

Common Applications of Computers and Information Systems

An information system encompasses structured components that collect, store, and process data into information to help support decision-making in an organization.

Five key components of information include:

1. Hardware,
2. Software,
3. Data,
4. People,
5. Processes.

These components work together to help turn raw data into meaningful information. People are the users of the hardware and software, which are used for processing the raw data into meaningful information, whilst the procedures are the means by which the data is collected, stored, and manipulated on these databases. These components work together to thus turn raw facts into meaningful information that can be used to aid the business.

Bidgoli summarizes the components of an information system into:



1. Data (input)
2. Databases
3. Processing
4. Information (output).
5. Feedback (from user).

The difference between data and information

- Data is the raw facts that are the **input of an information system**, but information is the **output of the information system** in which the data has become **processed** into meaningful information.
- Data is not helpful in **business decision-making**, whilst information is useful to business decision-making.

Qualities of Good Information

According to stair and reynolds, for information to be useful and valuable, it needs to possess the following qualities: **R.E.S.S.T.A.V.A.C**

1. **Reliable:** Information can be depended upon.
2. **Economical:** cost of production must not outweigh its benefits.
3. **Secure:** It needs to be secured safely in databases. 
4. **Simple:** Information must be simple and not difficult to understand.
5. **Timely:** Information is available when it is needed. 
6. **Accessible:** Accessible to authorized users.
7. **Verifiable:** It can be checked for accuracy with, for example, sources.

8. **Accurate:** Error-free, with correct methodology and data fed into the system.
9. **Complete:** Information that contains all important facts.

difference between computer literacy and information literacy.

In the 21st Century, Information and computer literacy are two essential skills that workers need to succeed in the workplace, but what are they?

Information Literacy defined:

Information literacy is not just about data, but it is about understanding the role business intelligence **(BI)** can have toward the success of an organization. Business intelligence and its extensive algorithmic predictive insights and in-depth forecasting



How does BI differ from an MIS? An MIS is used for more routine general decision-making at the middle-management level, but the extensive BIS is used like a crystal ball for aiding in decision-making.

The importance of being information literate:

This is understanding where data comes from and how it can benefit an organization. For example, harnessing the power of social media data for attaining a competitive advantage, as done by Cambridge Analytica.

Computer literacy is defined as:

Being computer literate means being knowledgeable about computer hardware, having skills in the use of productivity software such as Excel, and other computational resources such as the internet.

Importance of computer Literacy:

Being computer literate in today's digital world is like attaining a digital skill set that can be used to help the organization with, for example, creating helpful and useful presentations. In the age of AI, it could be using AI as a productivity tool for the generation of dashboards to potentially increase the speed of delivery and subsequent profits for the company.

Defining a TPS (Transactional Processing System)

A Transactional Processing system is a type of information system that is used to perform routine, yet structured, tasks effectively, such as:

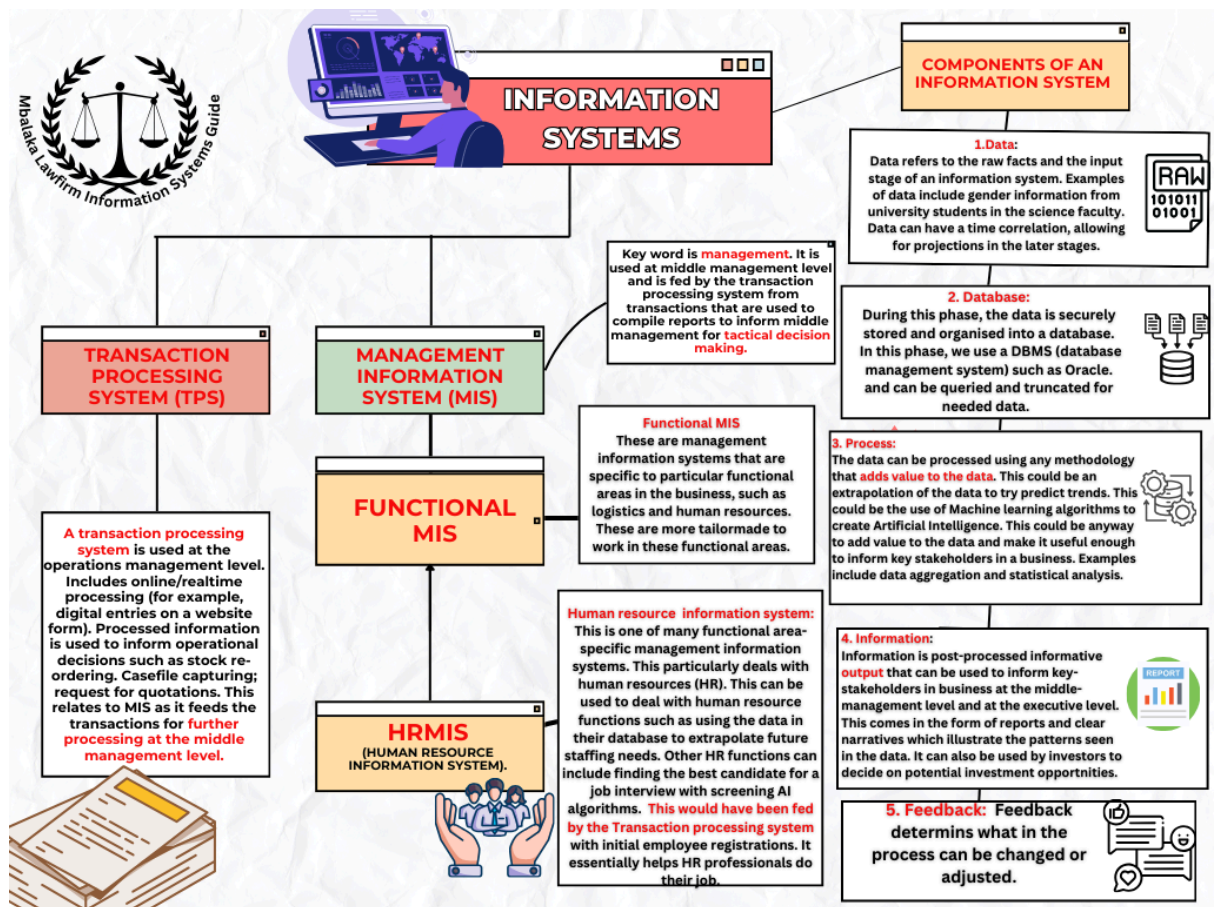
- inventory control,
- automated payroll,
- and record-keeping.

The main reason for employing such a system is that it can lead to significant cost savings for the company.

Defining a management information system (MIS).

A management information system is a specific type of information system that is used to help middle management make decisions in a business. The MIS typically receives the TPS output, and using their software, they can choose to aggregate the findings into meaningful results for their study.

Describing the four major components of an information System.



1. Explain the importance and applications of information systems in functional areas of an organization.

Each functional area has area-specific needs, and there are thus information systems that are tailored for these same functional areas. Management information systems, for example, can be broken into different categories such as the logistics information system (LIS) or the HRIS (human resource Information system).

2. *Discuss how information technologies are used to gain a competitive advantage.*

Information technologies can be used to gain a competitive advantage because they can help a business stand out and differentiate itself from its competitors by, for example, providing an app that separates it from the competitors, and also enhanced efficiency can lead to opportunities to attain more profits from the optimized efficiency.

How is a computer System defined?

A computer system is defined as any device that has the characteristics of taking in input and performing pre-defined instructions, which are called algorithms based on the boolean logic of ones and zeroes. Boolean logic, having been defined by George Boole in the 19th century, laid the foundation for searching databases. His application to circuit design helped to create boolean logic.

What are the components of a computer System? [I/O & CMMSM]

The main components of a computer system include:

- Input devices and Output devices (I/O)
 - CPU, which comprises the ALU and CU (Arithmetic processing Unit, and Control Unit).
 - Main memory (RAM: Random Access Memory)
 - Secondary Memory [HDD (Hard disk drive) / SSD (Solid State Drive)]
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What is the history of computer Hardware

1st generation: In the **1940s**, these computers were massive, consisted of vacuum tubes, were difficult to program, and generated excessive heat.

