



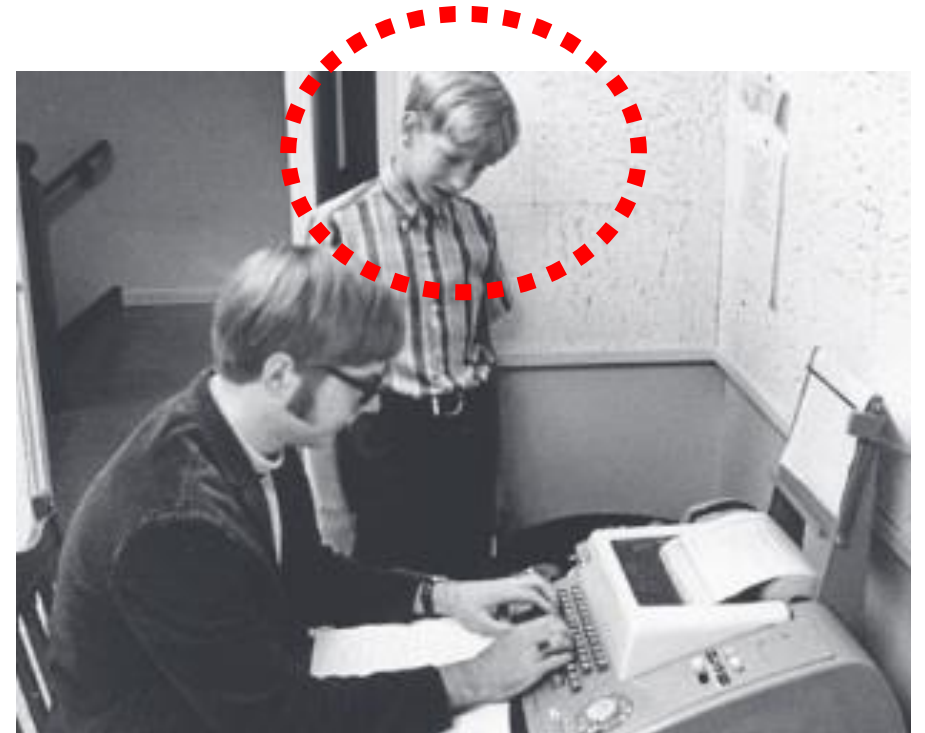
# Computer Architecture

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Computer Systems

# Brief History of Programming Languages

- 1842 – Ada Lovelace...
- 1956 - *FORTRAN*
  - Developed by a team at IBM
  - Low-level language using a compiler
- 1964 - *BASIC*
  - even schoolkids could begin to write their own programs using this new programming language *BASIC*



# Brief History of Programming Languages

Here's a nicely put together 2 minute Prezi which goes through some pivotal **History of Programming Languages**, bringing you up to the creation of the PHP scripting language in 1995

<https://goo.gl/Sco3Ks>

# Modern computer architecture:

- Cache
- CPU
- Hardware
- Machine instruction cycle/Fetch-decode-execute cycle
- Main memory
- Network
- Peripheral
- Random access memory (RAM)
- Read-only memory (ROM)
- Secondary Memory
- Software

