Dr. SNS RAJALAKSHMI COLLEGE OF ARTS & SCIENCE (AUTONOMOUS)

Accredited by NAAC (Cycle III) with 'A+' Grade

Affiliated to Bharathiar University

Coimbatore-49

DEPARTMENT OF COMPUTER APPLICATIONS

II BCA – A

MANAGEMENT INFORMATION SYSTEM

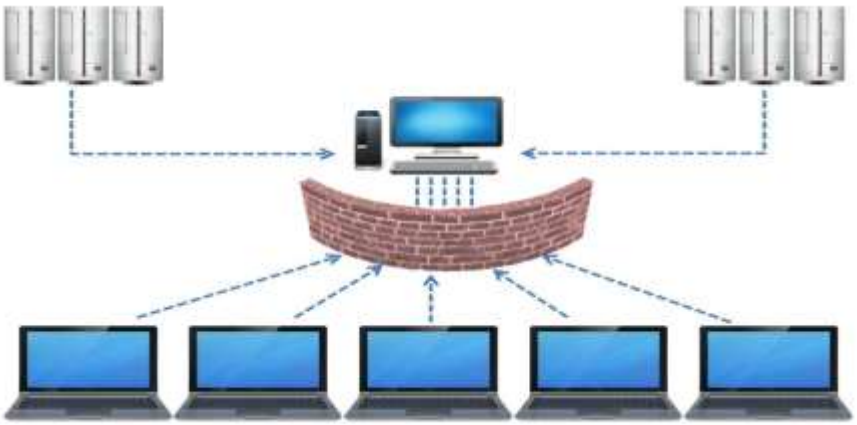
21UCP302

UNIT - V

NETWORKS:

A computer network is a communications system connecting two or more computers that work to exchange information and share resources (hardware, software and data). A network may consist of microcomputers, or it may integrate microcomputers or other devices with larger computers. Networks may be controlled by all nodes working together equally or by specialized nodes coordinating and supplying all resources. Networks may be simple or complex, self-contained or dispersed over a large geographical area.

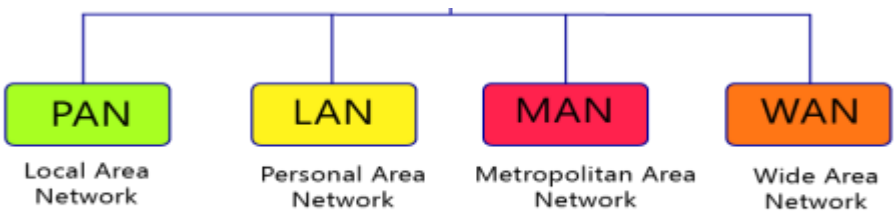
Network architecture is a description of how a computer is set-up (configured) and what strategies are used in the design. The interconnection of PCs over a network is becoming more important especially as more hardware is accessed remotely and PCs intercommunicate with each other.



TYPES OF COMPUTER NETWORKS:

Different communication channels allow different types of networks to be formed. Telephone lines may connect communications equipment within the same building. Coaxial cable or fibre-optic cable can be installed on building walls to form communication networks. You can also create your own network in your home or apartment. Communication networks also differ in geographical size.

Three important networks according to geographical size are LANs, MANs, WANs and PANs.



LOCAL AREA NETWORK (LAN):

A LAN is a computer network in which computers and peripheral devices are in close physical proximity. It is a collection of computers within a single office or building that connect to a common electronic connection – commonly known as a network backbone. This type of network typically uses microcomputers in a bus organization linked with telephone, coaxial, or fibre-optic cable. A LAN allows all users to share hardware, software and data on the network. Minicomputers, mainframes or optical disk storage devices can be added to the network. A network bridge device may be used to link a LAN to other networks with the same configuration. A network gateway device may be used to link a LAN to other networks, even if their configurations are different.

METROPOLITAN AREA NETWORK (MAN):

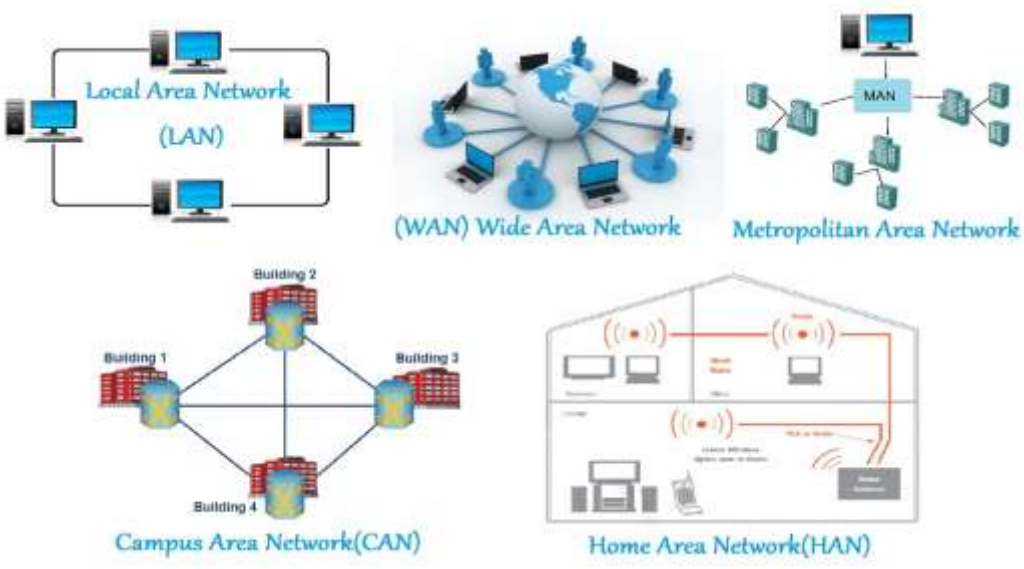
A MAN is a computer network that may be citywide. This type of network may be used as a link between office buildings in a city. The use of cellular phone systems expand the flexibility of a MAN network by linking car phones and portable phones to the network.

