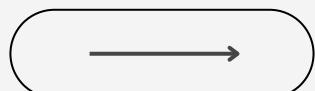


PRORTFOLIO #4
A Comprehensive Study

DATE
11/05/24



COMPUTER HARDWARE AND SOFTWARE



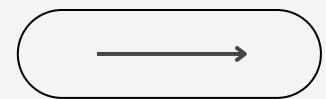
BS INFORMATION TECHNOLOGY
CIS 1102

PRESENTED BY
mizzi pomoy

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HARDWARE CONCEPTS



WHAT IS COMPUTER SYSTEMS?

A **computer system** is defined as a combination of hardware components, such as a processing unit, memory, input/output devices, and storage, along with software components like operating systems and applications, working together to achieve a specific purpose in the field of Computer Science (Mishra, et al., 2015).

WHAT IS A COMPUTER?

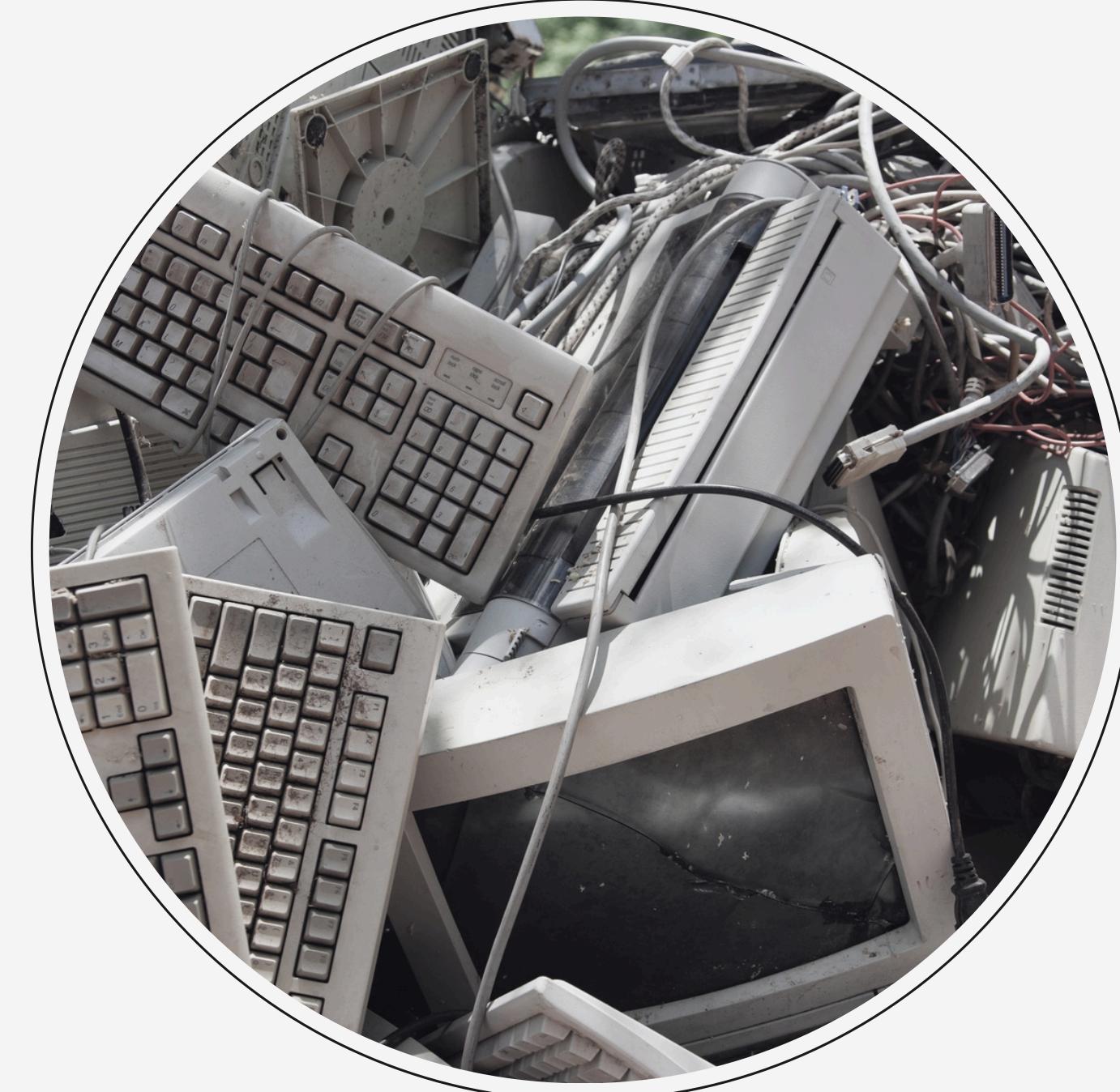
A **computer** is a device that can be instructed to carry out sequences of arithmetic or logical operations automatically via computer programming (Sharma, 2018).

WHAT IS A SYSTEM?

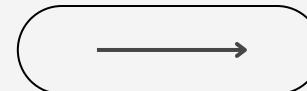
A **system** is an assembly or set of interacting entities or elements with relations between them (Backlund, 2000).

COMPUTER HARDWARE

- a collective term used to describe any of the physical components of an analog or digital computer (Rosencrance & Awati, n.d.).
- The term hardware distinguishes the tangible aspects of a computing device from software, which consists of written, machine-readable instructions or programs that tell physical components what to do and when to execute the instructions (Rosencrance & Awati, n.d.).



TYPES OF COMPUTER SYSTEMS



Supercomputers

Supercomputers are large systems that are specifically designed to solve complex scientific and industrial challenges. Such applications span a wide range of computational intensive tasks, including quantum mechanics, weather forecasting, climate research, oil and gas exploration (Gioiosa, 2017).

Workstations

Computer **workstations** are defined as specialized work areas equipped with features such as displays, controls, seating, and positioning of equipment, designed based on research to enhance user comfort and productivity in office settings (Sundstrom, 2001).

Mainframe

A **mainframe** computer, known as a big iron or mainframe, is typically used by large enterprises for mission-critical applications. This involves processing massive amounts of data for activities like censuses, industry and consumer analytics, enterprise resource planning, or large transaction processing (BasuMallick, 2023).

Mid range or Mini Computers

Mini computers, also known as **midrange** computers, are a class of multi-user computers that are smaller and less powerful than mainframe computers. Despite their smaller size, mini-computers are capable of supporting multiple users simultaneously and are often used in business environments for tasks such as word processing, database management, and networking (.

Server Computer

A **server** is a computer program or device that provides a service to another computer program and its user, also known as the client. In a data center, the physical computer that a server program runs on is also frequently referred to as a server. That machine might be a dedicated server or it might be used for other purposes (Posey, n.d.).