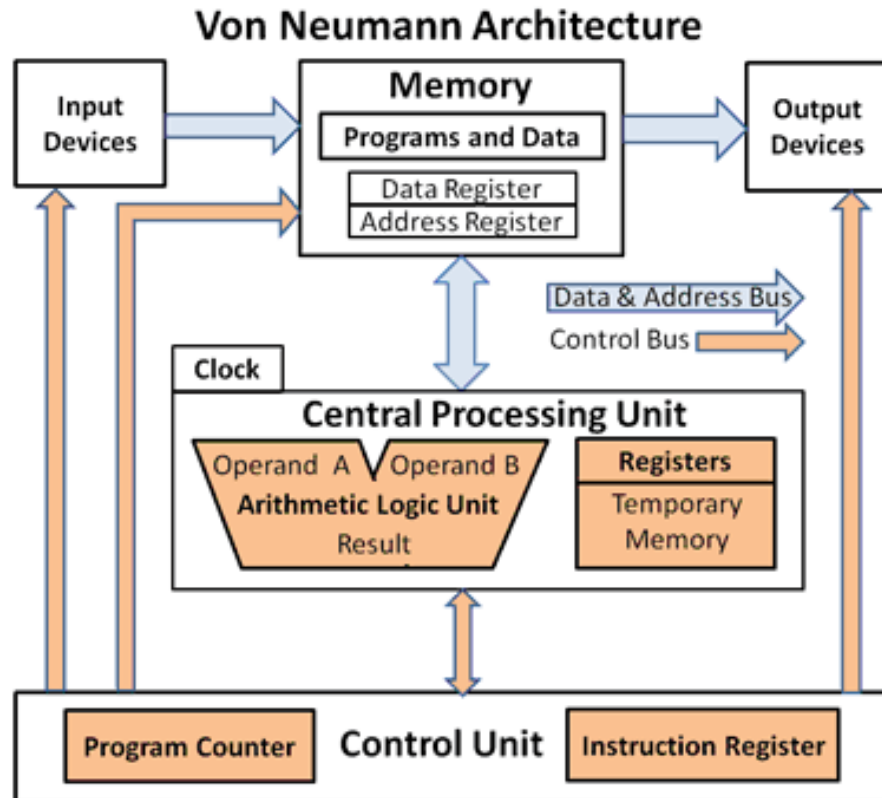
# Every Computers Basic Functions

1. Store data and programs
2. Function unattended due to its ability to interpret and follow instructions it is provided
3. Do arithmetic calculations
4. Perform logical operations

An operating system (OS) exploits the hardware resources of one or more processors to provide a set of services to system users.

- The OS also manages secondary storage memory and I/O devices on behalf of its users.

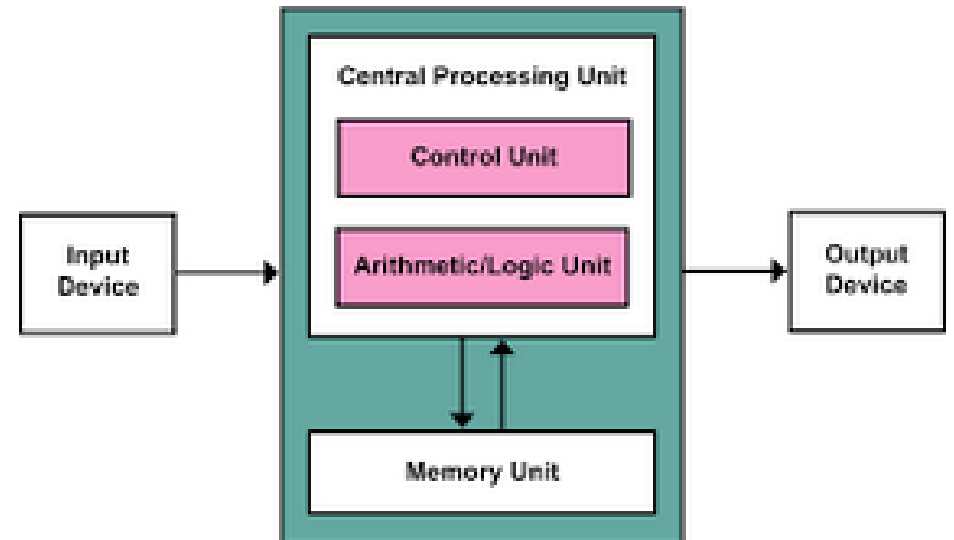
# 1945 - Von Neumann Architecture



- The basic building blocks of a stored program digital computer were defined around 1945 by Eckert and Mauchly based on their experience with their ENIAC computer (1943-1946), and used in the construction of their 1952 EDVAC stored program computer.
- A description of how these blocks were interconnected and how they functioned together was published in a progress report in 1945 by mathematician John von Neumann who worked on the project.