WIDE AREA NETWORKS (WAN):

A WAN is a computer network that may be countrywide or worldwide. It normally connects networks over a large physical area, such as in different buildings, towns or even countries. A modem connects a LAN to a WAN when the WAN connection is an analogue line. This type of network typically uses microwave relays and satellites to reach users over long distances. The widest of all WANs is the Internet, which spans the entire globe

PERSONAL AREA NETWORK (PAN):

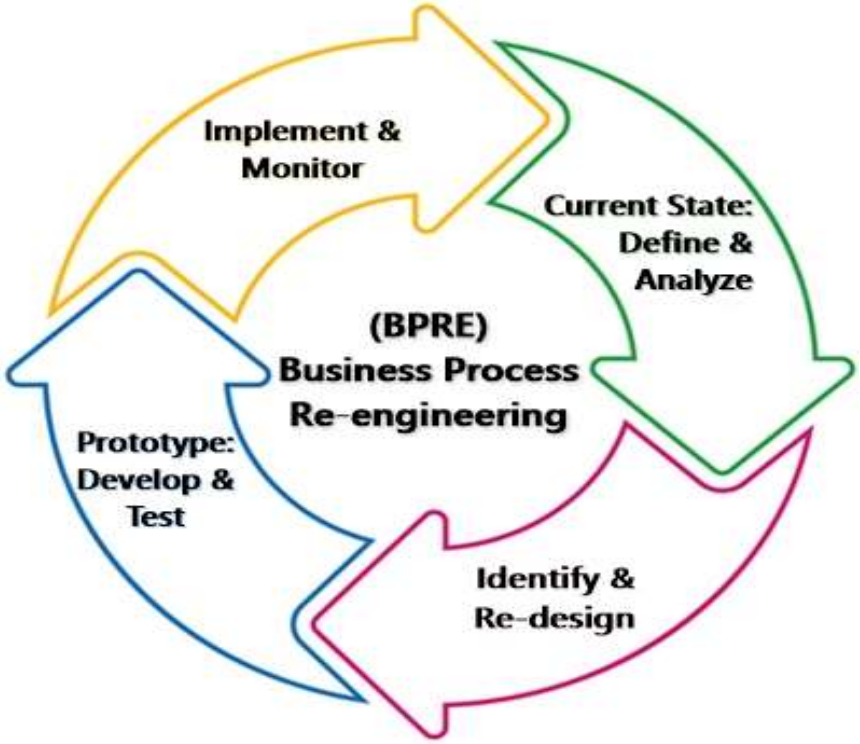
It is an interconnection of personal technology devices to communicate over a short distance, which is less than 33 feet or 10 meters or within the range of an individual person, typically using some form of wireless technologies.



BUSINESS PROCESS REENGINEERING:

Business process reengineering (BPR) is a management practice in which the related tasks required to obtain a specific business outcome are radically redesigned. A major aim of BPR is to analyse workflows within and between business functions in order to optimize the end-to-end business process and eliminate tasks that do not improve performance or provide the customer with value. The use of IT to automate and integrate steps in the process is central to BPR initiatives.

Business Process Reengineering is the radical redesign of business processes to achieve dramatic improvements in productivity, cycle times, quality, and employee and customer satisfaction. Companies start by assessing what work needs to be done to deliver customer value. Techniques such as process mining (the analysis of information systems event logs) can help discover, monitor, and improve processes. Then they decide how to do the work—or if it should be done at all. Rethinking the roles of third parties or outsourcing is also a crucial component of Business Process Reengineering.



BUSINESS PROCESS REENGINEERING IMPLEMENTATION:

Business Process Reengineering is a dramatic change initiative that contains seven major steps:

- Refocusing company values on customer needs and eliminating low-value work
- Simplifying and standardizing overly complex work, and automating repetitive work

- Enabling processes with modern systems and data
- Locating work in the most efficient and effective environment
- Reorganizing a business into cross-functional teams with end-to-end responsibility for a process
- Rethinking basic organizational and people issues
- Determining appropriate roles for third parties or outsourcers, focusing on where they truly add value

COMMON USES FOR BUSINESS PROCESS REENGINEERING:

Companies use Business Process Reengineering to improve the performance of key processes that affect customers by:

- Reducing costs and cycle times by eliminating unproductive activities and locating work in the most efficient and effective environment
- Reorganizing by teams to decrease the need for management layers, accelerate information flows, and eliminate errors and rework caused by multiple handoffs.
- Improving quality by standardizing and automating work to reduce errors and focus workers on higher-value activities. It also reduces the fragmentation of work and establishes clear ownership of processes.

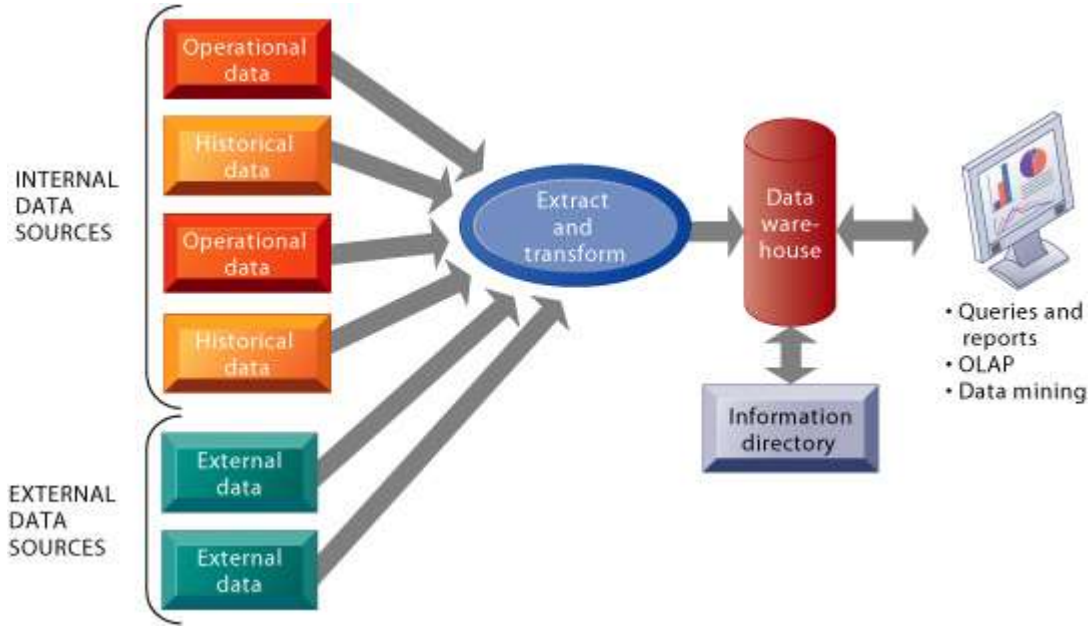
DATA WAREHOUSE:

A data warehouse is a type of data management system that is designed to enable and support business intelligence (BI) activities, especially analytics. Data warehouses are solely intended to perform queries and analysis and often contain large amounts of historical data. The data within a data warehouse is usually derived from a wide range of sources such as application log files and transaction applications.

A data warehouse centralizes and consolidates large amounts of data from multiple sources. Its analytical capabilities allow organizations to derive valuable business insights from their data to improve decision-making. Over time, it builds a historical record that can be invaluable to data scientists and business analysts. Because of these capabilities, a data warehouse can be considered an organization's "single source of truth."

A typical data warehouse often includes the following elements:

- A relational database to store and manage data
- An extraction, loading, and transformation (ELT) solution for preparing the data for analysis
- Statistical analysis, reporting, and data mining capabilities
- Client analysis tools for visualizing and presenting data to business users
- Other, more sophisticated analytical applications that generate actionable information by applying data science and artificial intelligence (AI) algorithms, or graph and spatial features that enable more kinds of analysis of data at scale.



BENEFITS OF A DATA WAREHOUSE:

Data warehouses offer the overarching and unique benefit of allowing organizations to analyse large amounts of variant data and extract significant value from it, as well as to keep a historical record.

Four unique characteristics (described by computer scientist William Inman, who is considered the father of the data warehouse) allow data warehouses to deliver this overarching benefit. According to this definition, data warehouses are

- **SUBJECT-ORIENTED:**

  They can analyse data about a particular subject or functional area (such as sales).

- **INTEGRATED:**

  Data warehouses create consistency among different data types from disparate sources.

- **NON-VOLATILE:**

  Once data is in a data warehouse, it's stable and doesn't change.

- **TIME-VARIANT:**

  Data warehouse analysis looks at change over time.

A well-designed data warehouse will perform queries very quickly, deliver high data throughput, and provide enough flexibility for end users to "slice and dice" or reduce the volume of data for closer examination to meet a variety of demands—whether at a high level or at a very fine, detailed level. The data warehouse serves as the functional foundation for middleware BI environments that provide end users with reports, dashboards, and other interfaces.

DATA WAREHOUSE ARCHITECTURE:

The architecture of a data warehouse is determined by the organization's specific needs. Common architectures include

- **SIMPLE:**

  All data warehouses share a basic design in which metadata, summary data, and raw data are stored within the central repository of the warehouse. The repository is fed by data sources on one end and accessed by end users for analysis, reporting, and mining on the other end.

- **SIMPLE WITH A STAGING AREA:**

  Operational data must be cleaned and processed before being put in the warehouse. Although this can be done programmatically, many data warehouses add a staging area for data before it enters the warehouse, to simplify data preparation.

- **HUB AND SPOKE:**

  Adding data marts between the central repository and end users allows an organization to customize its data warehouse to serve various lines of business. When the data is ready for use, it is moved to the appropriate data mart.

- **SANDBOXES:**

  Sandboxes are private, secure, safe areas that allow companies to quickly and informally explore new datasets or ways of analysing data without having to conform to or comply with the formal rules and protocol of the data warehouse.

DATA WAREHOUSE ARCHITECTURE:

A data warehouse architecture is a method of defining the overall architecture of data communication processing and presentation that exist for end-clients computing within the enterprise. Each data warehouse is different, but all are characterized by standard vital components.

Production applications such as payroll accounts payable product purchasing and inventory control are designed for online transaction processing (OLTP). Such applications gather detailed data from day to day operations.

Data Warehouse applications are designed to support the user ad-hoc data requirements, an activity recently dubbed online analytical processing (OLAP). These include applications such as forecasting, profiling, summary reporting, and trend analysis.

Production databases are updated continuously by either by hand or via OLTP applications. In contrast, a warehouse database is updated from operational systems periodically, usually during off-hours. As OLTP data accumulates in production databases, it is regularly extracted, filtered, and then loaded into a dedicated warehouse server that is accessible to users. As the warehouse is populated, it must be restructured tables de-normalized, data cleansed of errors and redundancies and new fields and keys added to reflect the needs to the user for sorting, combining, and summarizing data.

THREE COMMON ARCHITECTURES ARE:

- Data Warehouse Architecture: Basic
- Data Warehouse Architecture: With Staging Area
- Data Warehouse Architecture: With Staging Area and Data Marts

DATA WAREHOUSE ARCHITECTURE: BASIC

Operational System:

An **operational system** is a method used in data warehousing to refer to a **system** that is used to process the day-to-day transactions of an organization.

Flat Files:

A **Flat file** system is a system of files in which transactional data is stored, and every file in the system must have a different name.

Meta Data:

A set of data that defines and gives information about other data.

Meta Data used in Data Warehouse for a variety of purpose, including:

Meta Data summarizes necessary information about data, which can make finding and work with particular instances of data more accessible. For example, author, data build, and data changed, and file size are examples of very basic document metadata.

