COMPUTER SKILLS

College of Science and Engineering
Department of Computer Science

LECTURE 2

Bahast A.

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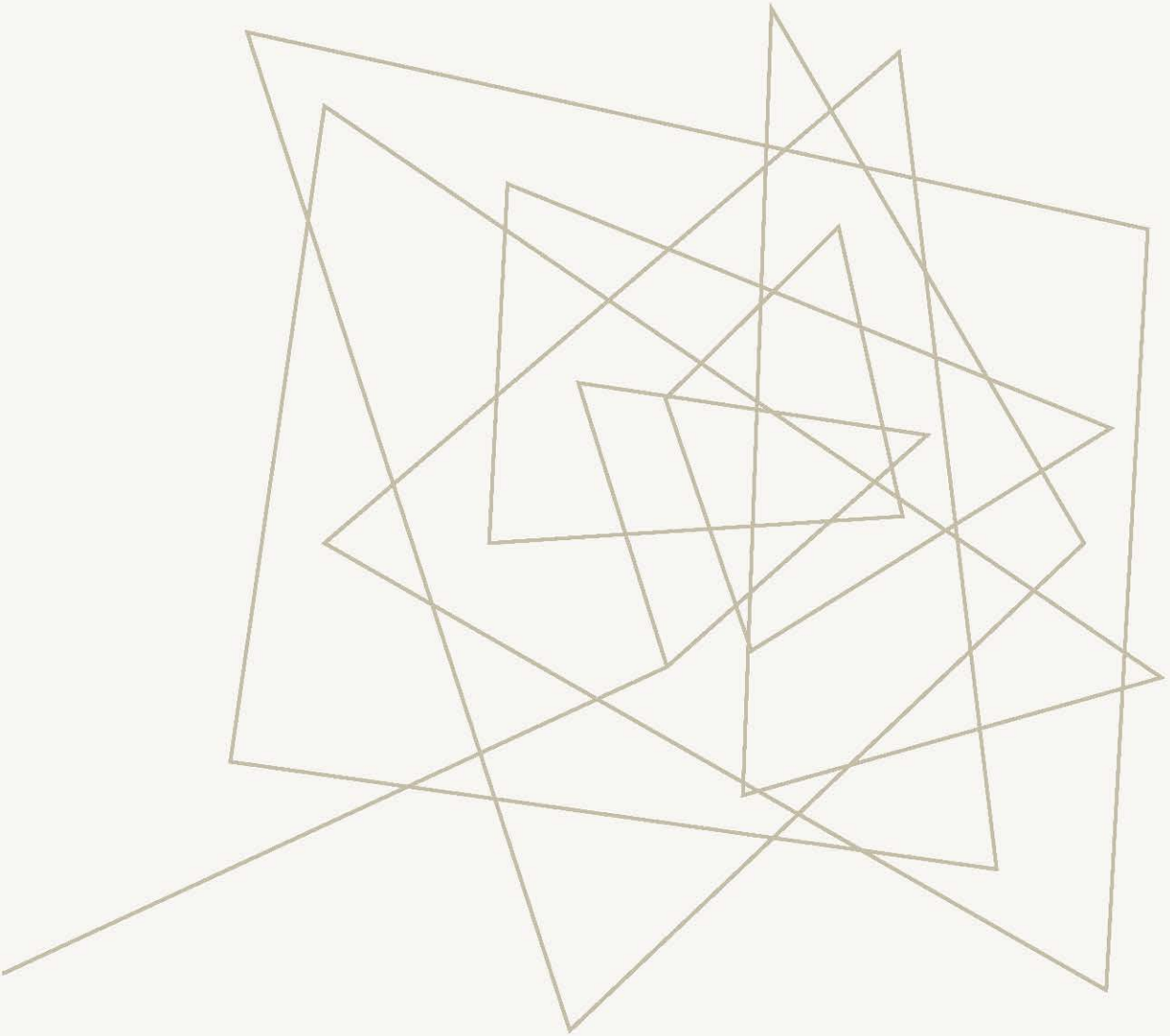
Google Classroom



LECTURE 1 RECAP

TODAY

- What is binary
- Software
- Operating System
- Programming Languages

LEARNING OUTCOMES

By the end of this lesson, you should be able to:

- **Define** & **Categorise** data measurement units.
- Differentiate between hardware & software, **identifying** software as the intangible instructions required for hardware to function.
- **Explain** application software and give examples.
- **Classify** a software as an app or system program.
- **Describe** the cycle of a software from storage to memory.