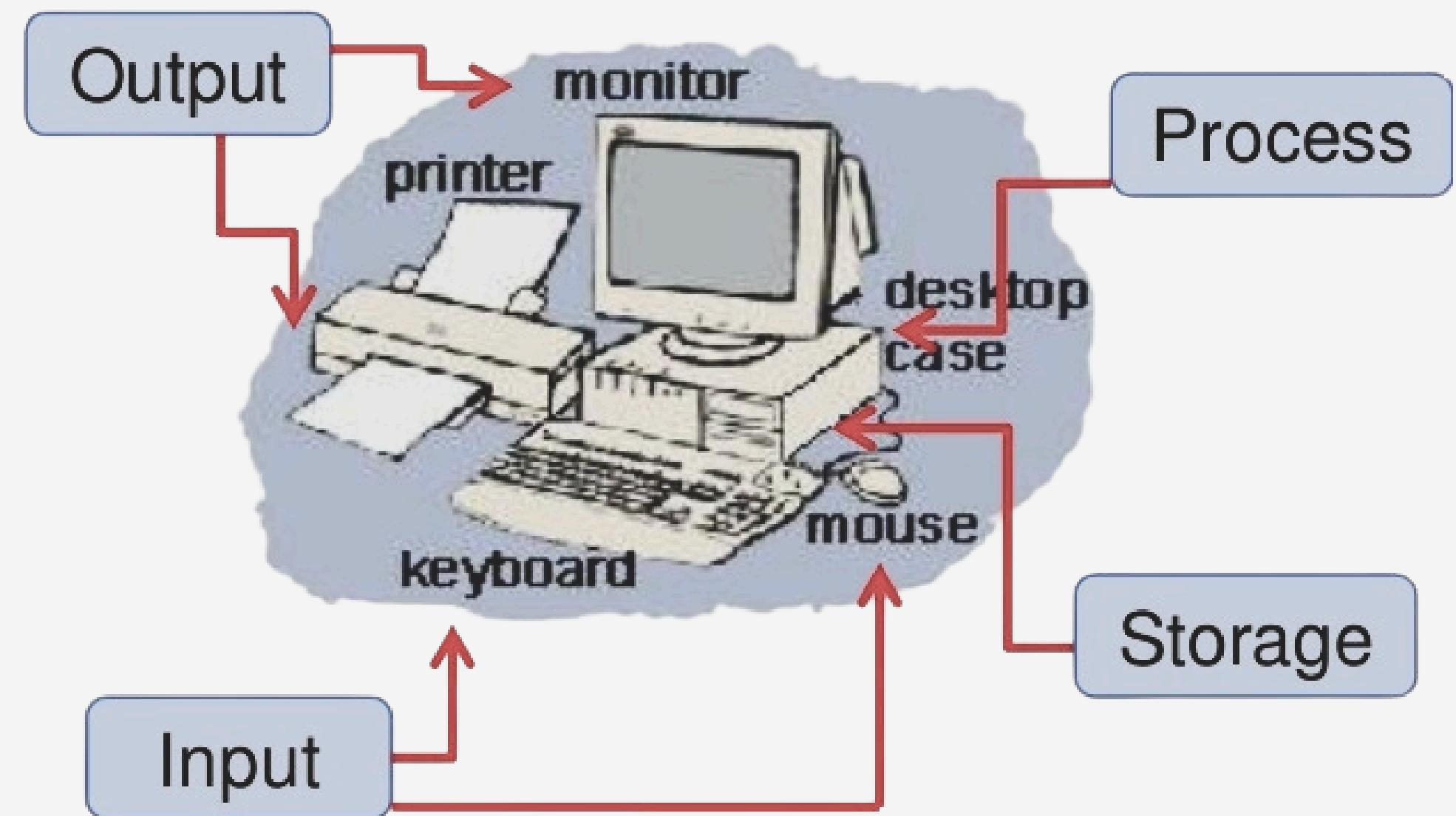
Micro Computer

A **microcomputer** is a complete computer on a small scale, designed for use by one person at a time. An antiquated term, a microcomputer is now primarily called a personal computer (PC). Common microcomputers today include laptops and desktops (Wright, n.d.).

BASIC DATA FLOW BETWEEN HARDWARE DEVICES

Operations performed by a computer system

- a. Input
- b. Storage
- c. Processing
- d. Output



INPUT

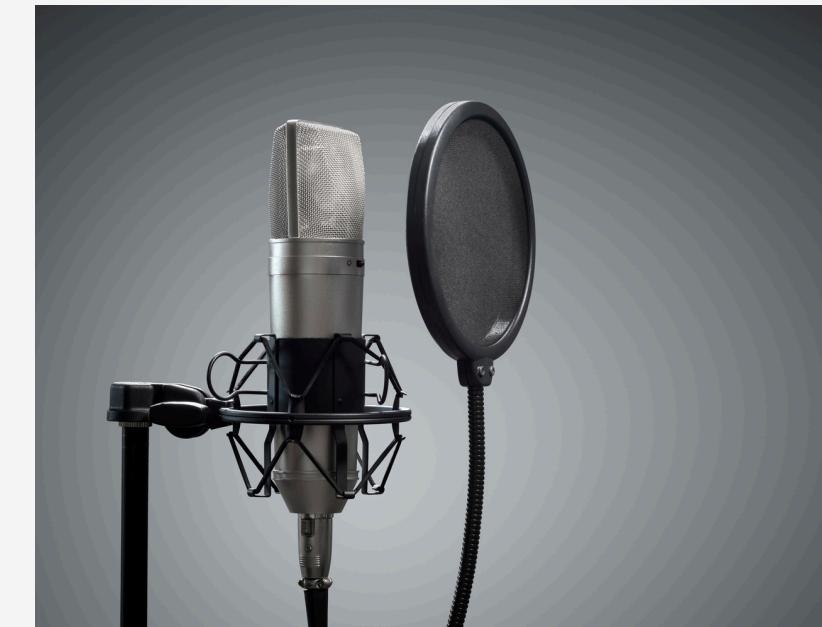
The input function is the process by which a computer receives data and instructions from the outside world. This is achieved through input devices such as keyboards, mice, scanners, and microphones. When you type on a keyboard or click with a mouse, you are providing input to the computer. This input data is then sent to the computer's central processing unit (CPU) for further processing (Rajkumar, 2024).



01



02



03

PROCESSING

The processing function is carried out by the CPU, which is often referred to as the “brain” of the computer. The CPU takes the input data and performs various operations on it based on the instructions provided. These operations may include calculations, data manipulation, and decision-making. The CPU processes the input data at incredibly high speeds, allowing the computer to perform complex tasks within milliseconds (Rajkumar, 2024).



01



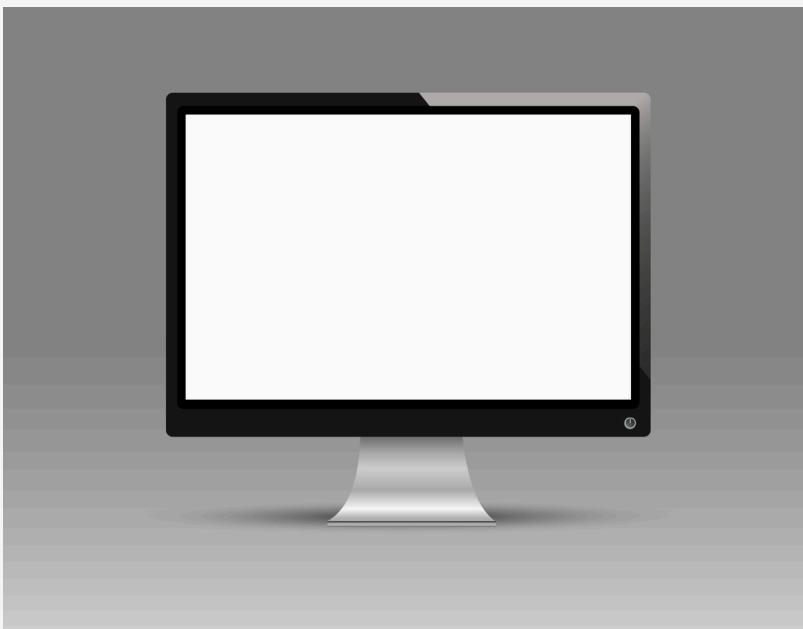
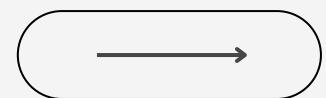
02



03

OUTPUT

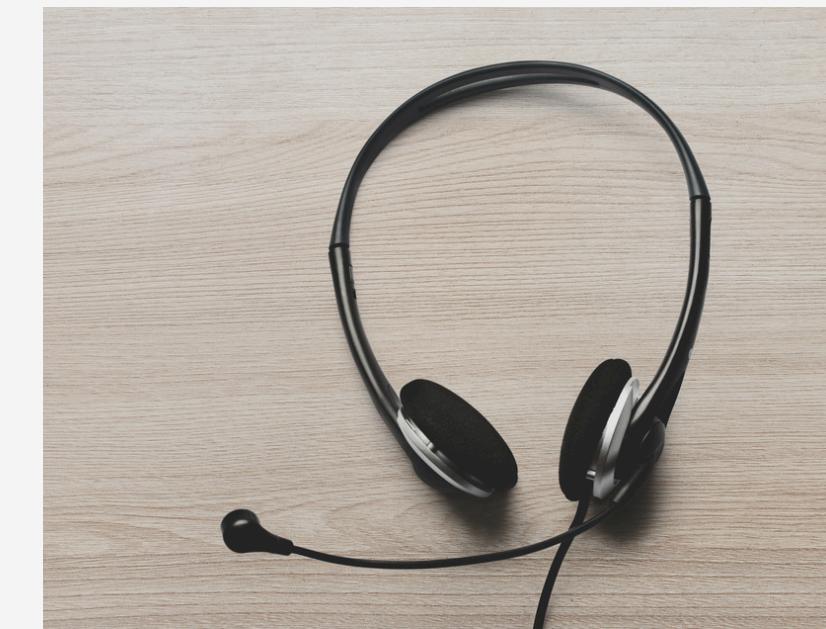
Once the data has been processed, the computer needs to present the results to the user. This is where the output function comes into play. Output devices such as monitors, printers, and speakers are used to display or produce the processed data in a human-readable form. Output makes it possible for users to see, hear, and interact with the results of the computer's processing. (Rajkumar, 2024).