# 1945 - Von Neumann Architecture

- This arrangement subsequently became known as the von Neumann architecture and is the basis of most general purpose digital computers today.
- It's a design of computer system where there essentially three different entities
  1. a processing unit,
  2. an i/o unit and
  3. a storage unit

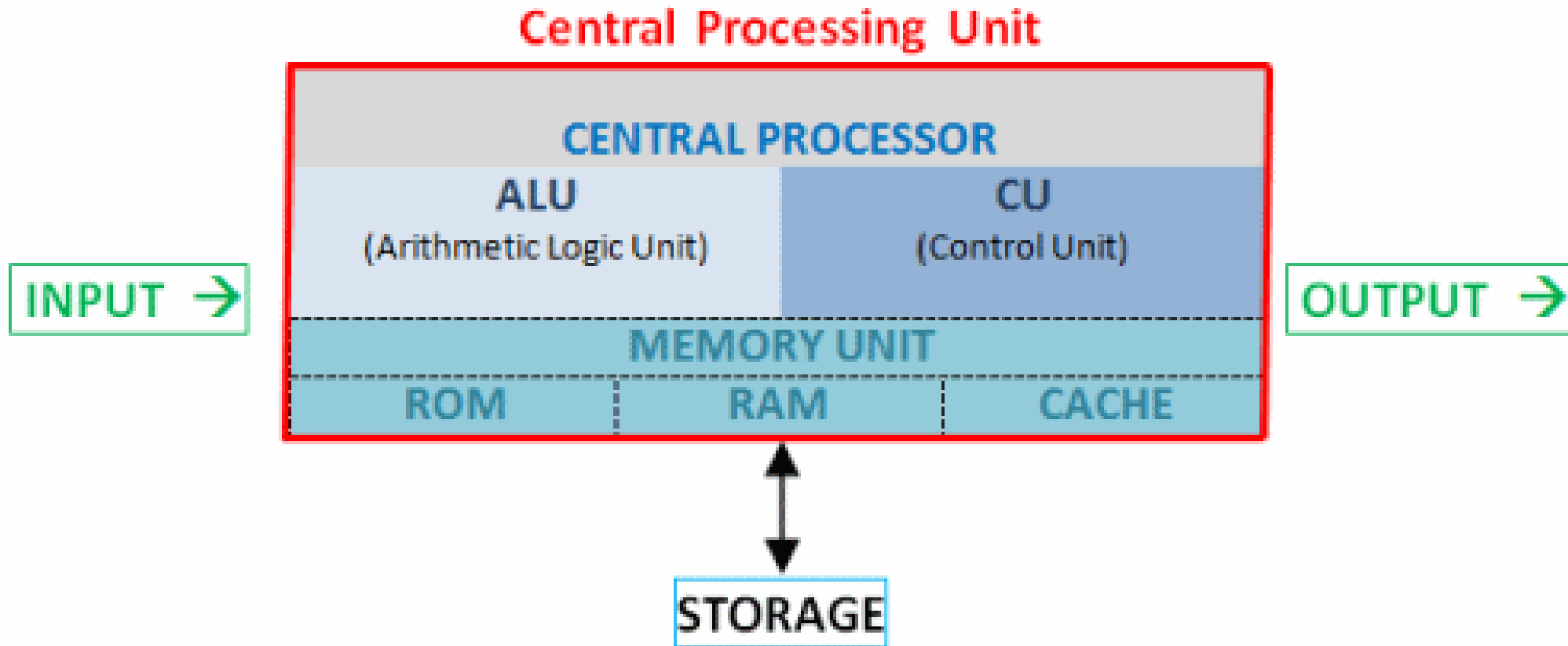


# Von Neumanns 3 Major Components

- At its most basic overview there are **three** major components:
  1. The **Arithmetic Logic Unit (ALU)** performs arithmetic operations such as addition and subtraction and logical operations such as AND, OR, and NOT.
  2. The **Control Unit (CU)** coordinates the sequencing of steps involved in executing machine instructions.
  3. **Registers** are local storage areas within the processor that are used to hold data that is being worked on by the processor.