Metadata is used to direct a query to the most appropriate data source.

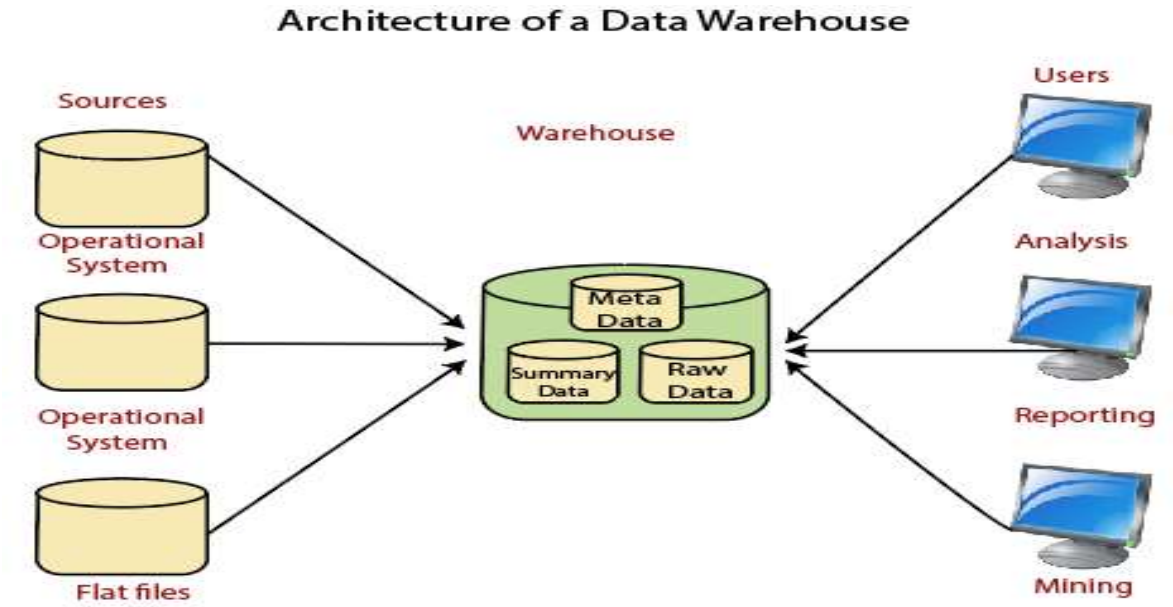
Lightly and highly summarized data:

The area of the data warehouse saves all the predefined lightly and highly summarized (aggregated) data generated by the warehouse manager.

The goals of the summarized information are to speed up query performance. The summarized record is updated continuously as new information is loaded into the warehouse.

End-User access Tools:

The principal purpose of a data warehouse is to provide information to the business managers for strategic decision-making. These customers interact with the warehouse using end-client access tools.