01



02



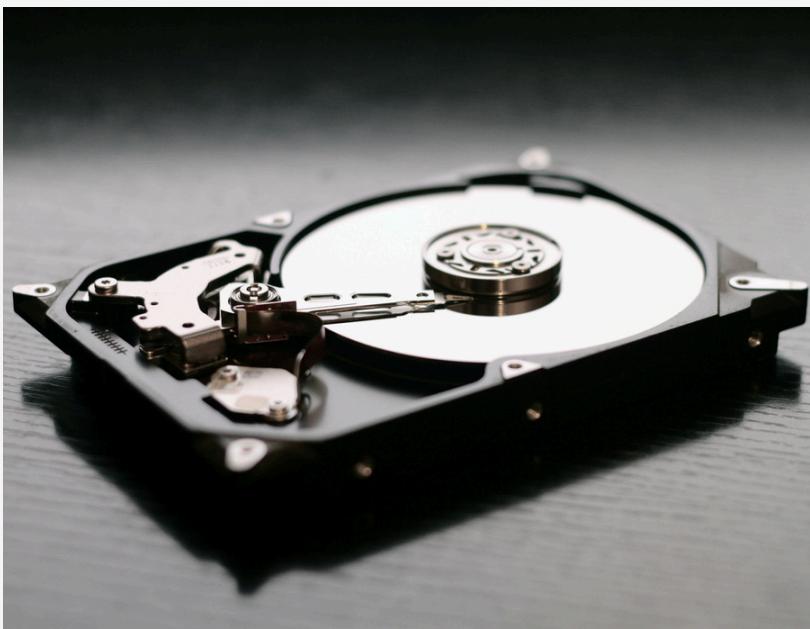
03

STORAGE

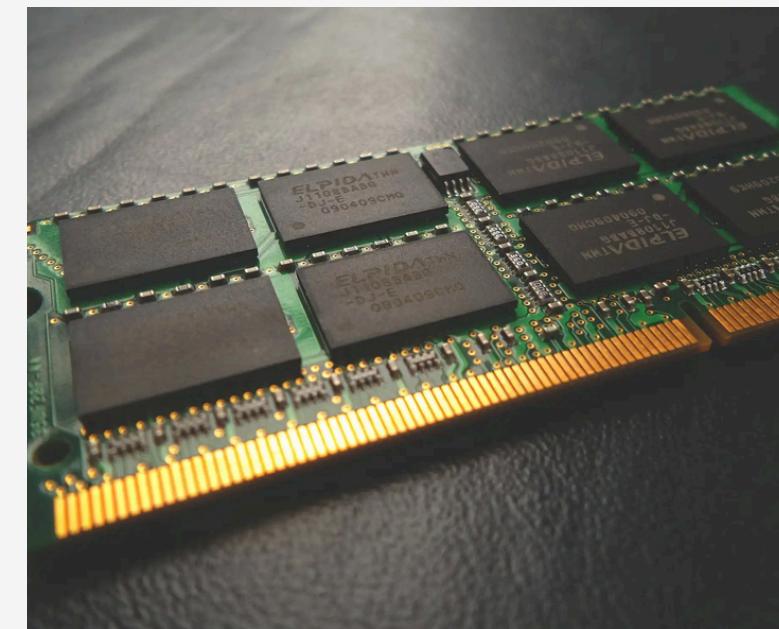
The storage function deals with saving data for future use.

Computers have both temporary (RAM) and permanent (hard drives, SSDs) storage devices. Temporary storage, or memory, holds data that the CPU needs while performing tasks, but this data is lost when the computer is turned off.

Permanent storage, on the other hand, retains data even when the computer is powered down. This allows users to save their work, install software, and store important files for future access (Rajkumar, 2024).



01



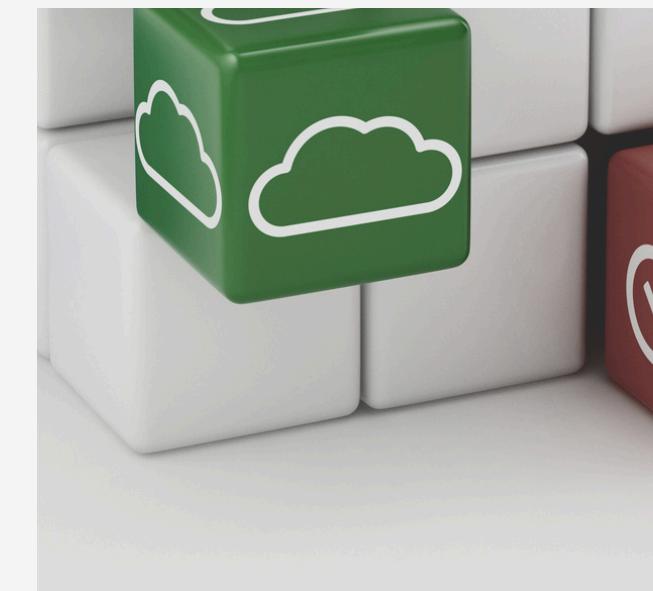
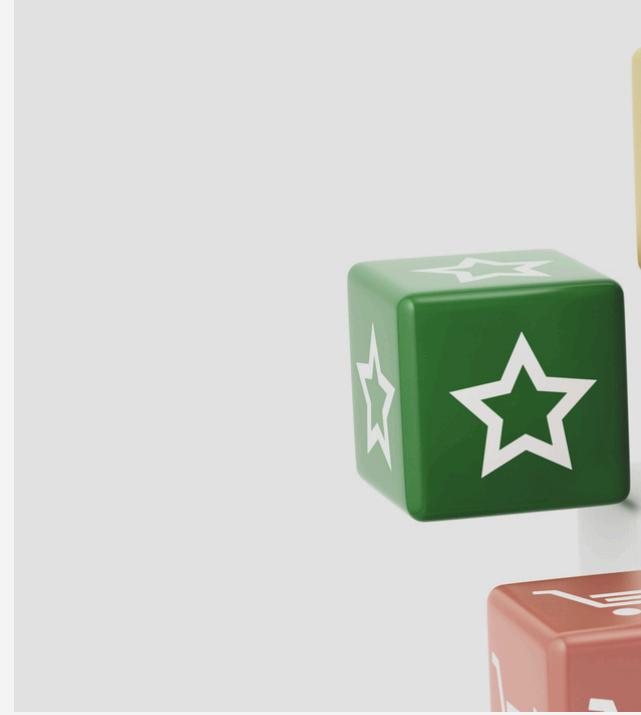
02



03

SOFTWARE

Object-oriented development is an approach based on the concept of developing a software system in terms of objects and their interactions (Tsagatidou, et al., 1991).



Who invented it?

The history of software and its development can be traced to the early nineteenth century. All computer systems are designed to utilize the "stored program concept" as first developed by Charles Babbage in the 1850s (Computer software, 1986).





Overview

01

Application Software is a kind of software that performs specific functions for the end user by interacting directly with it (Satis, 2024).



02

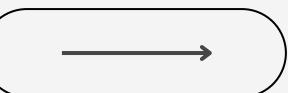
System software is a program that is architected to execute and process hardware and application software development simultaneously (Halwai, 2024).

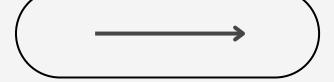
- General Purpose Software
- Specific Purpose Software

- System Management Software
- System Development Software

APPLICATION SOFTWARE

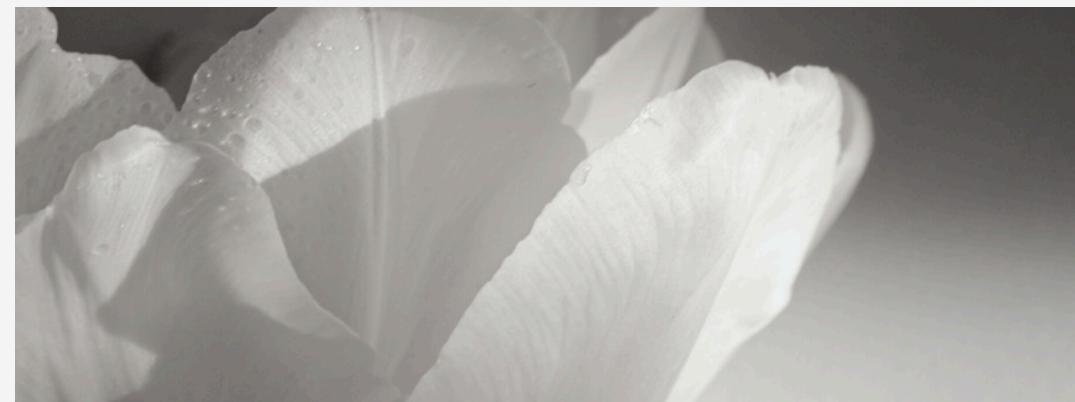
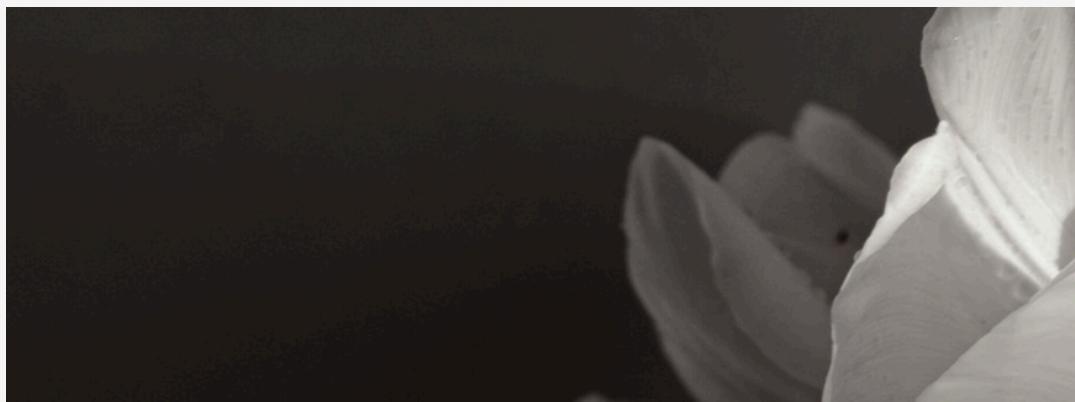
Application Software is a type of computer program that performs specific functions. These functions, performed by application software, can be personal, business as well as educational. Thus, application Software is also known as end-user software or productivity software (Halwai, 2021).