BINARY NUMERAL SYSTEM

The binary system is a way of representing data using **0s** and **1s**. This system is used by computers to represent all the data it works with.

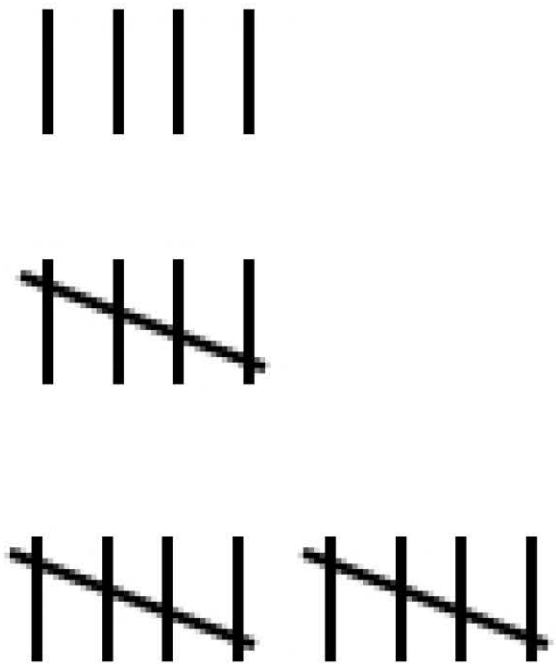
1011110000011111
0010101000100101
0101010011111001
0100001001010100
0010010010101010
0011001011

DECIMAL SYSTEM

The decimal system is also referred to as **Arabic Numbers.**
The number system we use starts with 0,1,2...9.
It has 10 complete digits in each cycle.

OTHER NUMBER SYSTEMS

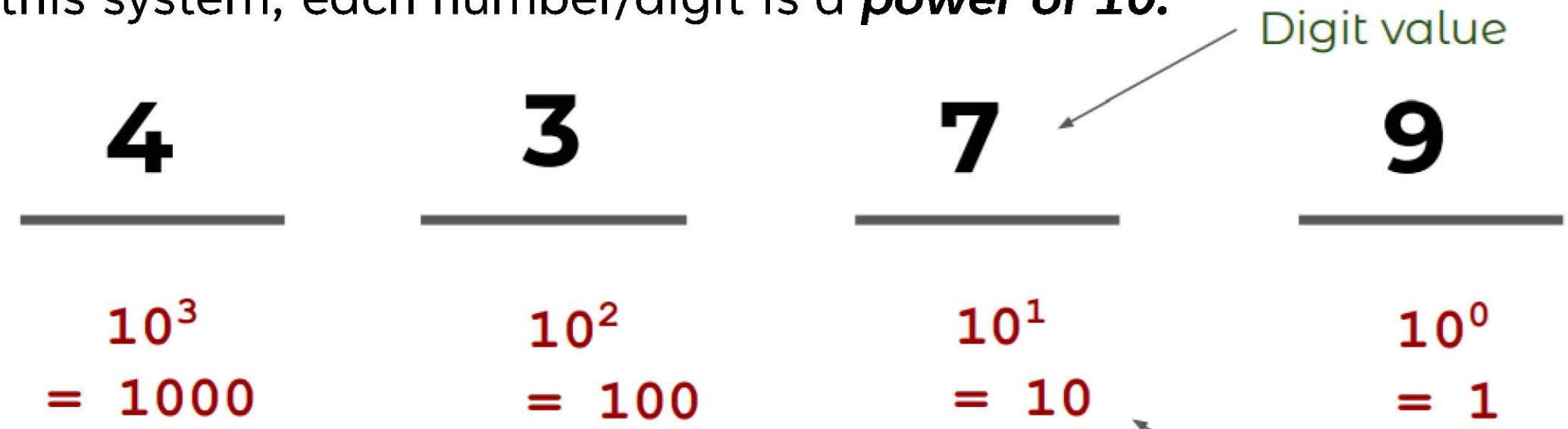
There are many different number systems, including Roman numerals, tally (Unary), Mayan etc.