2nd generation: The second generation transpired between **1957—1963**. These computers used transistors instead of vacuum technology. Furthermore, they were easier to program, faster, and more reliable.

3rd generation: From **1963—1970**. These computers had integrated circuits, telecommunication capacity, remote data entry, smaller size, and yet faster computing than the previous generations.

4th generation: From **1971 to 1992**. This was continued development from the contributions of the previous generations, and these advancements made miniaturization, ease of use, and increased speed all possible.

5th generation: The current generation. Computers support parallel processing, faster computer chips, Optical speeds and reduced computational power.

The History of Computer Software [M. A. H. O. D]

The history of computer software describes the 5 generations of computer software that evolved from machine language to database languages.

- **First generation: Machine Language:** Boolean binary logic of 10101010101010101's.
 - **Second generation: Assembler Language:** Assembler languages were created to make programming easier by allowing programmers a way to write code that was closer to english. It used an assembler to translate assembly language into binary so the computer could understand.
 - **Third generation: Higher-level languages:** These are languages that were easier than assembly. The logic is procedural, and this means that each of the languages is directly translated back into machine language. An example includes the Pascal and C programming languages.
 - **4th generation : Object Oriented Languages:** These are languages that include Java, [Vb.net](#). The advantage of object-oriented languages is that the code is reusable based on the principle of inheritance.
 - **5th Generation: Database-Oriented Languages:** Theseude SQL (structured query language) and noSQL (not only structured query language), and Natural language processing.
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What are the factors distinguishing computing Power/Performance?

Computing power is the performance of the computer, which is determined by the computer's: **S.A.R.S**

- Speed:
 - Accuracy:
 - Retrieval:
 - Storage:
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Summary of computer operations

The basic computer operations include the duties of the hardware, which is the hardware, the ALU, the CPU, and Main and secondary memory. The hardware allows the computer to perform arithmetic operations and logical operations, as well as the RAM and HDD/SSD allows for the storage and retrieval on the computer.

Therefore, the computer operations can be summarised into:

Basic computer operations:

- Arithmetic operations
- Logical operations
- Storage and retrieval operations

What are the types of Input devices?

Input devices are the devices used to send an input into the computer for processing. This includes technologies such as:

- OMR (Optical Mark recognition) system
- RFID (Radio Frequency Identification)
- Magnetic Stripe Card
- Automated Teller machine (ATM)
- Biometric Input
- Touch screen
- Pen-based devices, e.g., the S pen stylus on Samsung Galaxy Note.
- Video input
- Computer vision
- Joystick or controller
- More

Anything that is an input device for a computer.

Discussing the types of Output devices?

- Output is the result of the processing within the computer, and output devices are the means by which we can see this output.
- Monitors, printers, and projectors are examples of hardware that shows us the output.
- Monitors include: Liquid crystal displays (LCD), gas plasma monitors (Plasma monitors), and Cathode ray tubes (CRT).
- Printers include: Impact printers, inkjet printers, laser printers, thermal printers, mobile printers, and 3D printers. Audio is projected with speakers, whilst plotters deal with architectural drawings, and the digital equivalent of a book is displayed on an e-book or e-pub file.

Discussing Memory Devices

There are two types of memory devices, and these are:

- *Main Memory:*

Random Access Memory (RAM). There are types of RAM, and these types include:

1. *Static Random Access Memory,*
2. *Dynamic Random Access Memory,*
3. *DDR RAM: Double Data Rate Synchronous Dynamic Random Access Memory. E.g., DDR4/DDR5 RAM.*



- *Secondary memory:*

How are classical computers classified?

Classical computers are classified into the following classes:

- **Supercomputer:** Extremely powerful machines that are used for weather forecasting, nuclear research, protein folding, and other tough computational tasks. Speed is measured in flops, and today speeds exceed petaflops. The IBM blue Gene/L is an example of a supercomputer.
- **Mainframe computers:** Enterprise centralized systems are used to handle transactions and host servers in an organization. They process millions of instructions per second. Enterprises are opting for downsizing and using cloud computing as the cost of owning and maintaining a mainframe is expensive, also the risk of losing company data if the local mainframe is damaged is something companies are opting to outsource to data centers.
- **Mini-Computers:** Mini-computers are less powerful than mainframes but are more powerful than personal computers. Since the case of these devices has mainly been for servers, it's almost become an understated name with people calling them servers.