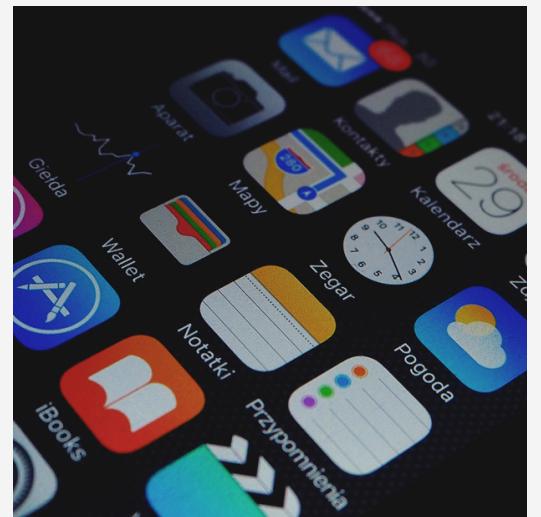


What is a General-Purpose Application Software?

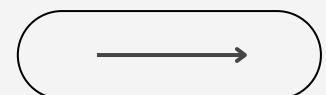
General-purpose software performs a large range of specific basic tasks. They fulfill all the general tasks that a person needs to perform on the system. There are numerous applications that a user needs to perform. Among them, some variety of applications that are frequently used comes under this category (Application Software, n.d.).



The four types of Suites

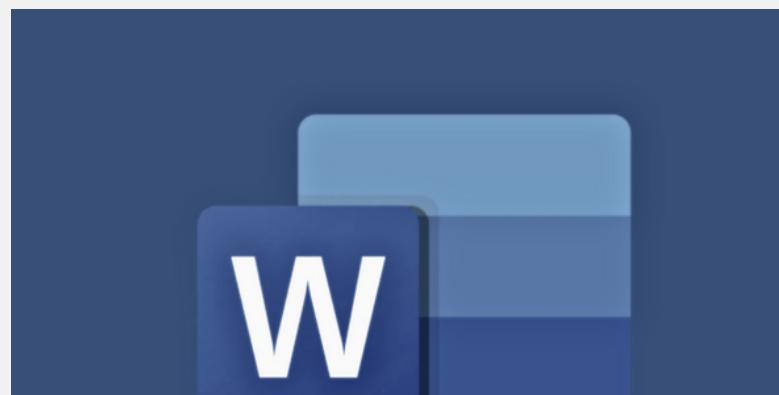


- Office Productivity Suites
- Integrated Development Environment Suites
- Graphic Processing Suites
- Web Browsers



OFFICE PRODUCTIVITY SUITES

Are collections of productivity programs intended to be used by knowledge workers.



WORD PROCESSORS

operation in which a text-editing software program called a word processor is used to create a document on a computer. A word-processing system can produce a wide variety of documents, including letters, memoranda, and manuals, rapidly and at relatively low cost (Britannica, 2024).



ELECTRONIC SPREADSHEETS

software programs designed to organize, calculate, and analyze numerical data in tabular form. They are part of office productivity suites and are highly flexible and fast with numbers (Brudner, 2015).



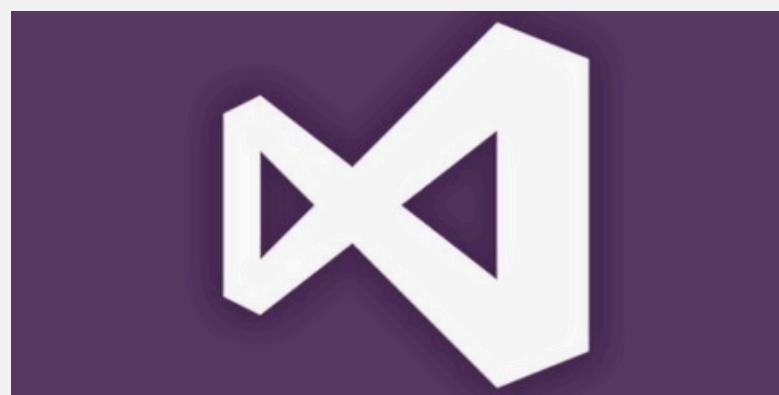
PRESENTATION SOFTWARE

a type of computer application software that is designed to help users create digital presentations, or slide shows, to convey information in a more engaging way (Turner, 2023).



INTEGRATED DEVELOPMENT ENVIRONMENT SUITES

Are suites, or programs bundled together for the development of new software. This may include code-generating software, CASE-tools, testing and debugging tools, and more. (**NOTE:** These fall better under the system software category.)



VISUAL STUDIO

Developed by Microsoft, offering IDEs for Windows, web, and mobile development (Gillis, n.d.).



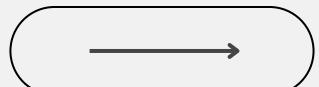
ECLIPSE

An open-source IDE supporting multiple programming languages (Gillis, n.d.)



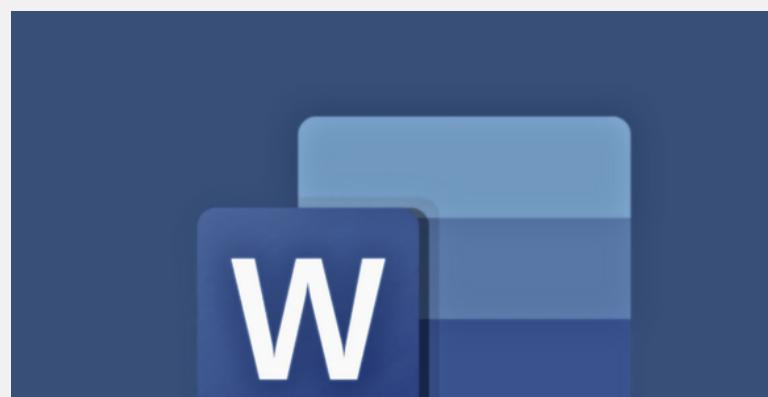
XCODE

Developed by JetBrains, known for its advanced features in Java development (Gillis, n.d.).



GRAPHIC PROCESSING SUITES

Are used for image processing, these usually include image-processing, motion-processing, image-authoring or a combination of the aforementioned applications.



ADOBE CREATIVE SUITE

A comprehensive suite including Photoshop, Illustrator, After Effects, and Premiere Pro (Luo & Guo, 2017).



GIMP

A free, open-source alternative to commercial image editors (Luo & Guo, 2017).