I	II	III	IV	V	VI	VII
ONE	TWO	THREE	FOUR	FIVE	SIX	SEVEN
VIII	IX	X	XI	XII	XIII	
EIGHT	NINE	TEN	ELEVEN	TWELVE	THIRTEEN	
XIV	XV	XVI	XVII	XVIII		
FOURTEEN	FIFTEEN	SIXTEEN	SEVENTEEN	EIGHTEEN		
XIX	XX	L	C	D	M	
NINETEEN	TWENTY	FIFTY	ONE HUNDRED	FIVE HUNDRED	ONE THOUSAND	

DECIMAL SYSTEM

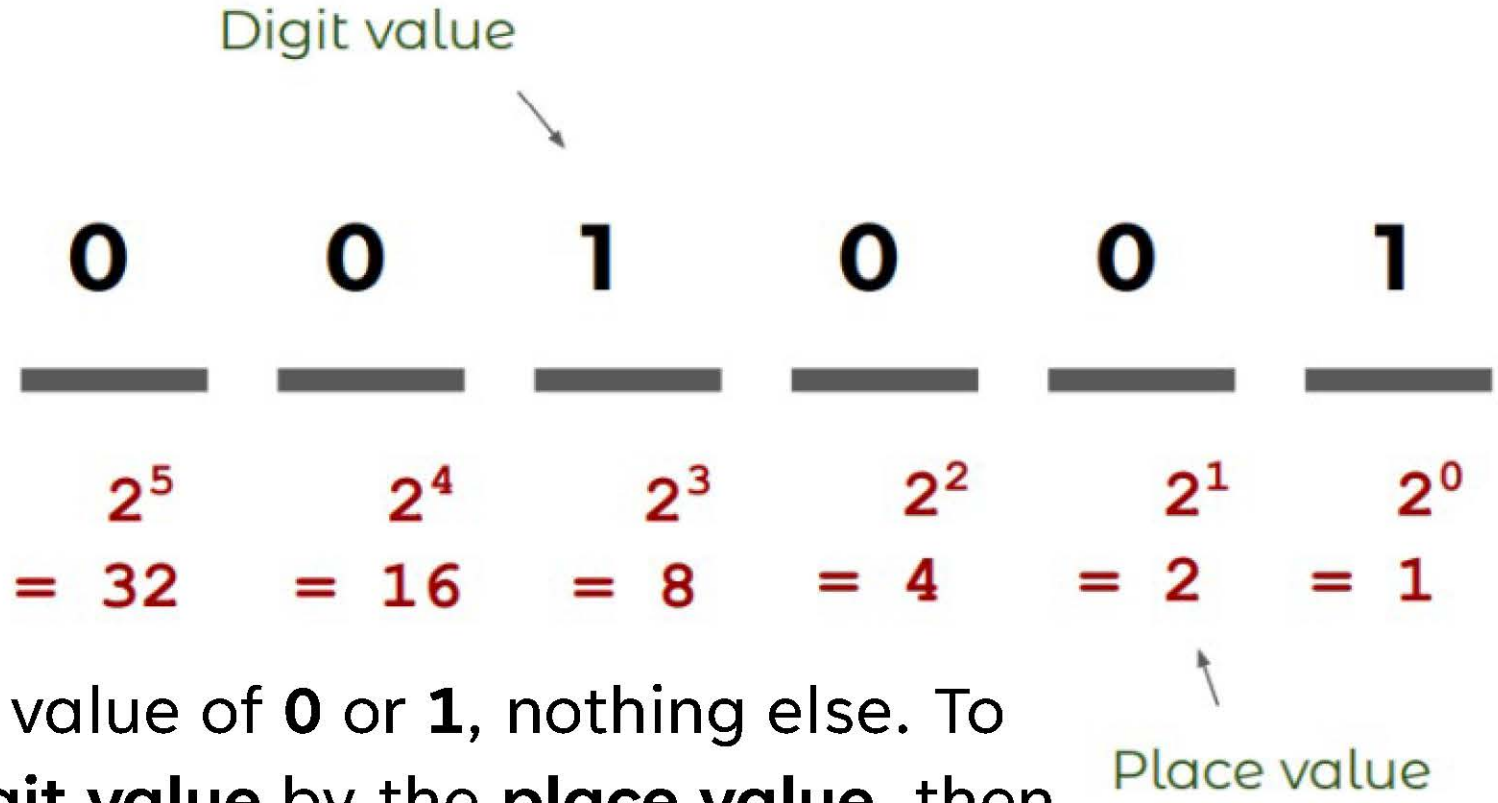
In this system, each number/digit is a ***power of 10.***



To compute a number in this system, multiply **the digit value** by the **place value**, then **add them all** together. To represent the number *4379*, you would have to compute :
*(4*1000)+(3*100)+(7*10)+(9*1)=4379*

BINARY TO DECIMAL

This system uses the structure except each number/digit is a ***power of 2.***



Each digit has a possible value of **0** or **1**, nothing else. To compute, multiply **the digit value** by the **place value**, then **add them all** up. The binary number 1001:

(1*8)+(0*4)+(0*2)+(1*1) = 9

DECIMAL TO BINARY

To convert this number back to binary, find the largest power of 2 and subtract until your total is **0**.