Examples of servers include:

- *Application servers: hosts software*
 - *database servers: hosts database*
 - *remote access servers: Allow remote access to company servers.*
 - *print servers: When print data is sent to printers on an organization's network.*
 - *mail servers: Allow us to receive and send emails.*
 - *file servers: Allow users to send and receive files on a server.*
 - *fax servers: Enable users to send faxes.*
 - *disk servers: Location for storage for later use.*
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- **Personal computer:**  General umbrella for any computer designed for personal use or small business application. The use is dependent on the specifications of the computer, which determine its computational power (**Speed, Accuracy, Retrieval, Storage**).
 - **Notebooks** : AKA Laptop, This is a type of portable personal computer, often referred to as a laptop or notebook, that can perform any task. It is battery powered and can be used on AC power too. It is ideal for portable use. They are smaller but can be as powerful as normal personal computers.

- **Subnotebooks** 📱: This is a very small type of computer or notebook with fast processing, although Bidgoli asserts that tablets qualify as subnotebooks. It has no optical drive (the Blu-ray disk reader or any other Compact disk or digital versatile disk reader).

Subnotebooks:

- Increased touch, gesture
- Increased power (S.A.R.S).
- Including smaller, thinner laptops and tablets.
- Wide-spread applications of wireless devices.

Additional Classes include:

- **Mobile Devices** – Tablets, Smartphones
- **Single-board / Embedded Systems** – Raspberry Pi, Smart devices
- **IoT Devices** – Wearables, smart home appliances
- **Special-purpose Systems**—Game consoles, ATMs, routers

Non-Classical Computers include:

- Quantum computers use **qubits**, not bits — exponentially powerful in certain tasks.
 - Optical/Photonic—using light instead of electrons.
 - Biological/Organic/Neuromorphic—Brain-like neuroplasticity, implications for experimental AI.
 - DNA computers—using DNA sequences for computing.
 - More
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Two Main Types of Software:

Bidgoli (2017) distinguishes between two types of software, which are

- Application software (AS)
- and Operating System software (OS).

1. An Operating system

- An operating system is a set of programs that is used to manage a computer's hardware and software on a computer.

The functions of an OS include:

- Prioritizes tasks performed by the CPU.
- Manage computer resources such as memory and storage, and in a networked environment, it helps to ensure that the hardware, such as the NIC and IP configurations, allows the computer access to a network, be it peer-to-peer or client-server.

- Helps maintain data integrity by performing checksums to ensure that the data does not get corrupted or changed inappropriately.
- Facilitates the flow of data between the CPU, memory, and the input/output devices (I/O).

2. Types of Application Software

Defining Application Software:

Application Software is software that, if installed on a computer, does various tasks dependent on the design of the software and the demands of the user.

Functions of Application software include:

- Enhanced efficiency of business activities
- Supporting business tasks
- Assist communication

Application Software has various types, which include

- **Packaged:** Packaged software is protected by copyrights. It is mass-produced and sold at the retail level. Examples include Excel.
 - **Custom:** This is software that is tailor-made to the needs of a company. It performs a pre-planned function, such as calculating taxes.
 - **Shareware:** This is copyrighted software that is distributed temporarily for free during a trial period. E.g., Adobe 14-day free trial for software.
 - **Freeware:** This is copyrighted software but allows free use by the user. They make their money through Ads. Examples are the free-to-download applications that make their money through adsense revenue. Usually a paywall to attain certain features.
 - **Open-source:** The source code is available for modification and alteration on open-source repositories such as github and hugging face. There are no restrictions by the license holder; usually, the MIT license is used to show the program is open source.
 - **Public domain:** Free software, which was donated for public use and has no copyright restrictions. It can be distributed without limited usage rights.
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