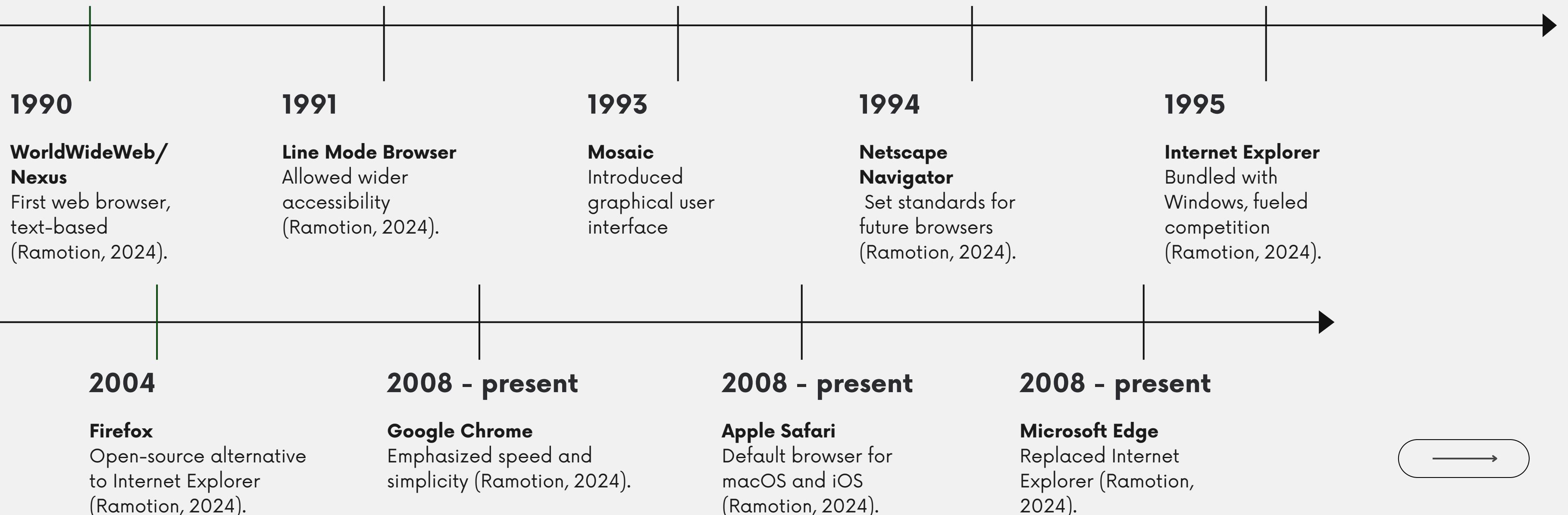
BLENDER

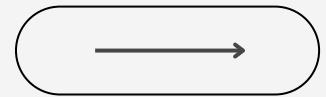
A free, open-source 3D creation suite that includes modeling, rigging, animation, and rendering (Luo & Guo, 2017).



WEB BROWSERS

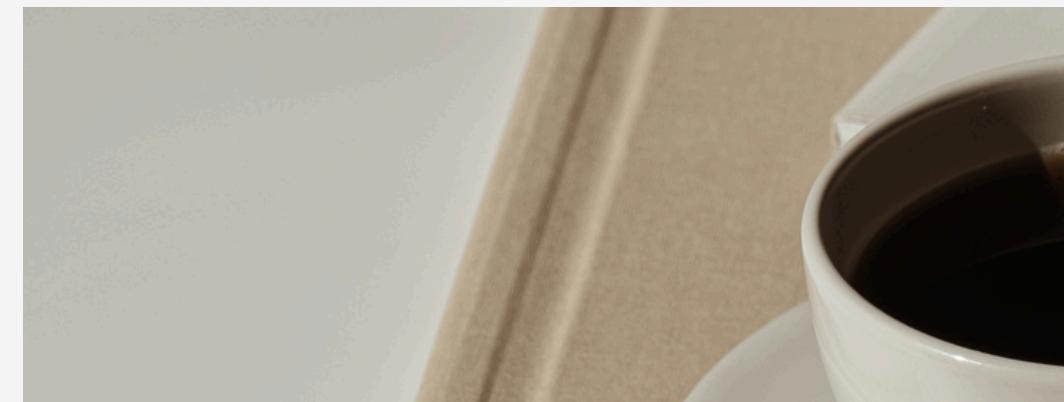
These are client software that reads and renders web pages. From simply rendering static web pages, web browsers are now used to deliver desktop-like applications such as office productivity suites, banking transactions, marketing transactions, etc.





What is a Application Specific Software?

Application software provides a wide range of solutions designed to cater to various needs and goals. Selecting the appropriate application software can revolutionize your operations and boost efficiency. Additionally, it can significantly affect your profitability, enhancing overall business performance (Mobile App Development, 2024).



What is a Business Application Software?



The simple business software definition is an application or program designed to help companies perform various business functions efficiently. These functions can range from managing finances and inventory to streamlining communication and improving customer relationships (Gunnel, 2024).

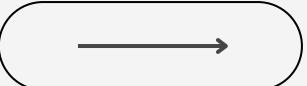
9 POPULAR EXAMPLES THAT ARE COMMONLY USED BY ORGANIZATIONS:

1.) Enterprise resource planning (ERP)

is a platform companies use to manage and integrate the essential parts of their businesses. Many ERP software applications are critical to companies because they help them implement resource planning by integrating all the processes needed to run their companies with a single system (Team, 2024).

2.) Customer relationship management (CRM)

is the combination of practices, strategies and technologies that companies use to manage and analyze customer interactions and data throughout the customer lifecycle. The goal is to improve customer service relationships and assist with customer retention and drive sales growth (Hashemi-Pour, n.d.).



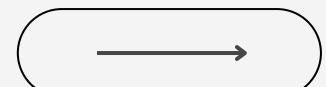
9 POPULAR EXAMPLES THAT ARE COMMONLY USED BY ORGANIZATIONS:(cont'd)

3.) Database (DB)

is a software system for creating and managing databases. A DBMS enables end users to create, protect, read, update and delete data in a database. It also manages security, data integrity and concurrency for databases (Yasar, n.d.).

4.) Project Management Software (PMS)

is a tool, supported by technology, that helps streamline and organize business operations. A PM tool can focus on one area of a business, such as marketing, or extend out into all areas, from production to inventory and operations to IT and beyond. You might visualize it like a hub where team tasks are recorded, accessed, and measured (Gannon, 2023).



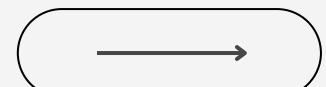
9 POPULAR EXAMPLES THAT ARE COMMONLY USED BY ORGANIZATIONS :^(cont'd)

5.) Business Process Management (BPM)

is a structured approach to improving the processes organizations use to get work done, serve their customers and generate business value. A business process is an activity or set of activities that helps accomplish an organization's goals, such as increasing profits or promoting workforce diversity (Tucci, n.d.).

6.) Productivity Software

is a category of application programs that help users produce things such as documents, databases, graphs, spreadsheets and presentations (Hanna, n.d.). They can be extended to include tools that improve collaboration and communication (OKIKI, 2024).



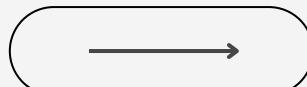
9 POPULAR EXAMPLES THAT ARE COMMONLY USED BY ORGANIZATIONS:(cont'd)

7.) Resource Management Software (RMLS)

helps project managers track and forecast resources across multiple projects. The most common features in these tools help to enhance project visibility, control, and efficiency (Low, 2024).

8.) Time Management Software

is a digital tool designed to manage and monitor the time that employees or workers dedicate to their work tasks. These programs make it easy to track attendance, hours worked, overtime, or absences (Armas, 2024).



9 POPULAR EXAMPLES THAT ARE COMMONLY USED BY ORGANIZATIONS:(cont'd)

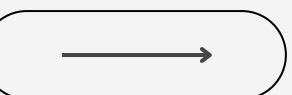
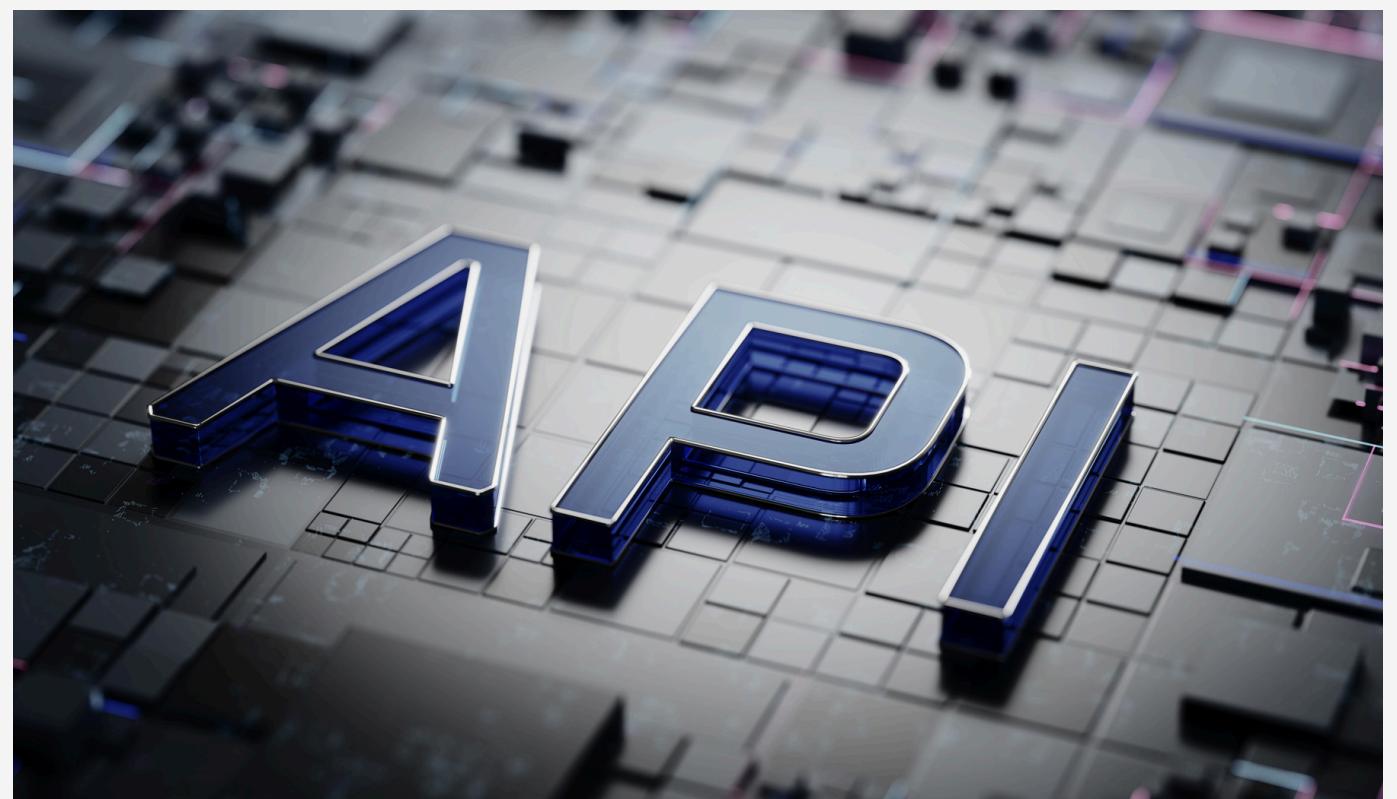
9.) Educational Software