9/2 = 4 → r1	so 4th digit is 1
4/2 = 2 → r0	so 3rd digit is 0
2/2 = 1 → r0	so 2nd digit is 0
1/2 = 0 → r1	so 1st digit is 1

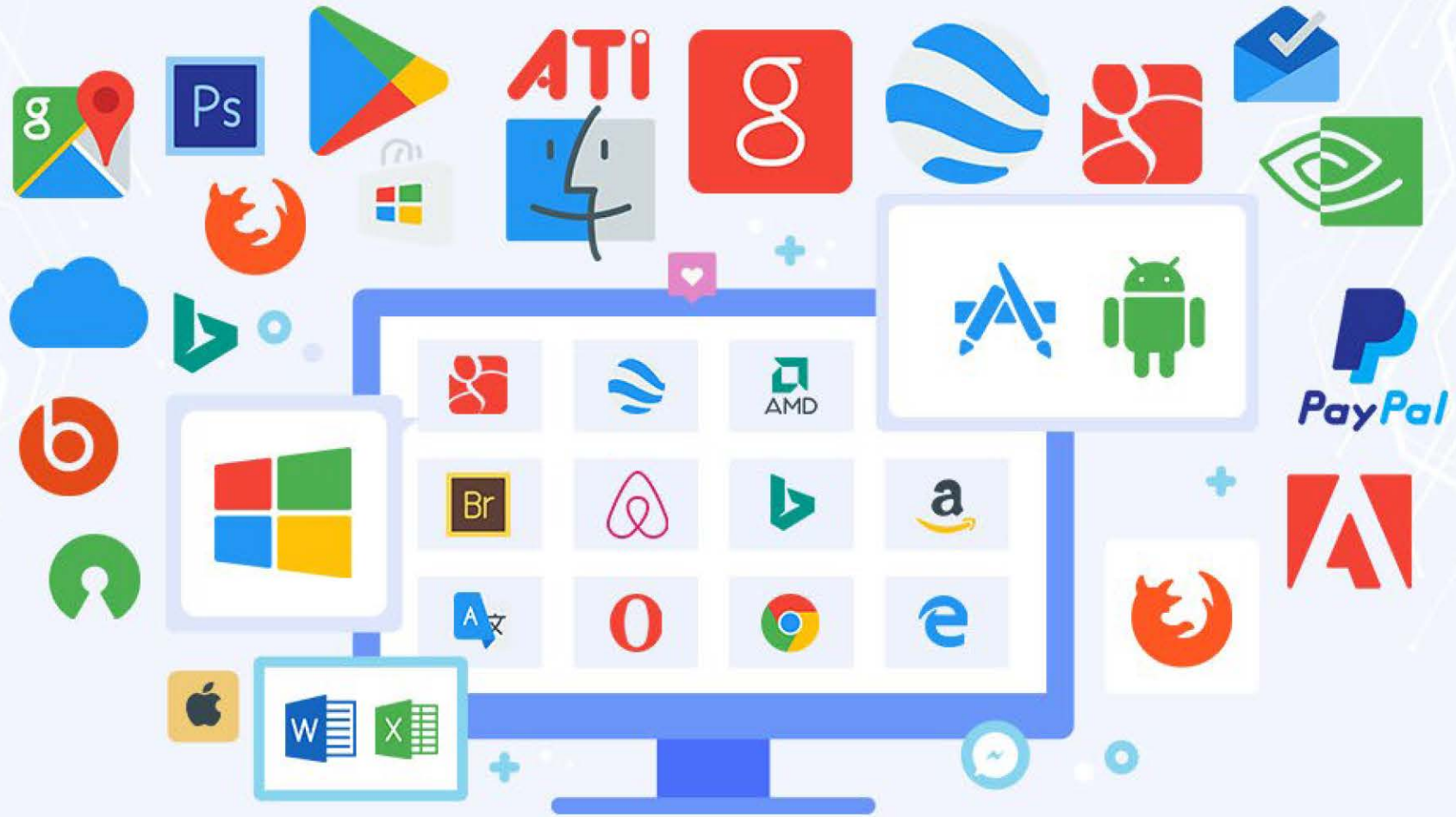
So the resulting number is **1001**.