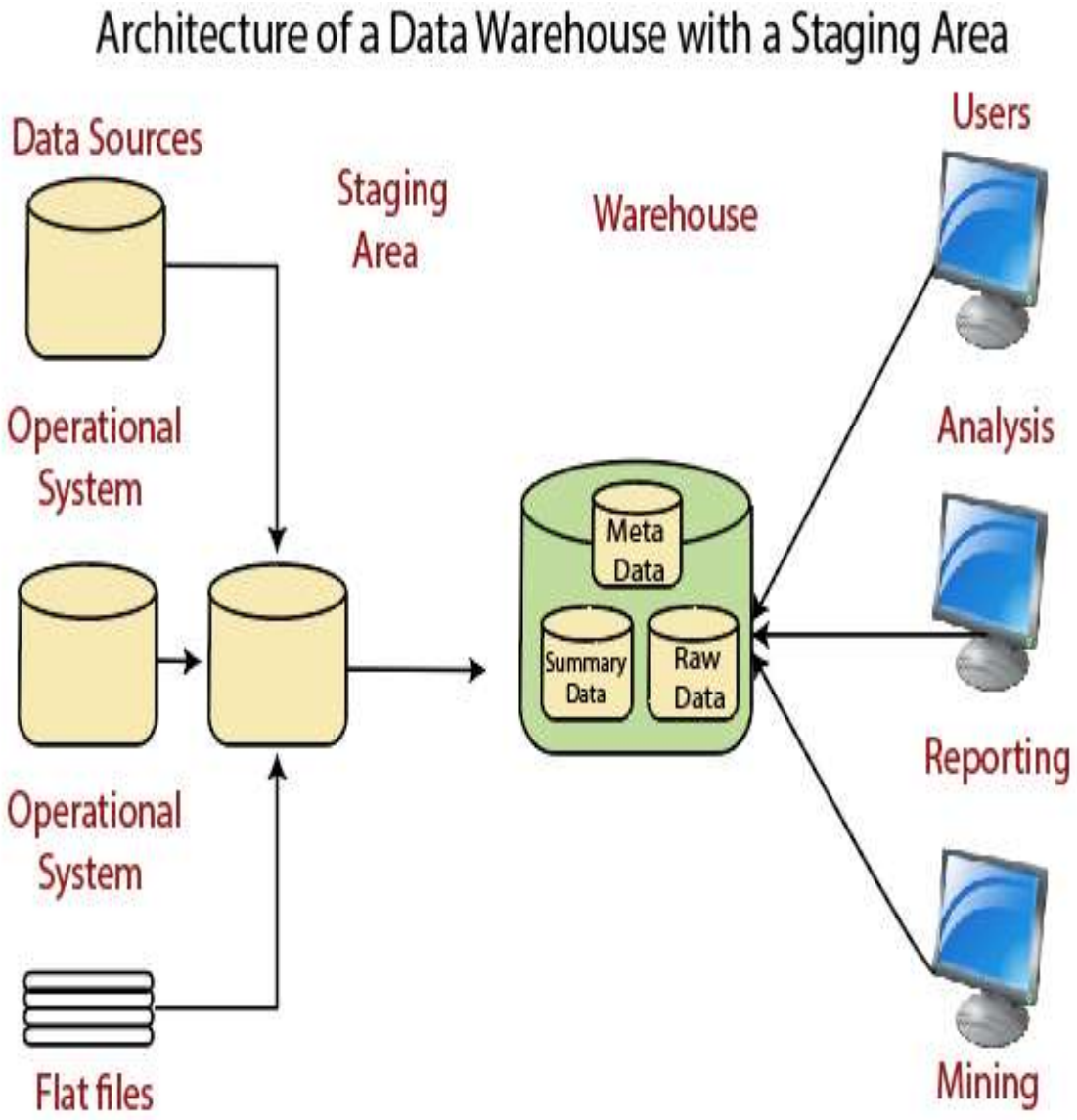


DATA WAREHOUSE ARCHITECTURE: WITH STAGING AREA:

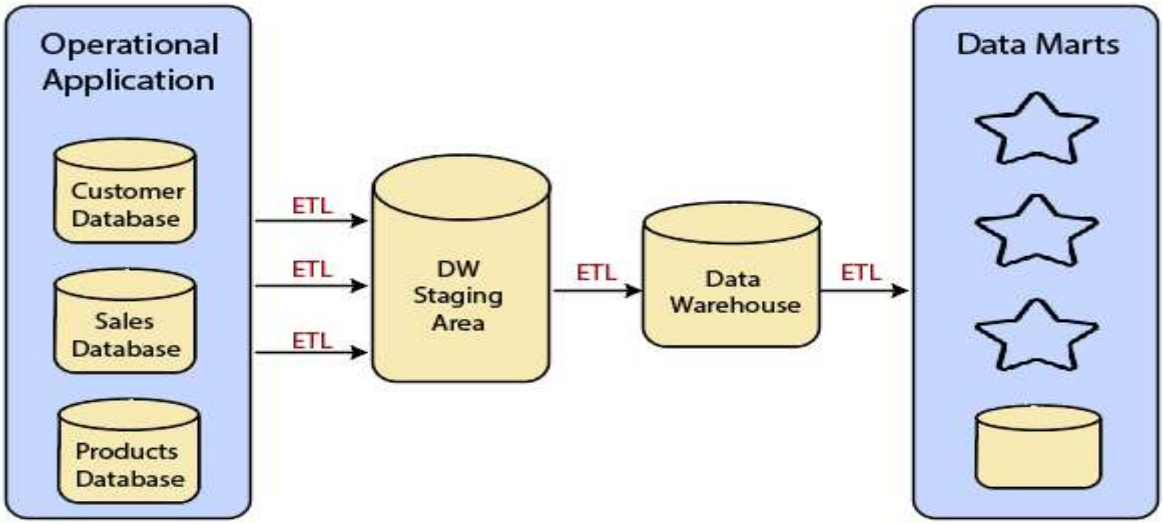
We must clean and process your operational information before put it into the warehouse.

We can do this programmatically, although data warehouses uses a **staging area** (A place where data is processed before entering the warehouse).

A staging area simplifies data cleansing and consolidation for operational method coming from multiple source systems, especially for enterprise data warehouses where all relevant data of an enterprise is consolidated.



Data Warehouse Staging Area is a temporary location where a record from source systems is copied.

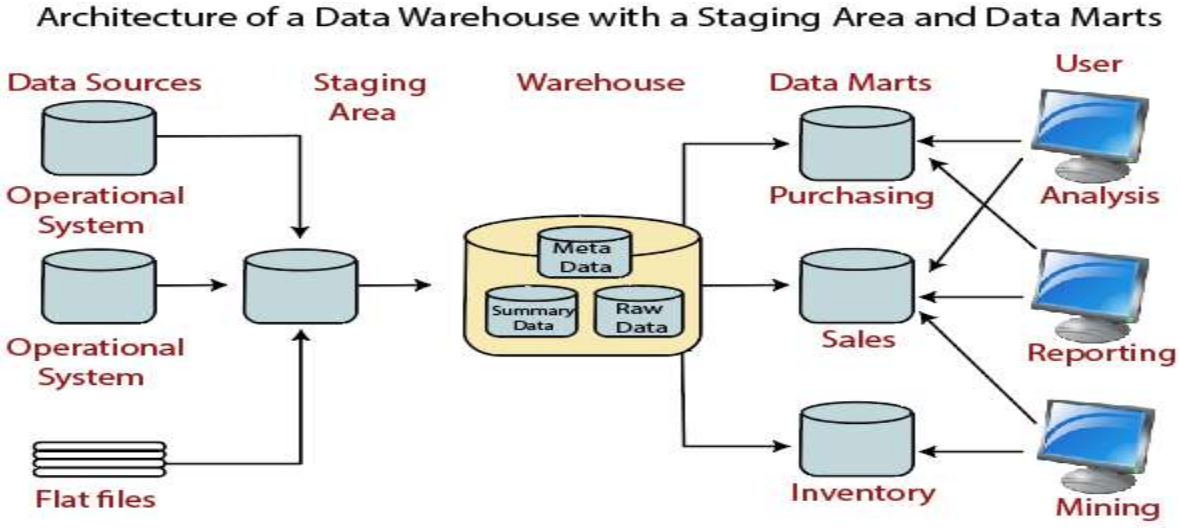


DATA WAREHOUSE ARCHITECTURE: WITH STAGING AREA AND DATA MARTS:

We may want to customize our warehouse's architecture for multiple groups within our organization.