A learning management system (LMS) is a software application or web-based technology used to plan, implement and assess a specific learning process. In its most common form, an LMS consists of a server that performs the base functionality and a user interface (UI) (Hashemi-Pour, 2024).



System software is a type of computer program that is designed to run a computer's hardware and application programs. If we think of the computer system as a layered model, the system software is the interface between the hardware and user applications. The operating system is the best-known example of system software. The OS manages all the other programs in a computer (Lutkevich, n.d.).

SYSTEM SOFTWARE



overview between the two types of system software

SYSTEM MANAGEMENT SOFTWARE

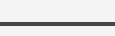
refers to software that runs, manages, and/or supports computer hardware, networking, application software execution, and data resources

- Device Drivers

SYSTEM DEVELOPMENT SOFTWARE

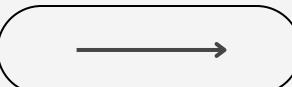
refers to a set of computer science activities that are dedicated to the process of creating, designing, deploying, and supporting software.

- Programming Languages
- Integrated Development Environments



System Management Software

Systems management is the administration of the information technology (IT) systems in an enterprise network or data center. An effective systems management plan facilitates the delivery of IT as a service and allows an organization's employees to respond quickly to changing business requirements and system activity (Lutkevich, n.d.).

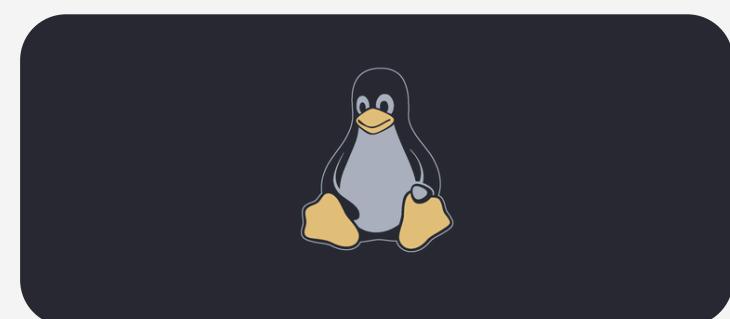


EXAMPLES OF SYSTEM MANAGEMENT SOFTWARE



Windows-Based Operation Systems

user-friendly interface with familiar features like the Start menu, taskbar, and windowed applications



Linux/Unix based Operating Systems

offers flexibility and customization options, allowing users to modify nearly every aspect of the operating system



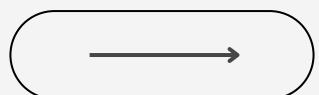
MAC OS

offers a sleek, visually appealing interface known for its elegant design and intuitive user experience.



OS X

essentially the same as macOS. It refers to earlier versions of Apple's operating system for Mac computers, which evolved into macOS over time.



Device Drivers



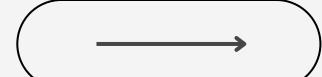
USB Drivers



Printer Drivers



ROM Drivers



Definition:

- A device driver is a software program without a user interface (UI) that manages hardware components or peripherals attached to a computer and enables them to function with the computer smoothly.

Examples:

Graphics Card Drivers:

- ATI Radeon
- NVIDIA

Printer Hardware and Software:

- Hewlett-Packard
- Epson

Motherboard Hardware and Drivers:

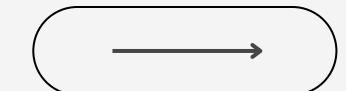
- ASUS
- Intel
- Gigabyte

System Development Software

Software development involves the design, programming, testing, documenting, and ongoing maintenance of software programs and systems. It is becoming a core function in many organizations, and plays a critical role in digital transformation, which is the use of technology to improve business strategy, products and services, and business processes (Team, n.d.).



Programming Languages



Definition:

- A programming language is a set of instructions written by a programmer to deliver instructions to the computer to perform and accomplish a task. This set of instructions is usually viewed as incomprehensible code structured following a definite programming language syntax (Tuama, n.d.).

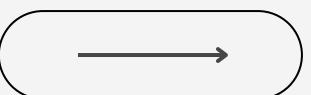
Examples:

1. **Python** - High-level, interpreted language known for its simplicity and versatility.
2. **JavaScript** - Client-side scripting language widely used for web development.
3. **C++** - Powerful, performance-oriented language with low-level memory management capabilities

The five types of programming languages



- ↓ Procedural Programming Language
- ↓ Functional Programming Language
- ↓ Object-oriented Programming Language
- ↓ Scripting Programming Language
- ↓ Logic Programming Language



5 TYPES OF PROGRAMMING LANGUAGES



Procedural Programming Language

Procedural languages are based on the data viewing range of a code statement.

Examples include Ada, BASIC, C/C++ and JavaScript (Indeed Editorial Team, 2024).

Functional Programming Language

Functional languages use stored data to perform recursive functions, which execute a process and then repeat it to solve any errors that arise during programming.

Examples include Agda, Cuneiform, PureScript and APL (Indeed Editorial Team, 2024).

Object-oriented Programming Language

Object-oriented language identifies everything it encounters as objects that have internal and external data and then it performs based on moving these "objects" to where they need to be.

Examples include Java, Visual Basic .NET, Ruby and Python (Indeed Editorial Team, 2024).

Scripting Programming Language

Scripting languages solve smaller programming issues and can be used to write operating system utilities.

Examples include Perl, PHP, JavaScript and Python (Indeed Editorial Team, 2024).

