelligence Architecture BI covers a wide range of technologies and applications to manage the entire data life cycle from acquisition to storage, transformation, integration, analysis, monitoring, presentation, and archiving.

 The BI architecture is composed of data, people, processes, technology, and the management of such components. The following figure depicts how all those components fit together within the BI framework.
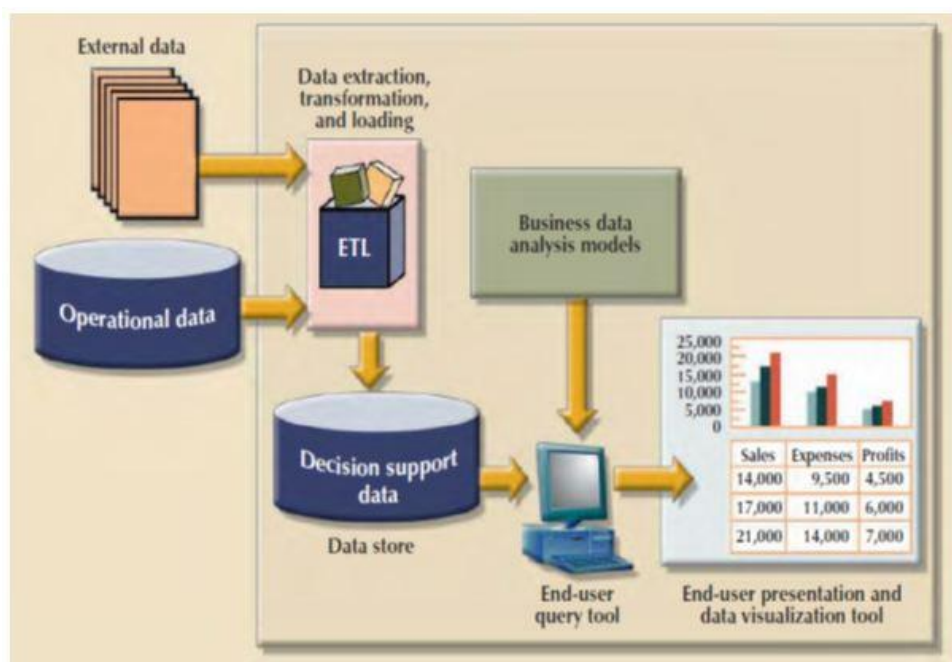
ETL tools:

Data extraction, transformation, and loading (ETL) tools collect, filter, integrate, and aggregate operational data to be saved into a data store optimized for decision support.

This component extracts the data, filters the extracted data to select the relevant records, and packages the data in the right format to be added to the data store component.

Data store: The data store is optimized for decision support and is represented by a data warehouse (data mart) The data store contains two main types of data: business data and business model data.

The business data are extracted from the operational database and from external data sources. The business data is stored in structures that are optimized for data analysis and query speed. The external data sources provide data that cannot be found within the company but that are relevant to the business, such as stock prices, market indicators, marketing information (demographics), and competitors' data.

Data query and analysis tools:

This component performs data retrieval, data analysis, and data-mining tasks using the data in the data store. This component is used by the data analyst to create the queries that access the database.

Depending on the implementation, the query tool accesses either the operational database, or more commonly, the data store. This tool advises the user on which data to select and how to build a reliable business data model. This component is generally represented in the form of an OLAP tool.

**Data presentation and visualization tools**:

This component is in charge of presenting the data to the end user in a variety of ways. This component is used by the data analyst to organize and present the data. This tool helps the end user select the most appropriate presentation format, such as summary report, map, pie or bar graph, or mixed graphs. The query tool and the presentation tool are the front end to the BI environment.

Decision Support Data:

Although BI is used at strategic and tactical managerial levels within organizations, its effectiveness depends on the quality of data gathered at the operational level.

The Kimball technical system architecture separates the data and processes comprising the DW/BI system into the backroom extract, transformation and load (ETL) environment and the front room presentation area, as illustrated in the following diagram.

Figure 1: Kimball technical system architecture diagram.
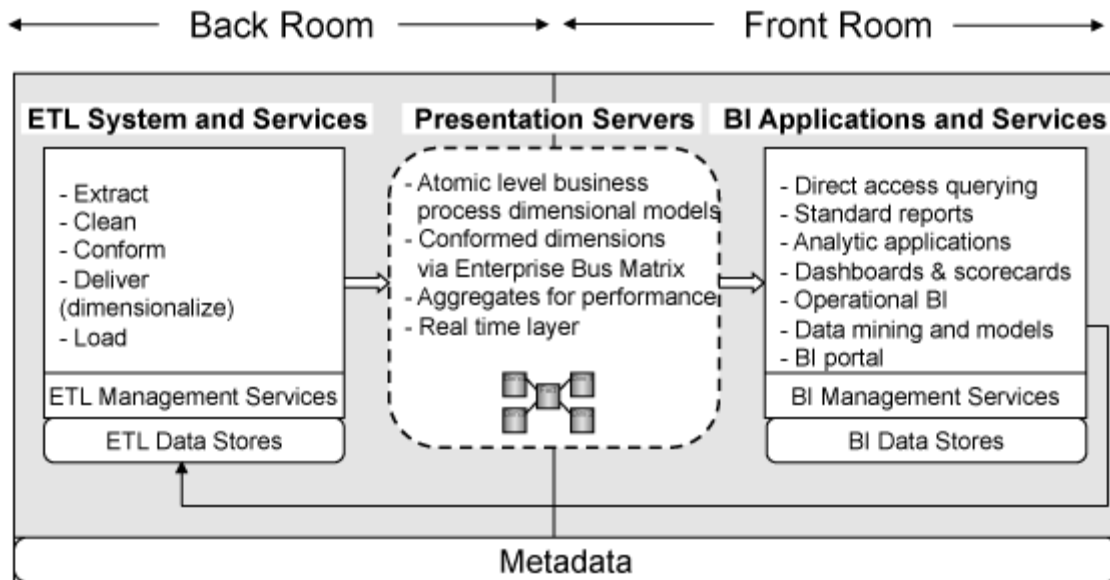
The Kimball technical system architecture focuses on the following components:

- *Backroom ETL system*: The Kimball Group has identified 34 subsystems in the ETL process flow, grouped into four major operations: *extracting* the data from the sources, performing *cleaning* and *conforming* transformations, *delivering* it to the presentation server, and *managing* the ETL process and back room environment.
- *Front room presentation area:* The Kimball Architecture presumes the data utilized by the BI applications is dimensionally-structured, organized by business process, atomically-grained (complemented by aggregated summaries for performance tuning), and tied together by the enterprise data warehouse bus architecture, as described earlier on this page.
- *Front room BI applications*: The front room is the public face of the DW/BI system; it's what business users see and work with day-to-day. There's a broad range of BI applications supported by BI management services in the front room, including ad hoc queries, standardized reports, dashboards and scorecards, and more powerful analytic or mining/modeling applications.
- *Metadata:* Metadata is all the information that defines and describes the structures, operations, and contents of the DW/BI system. *Technical metadata* defines the objects and processes which comprise the DW/BI system. *Business metadata* describes the data warehouse contents in user terms, including what data is available, where did it come from, what does it mean, and how does it relate to other data. Finally, *process metadata* describes the warehouse's operational results.