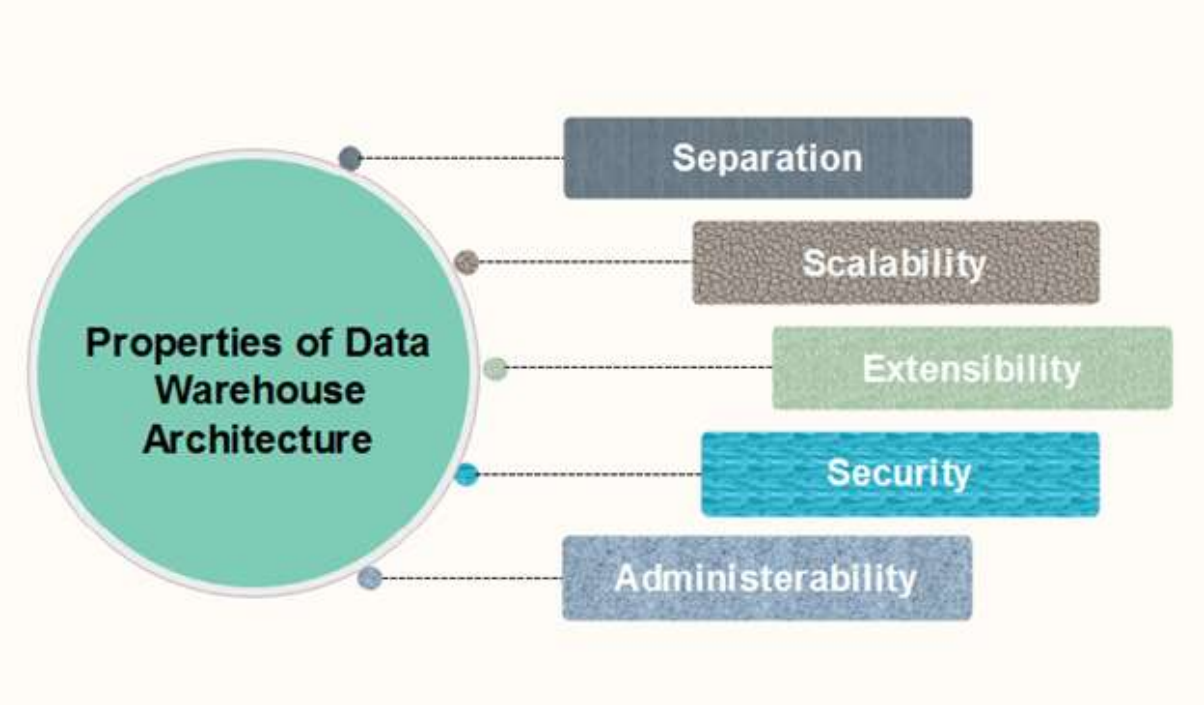
We can do this by adding **data marts**. A data mart is a segment of a data warehouses that can provided information for reporting and analysis on a section, unit, department or operation in the company, e.g., sales, payroll, production, etc.

The figure illustrates an example where purchasing, sales, and stocks are separated. In this example, a financial analyst wants to analyse historical data for purchases and sales or mine historical information to make predictions about customer behaviour.



PROPERTIES OF DATA WAREHOUSE ARCHITECTURES:

The following architecture properties are necessary for a data warehouse system:



Separation:

Analytical and transactional processing should be keep apart as much as possible.

Scalability:

Hardware and software architectures should be simple to upgrade the data volume, which has to be managed and processed, and the number of user's requirements, which have to be met, progressively increase.

Extensibility:

The architecture should be able to perform new operations and technologies without redesigning the whole system.

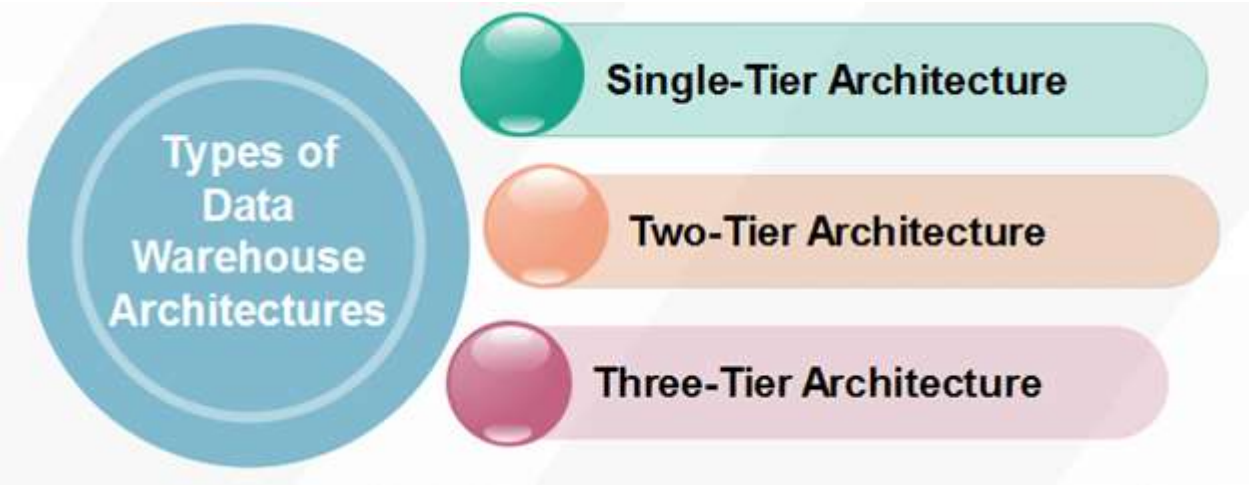
Security:

Monitoring accesses are necessary because of the strategic data stored in the data warehouses.

Administer ability:

Data Warehouse management should not be complicated.