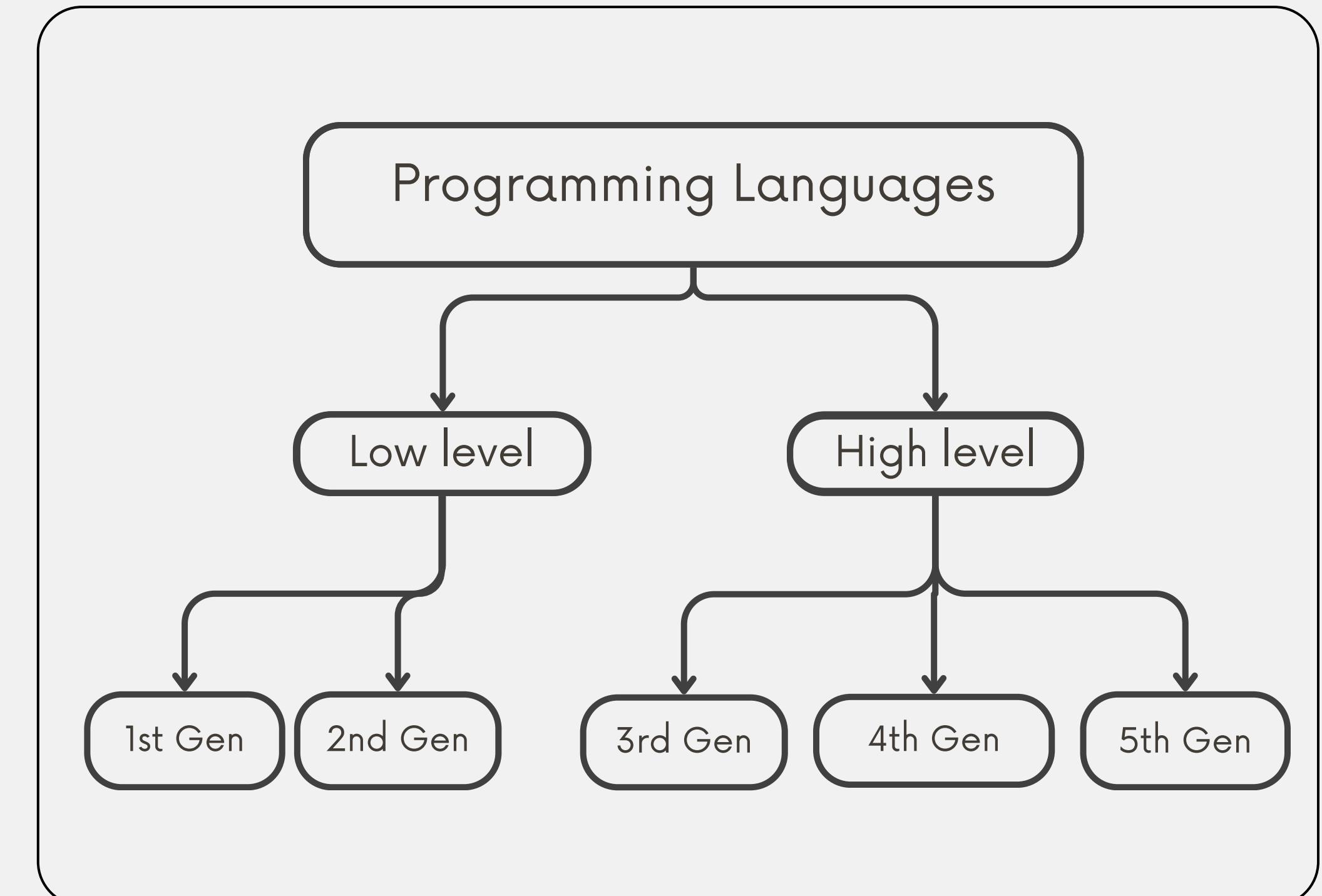
Logic Programming Language

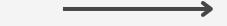
Logic programming languages add restrictions to statements made by developers that cause the computer to consider the possible outcomes of different actions.

Examples include Prolog, ASP and Datalog (Indeed Editorial Team, 2024).

LEVELS OF PROGRAMMING LANGUAGES

- 1GL – Machine Language
- 2GL – Assembly Language
- 3GL – High-Level Languages
- 4GL – Natural Languages
- 5GL – Natural Languages
- Other Languages:
 - Web Languages
 - Frameworks
 - RIA languages





1

1GL – Machine Language

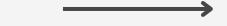
Machine language, also known as the **1GL** (First generation language), is the most basic programming language that computers can comprehend. It operates at the machine level and consists of a series of binary codes represented by 0s and 1s (Thomas, n.d.).

Ex.

1010 11001

1011 11010

1100 11011



2

2GL – Assembly Language

Assembly language, the **2GL** (Second-generation programming language), uses mnemonic codes to represent machine instructions. These mnemonics are easier for humans to understand than the complex binary code of machine language (Thomas, n.d.).

Ex.

MOV AX, BX

LEA DX, BX

ADD CX, 5



3

3GL – High-Level Languages

The 3GL (Third-generation language) utilizes high-level languages, like C, Java, Python, and JavaScript, which are more user-friendly than low-level languages. They use English-like statements and keywords for coding, making them easier to understand and write (Thomas, n.d.).

Ex.

(In C): `x = y + z;`

(In COBOL): `COMPUTE X = Y + Z`

(In Pascal): `x:= y + z`

4

4GL - Natural Languages

The 4GL (Fourth-generation languages) primarily concentrate on database management tasks. They allow developers to interact with databases more efficiently, simplifying data retrieval and manipulation. (Thomas, n.d.).

Ex.

(MySQL):

```
SELECT employee_ID FROM EMPLOYEE WHERE age=24;
```

(IBM Informix 4GL):

```
DISPLAY " INFORMIX-4GL By Example Application" AT 2,15  
ATTRIBUTE (REVERSE, GREEN)
```



5

5GL - Natural Languages

The **5GL** (Fifth-generation language) is tailored for artificial intelligence development. They heavily emphasize logic-based programming, which involves creating rules and conditions for programs to follow. This method allows programmers to focus on the logical flow of the program rather than intricate coding details.

Ex.

Mercury

OPS5

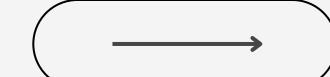
Prolog

6

OTHER LANGUAGES:

- **Web Languages** - Web application development languages and frameworks also exist.
 - **Markup languages** such as HTML, XML, help make up all web applications.
 - **Scripting languages** such as PHP, AJAX, JavaScript give interactivity to static HTML pages.
- **Frameworks** such as .NET, WordPress, Apache Struts make development much easier and more organized.
- **RIA languages (Rich Internet Application)** a Web application designed to deliver the same features and functions normally associated with desktop applications. Examples include: Microsoft Silverlight, JavaFX, and Adobe Flash.

Integrated Development Environments



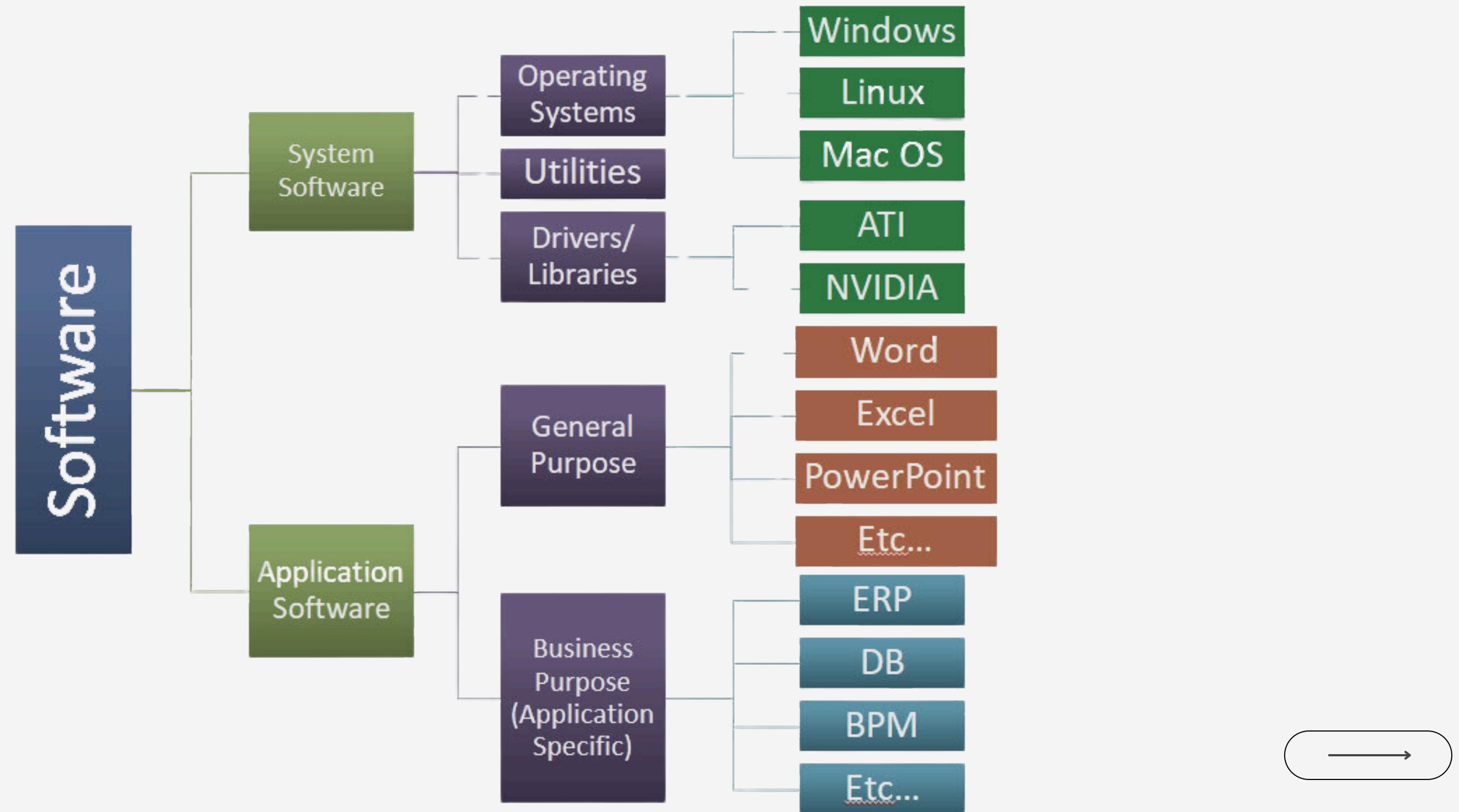
Definition:

- An integrated development environment is a software suite that streamlines the coding process by providing features that automate some aspects of computer programming. It can allow programmers to create and test their software more easily, which optimizes a team's productivity (Juma, 2023).