DATA MEASUREMENT

Computers operate only in binary for processing and storage.

Bit (b) – 0 or 1
Byte (B) – 8 bits
Kilobyte (KB) – 1024 bytes
Megabyte (MB) – 1024 KB
Gigabyte (GB) – 1024 MB
Terabyte (TB) – 1024 GB

SOFTWARE



SOFTWARE

Software → intangible **set of instructions** that tell the hardware what to do.

The Hardware (The Chef/Kitchen): The physical tools, the oven, and the person doing the work. It has the power to do things but doesn't know what to do.

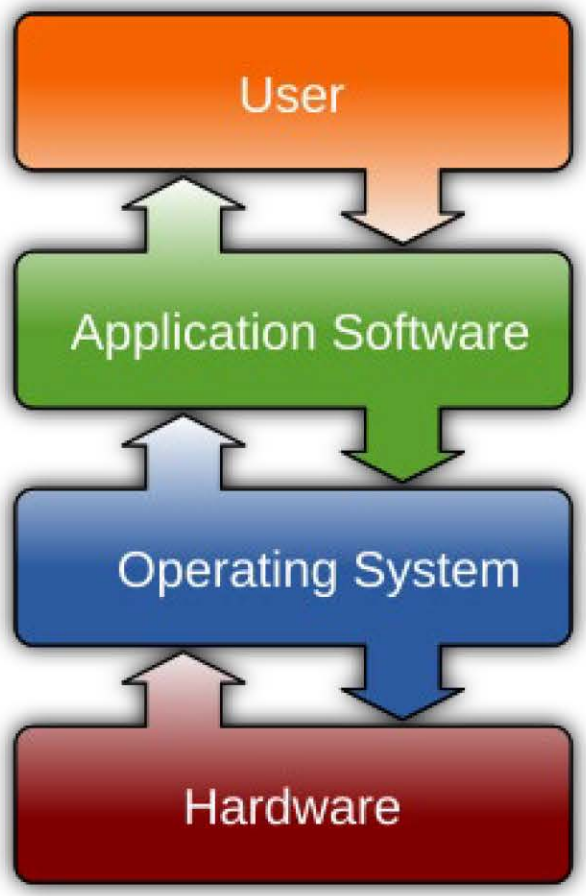
The Software (The Recipe): A set of step-by-step instructions. Without a recipe, the chef just stands there. With a recipe, the chef can make a cake, a pizza, or a salad.

SOFTWARE

Software → intangible **set of instructions** that tell the hardware what to do.

a **set of instructions**, **data** or **programs** used to operate computers & execute specific tasks.

You can't touch software;
It lives on the hardware.



OPERATING SYSTEM

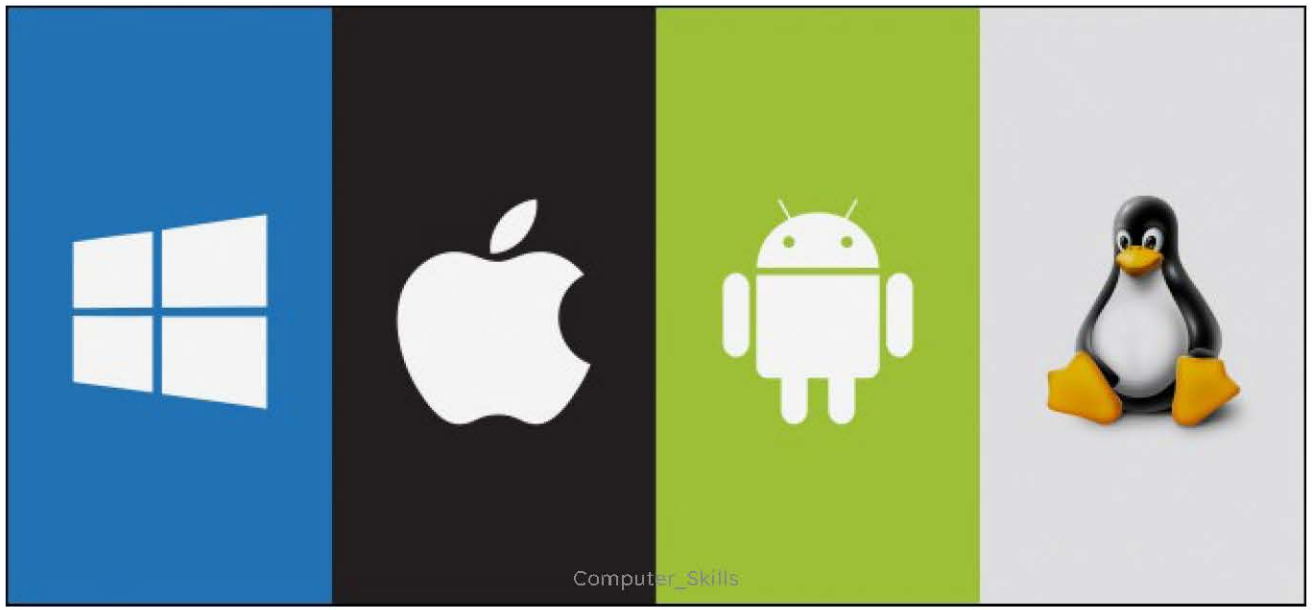
System Software (The Manager): The software that runs the computer itself.