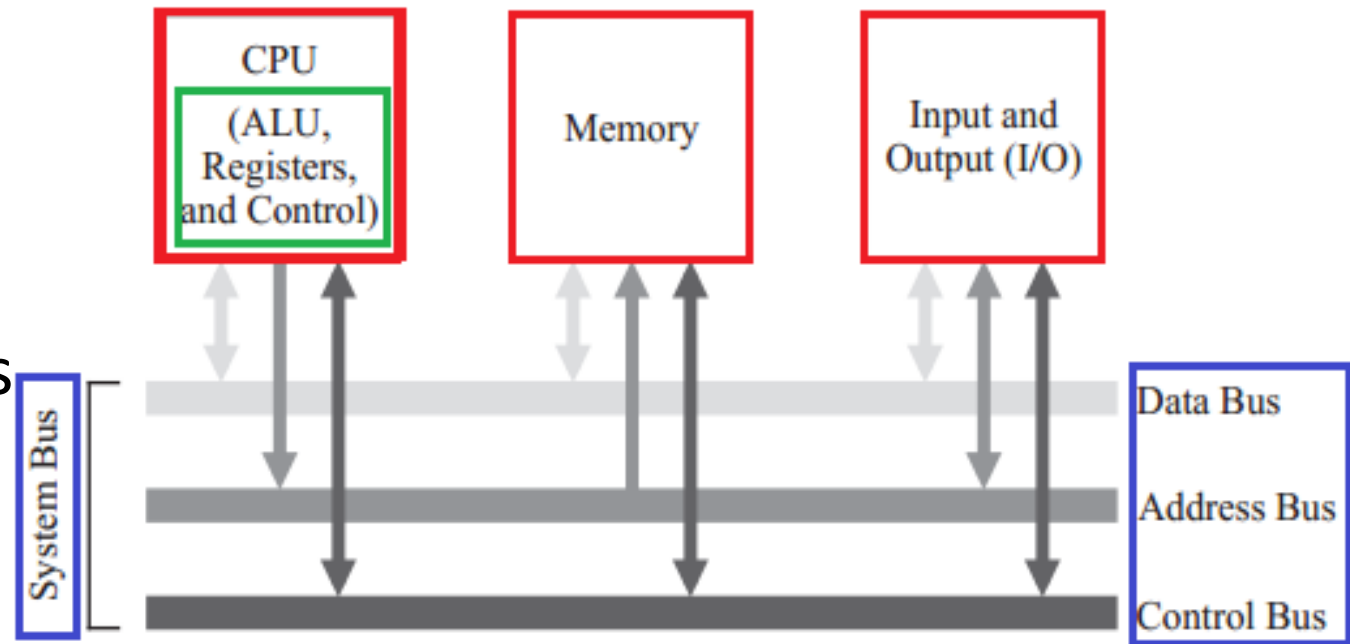
# Relationship between elements:



# System Bus

- These three major components are interconnected together using the **System Bus** (electrical pathway), which is made up of:

- The Control Bus
- The Data Bus
- The Address Bus



1. The CPU communicates with memory and I/O devices by placing a numeric value on the **address bus** to select one of the memory locations or I/O device port locations, each of which has a unique binary numeric address.
2. Then the CPU, I/O, and memory devices pass data among themselves by placing the data on the **data bus**.
3. The **control bus** contains signals that determine the direction of the data transfer:
  - To/from memory
  - or
  - To/from I/O device.

During a memory read or write operation (to the CPU), the address bus contains the address of the memory location where the data is to be read from or written to.



Understand well as I may, my  
comprehension can only be an  
infinitesimal fraction of all I want  
to understand.

~ Ada Lovelace