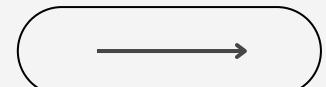
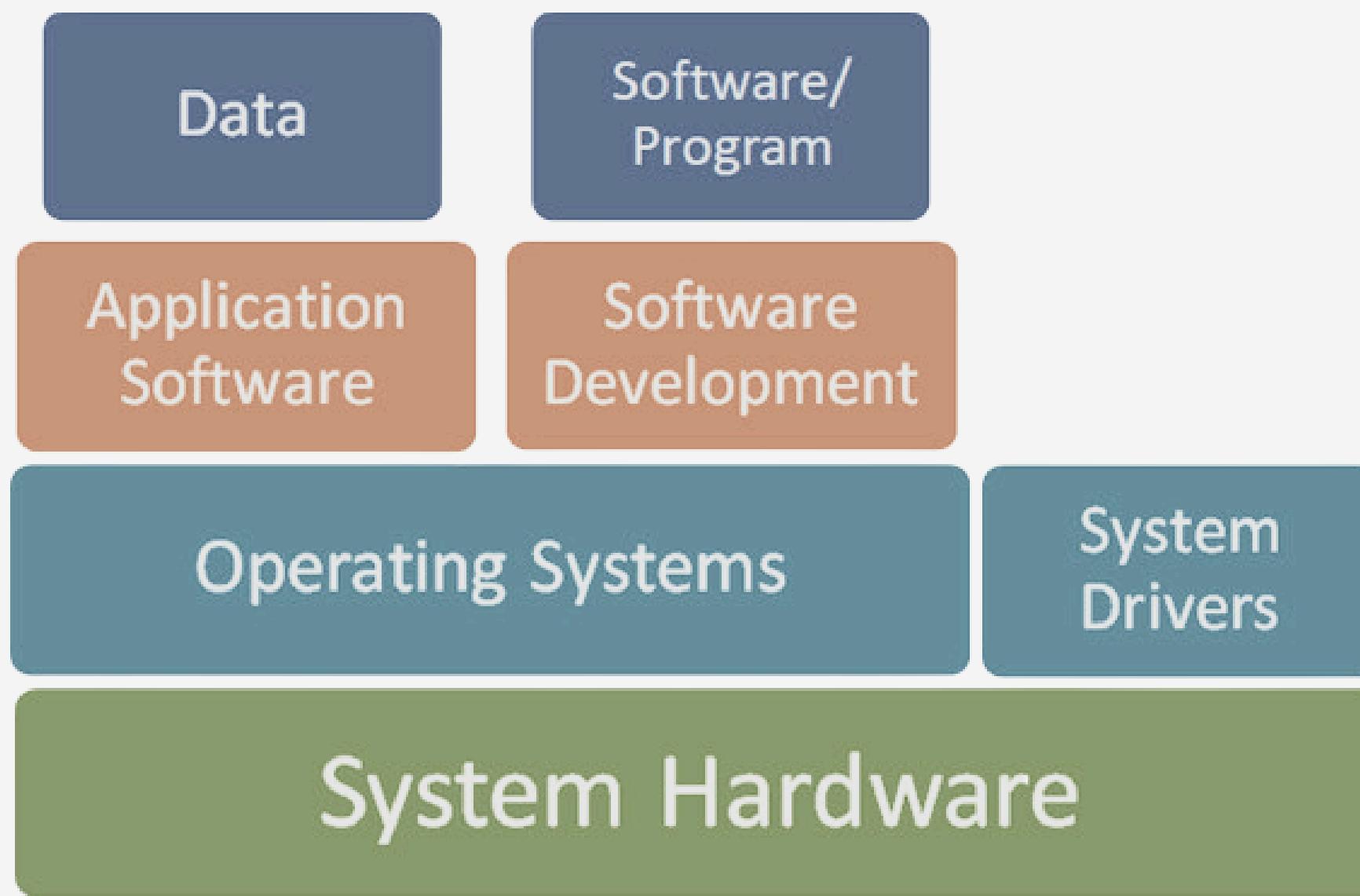
Examples:

1. **IntelliJ IDEA** - known for its powerful code analysis and optimization capabilities (Anas, 2023).
2. **Eclipse** - open-source IDE that supports a wide range of programming languages and platforms (Anas, 2023).
3. **Visual Studio** - used for enterprise-level development, especially in the .NET ecosystem (Anas, 2023).

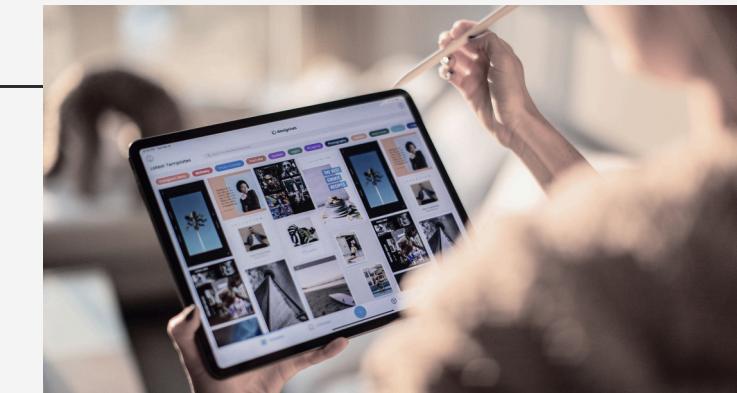
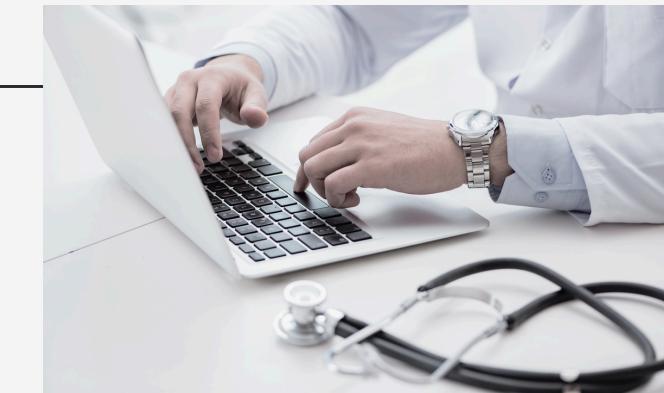
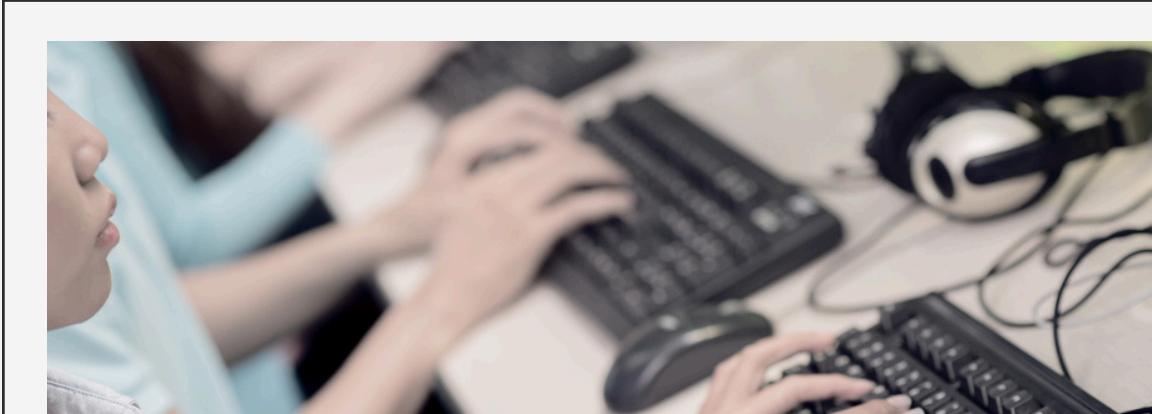
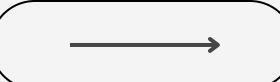
Software Hierarchy



Hardware and Software Hierarchy



HOW IS COMPUTER HARDWARE & SOFTWARE SHAPING OUR EVERYDAY LIVES?



Use of computer in **Education**

Many educational institutions are adopting online learning platforms that provide interactive and engaging content, allowing students to learn at their own pace (Simões, et al., 2022)

Use of computer in **Business**

Computers are the backbone of any business. Hardware ensures that employees can perform their tasks efficiently without frequent downtime or technical issues. Software automate routine tasks, improve accuracy, and facilitate better communication and collaboration among team members (Pathan, 2024).

Use of computer in **Healthcare Industries**

It has brought significant improvements in patient care, communication and coordination between healthcare providers, efficiency, and productivity. It has also helped in decision-making, diagnosis, reduced healthcare costs, and improved patient safety and quality of care (.Ivaniuk, 2023)

Use of computer in **Banking Sectors**

- Customers can manage accounts, transfer funds, and pay bills remotely.
- Computerized systems facilitate cash withdrawals and deposits.
- Advanced algorithms detect suspicious transactions in real-time (Kravchenko, 2024).