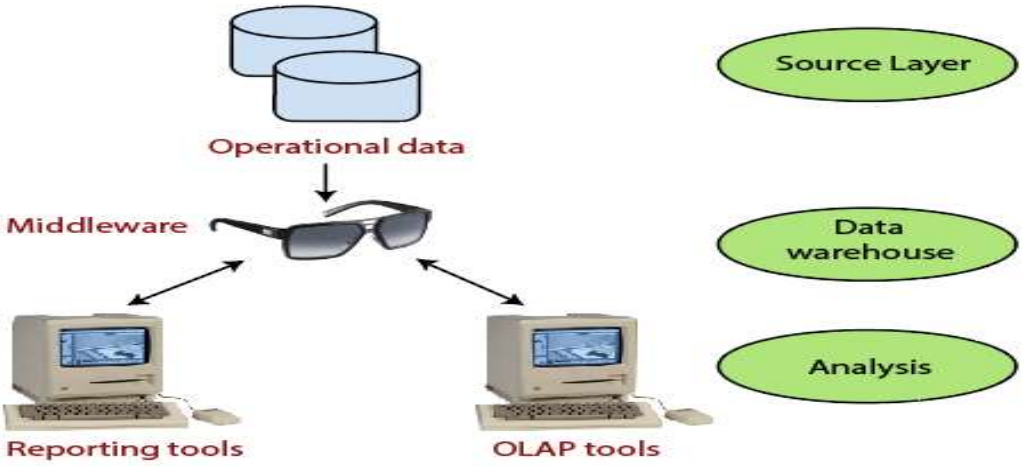
TYPES OF DATA WAREHOUSE ARCHITECTURES:



SINGLE-TIER ARCHITECTURE:

Single-Tier architecture is not periodically used in practice. Its purpose is to minimize the amount of data stored to reach this goal; it removes data redundancies.

The figure shows the only layer physically available is the source layer. In this method, data warehouses are virtual. This means that the data warehouse is implemented as a multidimensional view of operational data created by specific middleware, or an intermediate processing layer.

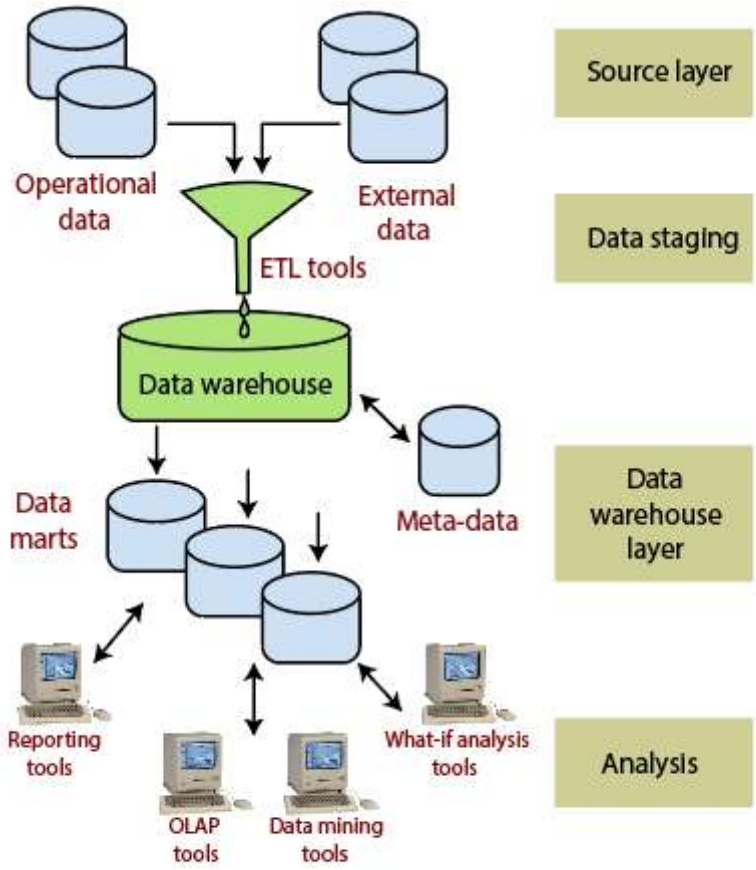


Single-Tier Data Warehouse Architecture

The vulnerability of this architecture lies in its failure to meet the requirement for separation between analytical and transactional processing. Analysis queries are agreed to operational data after the middleware interprets them. In this way, queries affect transactional workloads.

TWO-TIER ARCHITECTURE:

The requirement for separation plays an essential role in defining the two-tier architecture for a data warehouse system, as shown in fig:



Two-Tier Data Warehouse Architecture

Although it is typically called two-layer architecture to highlight a separation between physically available sources and data warehouses, in fact, consists of four subsequent data flow stages:

Source layer:

A data warehouse system uses a heterogeneous source of data. That data is stored initially to corporate relational databases or legacy databases, or it may come from an information system outside the corporate walls.

Data Staging:

The data stored to the source should be extracted, cleansed to remove inconsistencies and fill gaps, and integrated to merge heterogeneous sources into one standard schema. The so-named **Extraction**, **Transformation**, and **Loading Tools (ETL)** can combine heterogeneous schemata, extract, transform, cleanse, validate, filter, and load source data into a data warehouse.

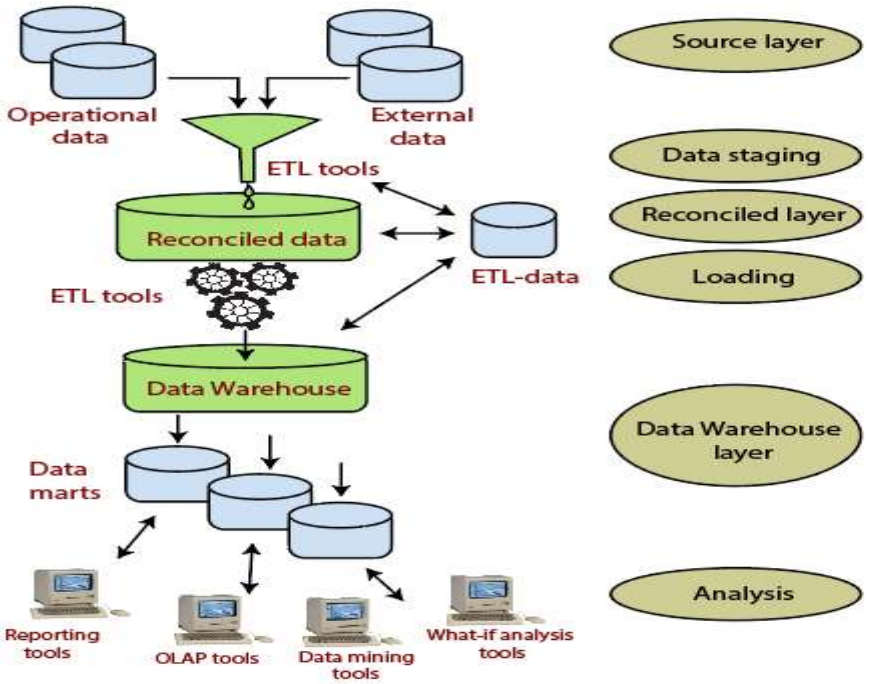
Data Warehouse layer:

Information is saved to one logically centralized individual repository: a data warehouse. The data warehouses can be directly accessed, but it can also be used as a source for creating data marts, which partially replicate data warehouse contents and are designed for specific enterprise departments. Meta-data repositories store information on sources, access procedures, data staging, users, data mart schema, and so on.

Analysis:

In this layer, integrated data is efficiently, and flexible accessed to issue reports, dynamically analyse information, and simulate hypothetical business scenarios. It should feature aggregate information navigators, complex query optimizers, and customer-friendly GUIs.

THREE-TIER ARCHITECTURE:



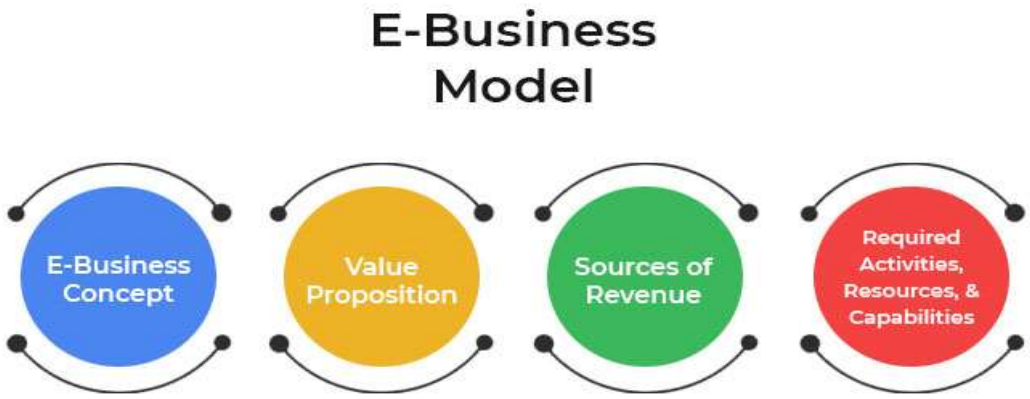
Three-Tier Architecture for a data warehouse system

The three-tier architecture consists of the source layer (containing multiple source system), the reconciled layer and the data warehouse layer (containing both data warehouses and data marts). The reconciled layer sits between the source data and data warehouse.

The main advantage of the **reconciled layer** is that it creates a standard reference data model for a whole enterprise. At the same time, it separates the problems of source data extraction and integration from those of data warehouse population. In some cases, the **reconciled layer** is also directly used to accomplish better some operational tasks, such as producing daily reports that cannot be satisfactorily prepared using the corporate applications or generating data flows to feed external processes periodically to benefit from cleaning and integration.

This architecture is especially useful for the extensive, enterprise-wide systems. A disadvantage of this structure is the extra file storage space used through the extra redundant reconciled layer. It also makes the analytical tools a little further away from being real-time.

ELECTRONIC BUSINESS TECHNOLOGY:



E-business stands for electronic business. Electronic business is also known as online business. Online business is a business where the transaction takes place online. Here, the buyer and the seller don't meet personally. The term "e-business" was coined by IBM's marketing and Internet team in 1996. E-business is a part of e-commerce. E-commerce means electronic commerce.

E-Business (electronic business) is any process that a business organization conducts over a computer-mediated network. Business organizations include any for-profit, governmental, or non-profit entity. Their processes include production-, customer-, and internal- or management-focused business processes.

Management Information Systems (MIS) E-Commerce/Digital Business option is about finding answers and leveraging information technology within an organization to increase

business value and profits. The MIS program prepares you to succeed in one of the most rapidly expanding professions in the world of business. In our MIS program you will learn how to:

- Analyse an organization's information systems
- Conceptualize and design business solutions using communication and information technologies
- Implement solutions and manage project teams
- Manage systems throughout their life cycles
- Apply technical skills in database, networking and business analytics

A bachelor's degree in MIS prepares you for a multitude of career paths, including IT consultant, business analyst, e-commerce systems developer, and database specialist.

MIS professionals are in high demand. In fact, the U.S. Labour Department predicts that MIS will have one of the largest growth rates over any other profession.

ADVANTAGES OF E-BUSINESS:

There are actually innumerable advantages of e-Business, the most obvious one being the ease of doing business. Some of the major advantages of e-business are as follows:

Easy to Set Up:

It is easy to set up an electronic business. You can set up an online business even by sitting at home if you have the required software, a device, and the internet.

Cheaper than Traditional Business:

Electronic business is much cheaper than traditional business. The cost taken to set up an e-business is much higher than the cost required to set up a traditional business. Also, the transaction cost is effectively less.

No Geographical Boundaries:

There are no geographical boundaries for e-business. Anyone can order anything from anywhere at any time. This is one of the benefits of e-business.

Government Subsidies:

Online businesses get benefits from the government as the government is trying to promote digitalization.

Flexible Business Hours:

Since the internet is always available. E-business breaks down the time barriers that location-based businesses encounter. As long as someone has an Internet connection, you may be able to reach and sell your product or service to these visitors to your business website.