It manages the hardware, handles the files, and makes sure the battery doesn't die.

OPERATING SYSTEM

An OS is a collection of software that manages a computer's hardware & applications by allocating resources, including memory, CPU, input/output devices and file storage.

Examples: Windows, macOS, Android, iOS.



APPLICATION SOFTWARE

The Tools that help the user do a specific tasks. These user-focused tools help with productivity, creativity, and communication.

An app operates on top of the system software such as Windows or Linux.

An app developed for a specific system cannot run on another system by default.

Examples: Word, PowerPoint, Excel, Browser, Calulator, etc.

PROGRAMMING LANGUAGES

To write a program is a complex and tedious task, especially with only machine code.

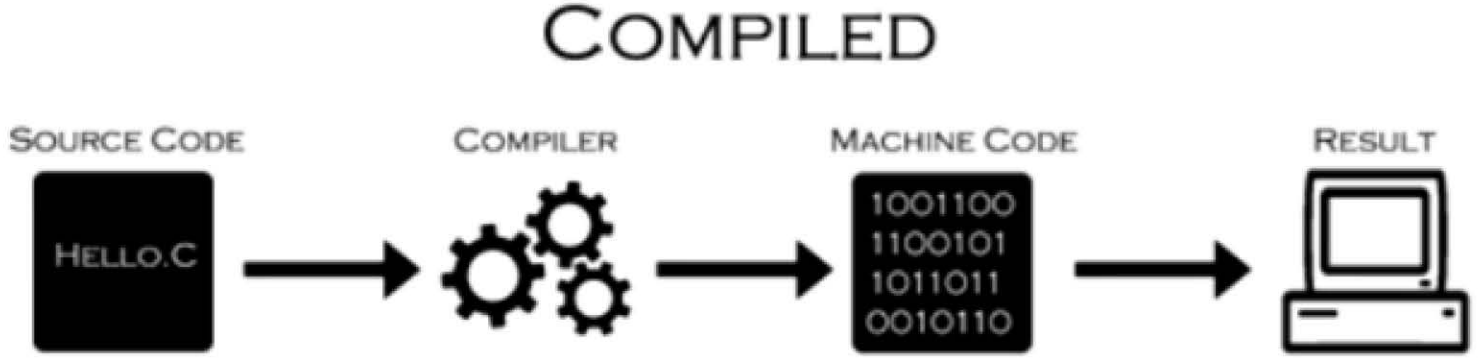
Programming languages are a **layer of abstraction** to assist in developing programs more easily.

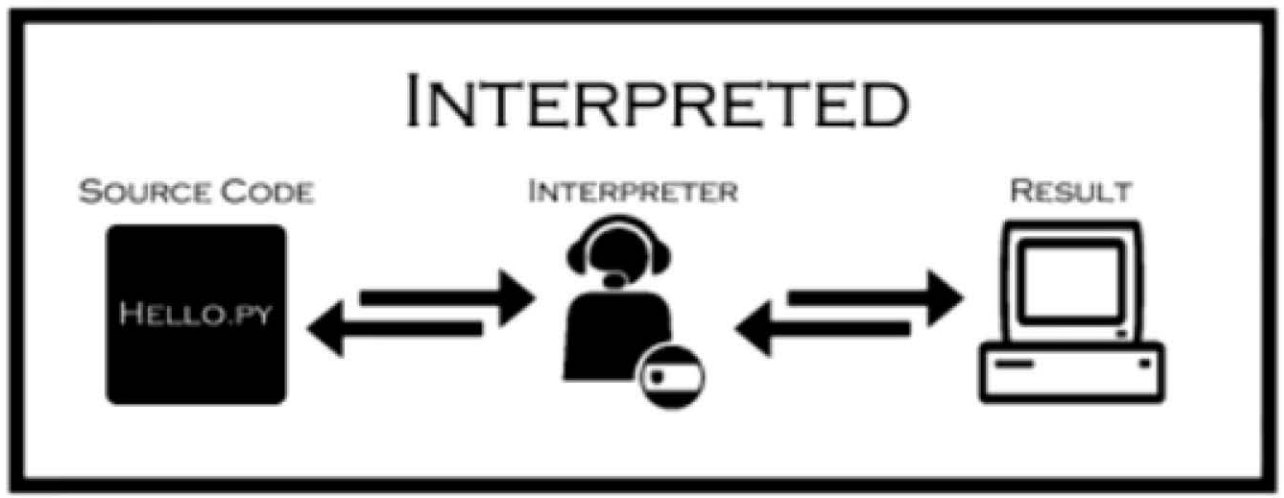
Computers only speak "1s and 0s" (Binary), but humans use "Programming Languages" (like Python or Java) as a middle ground to write instructions that are later translated for the computer.

Examples: C, C++, Java, Rust, Python, C#, etc.

COMPILED VS INTERPRETED

Computers only speak "1s and 0s" (Binary), but humans use "Programming Languages" (like Python or Java) as a middle ground to write instructions that are later translated for the computer.





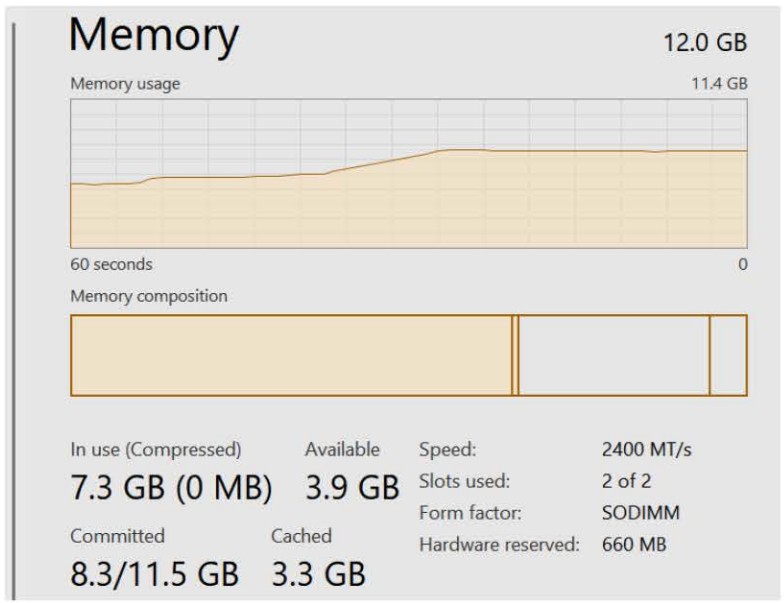
SOFTWARE STORAGE

Software ‘lives’ on your computer but depending on the state of the software it can change which component it is on.

Storage (SSD/HDD): Where the software is ‘parked’ when not in use.

Memory (RAM): Where the software "runs" when you double-click the icon.

The more software executed the more memory it will occupy.



SUMMARY

We talked about how computers process information, beginning with binary numeral system, which represents all data using only 0s & 1s. Unlike human decimal system based on powers of 10, computers use a base-2 system where each digit's value is determined by a power of 2. The lecture explained these data pieces are measured in units from a single bit & scaling up to Byte, KB, MB, & GB.

Software is the "intangible" set of instructions. Software is divided into two main categories: OS & apps.

Programming languages allows humans to write complex instructions that are eventually translated back into the computer's native binary language. Software ‘lives’ in long-term storage (SSD/HDD) when not in use but moves to RAM to run, with more active programs consuming more available memory.