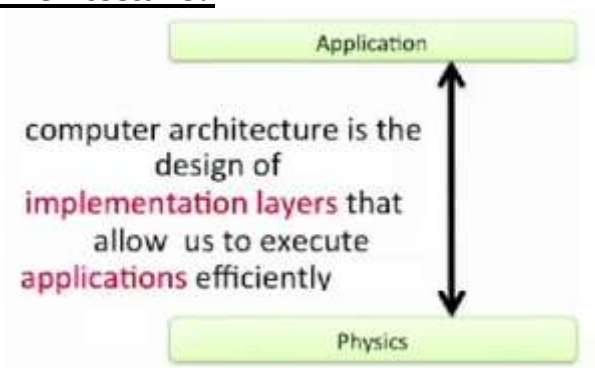
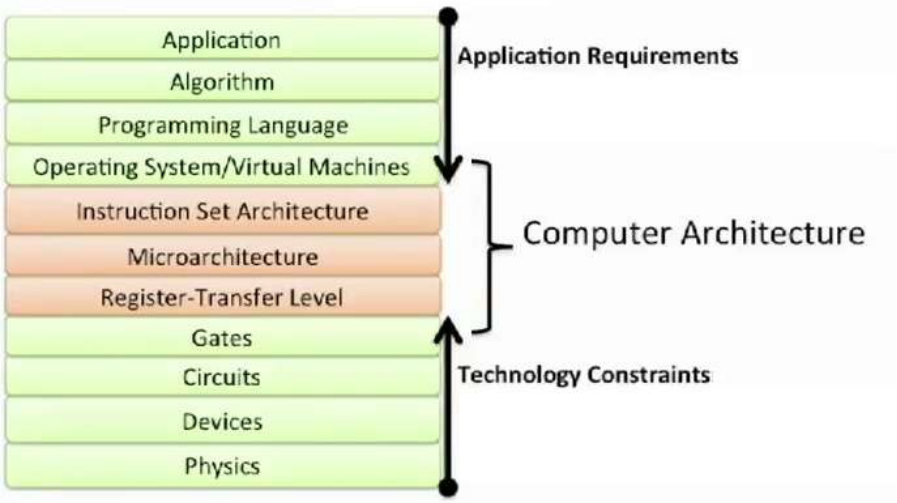
0.6-What is Computer Architecture?



The implementation layers are:



"Architecture"/Instruction Set Architecture:

- Programmer visible state (Memory & Register)
- Operations (Instructions and how they work)
- Execution Semantics (interrupts)
- Input/Output • Data Types/Sizes

Microarchitecture/Organization:

- Tradeoffs on how to implement ISA for metric (Speed, Energy, Cost)

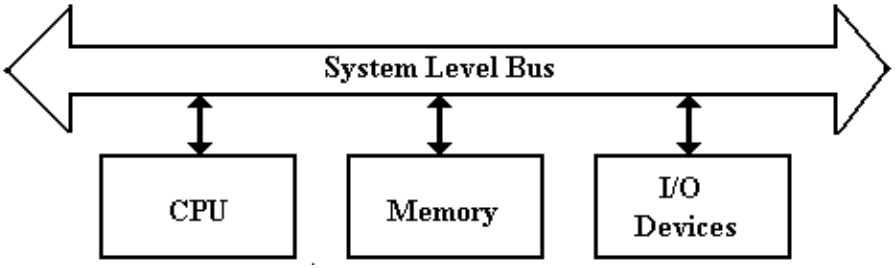
0.7 Computer Organization vs Architecture

Organization is **how** features are implemented	**Architecture** is attributes visible to the **programmer**
Control signals, interfaces, memory technology.	**Instruction** set, number of bits used for data representation, **I/O**, **addressing** techniques.
e.g. Is there a **hardware** multiply unit or is it done by repeated addition?	e.g. Is there a **multiply instruction**
Organization **differs** between different versions	All Intel x86 family share the same architecture. IBM 370 family share the same architecture. This gives code **compatibility** ☺

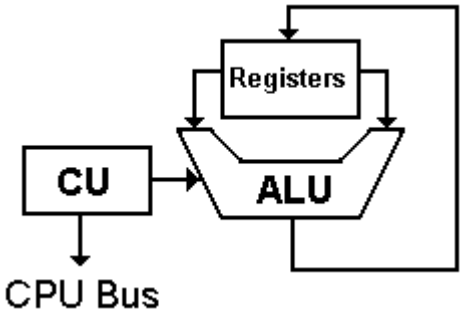
0.8-Structure vs. Function

Structure is the way in which **components relate** to each other.	**Function** is the operation of **individual** components as part of the structure

High-Level Structure of a Computer.

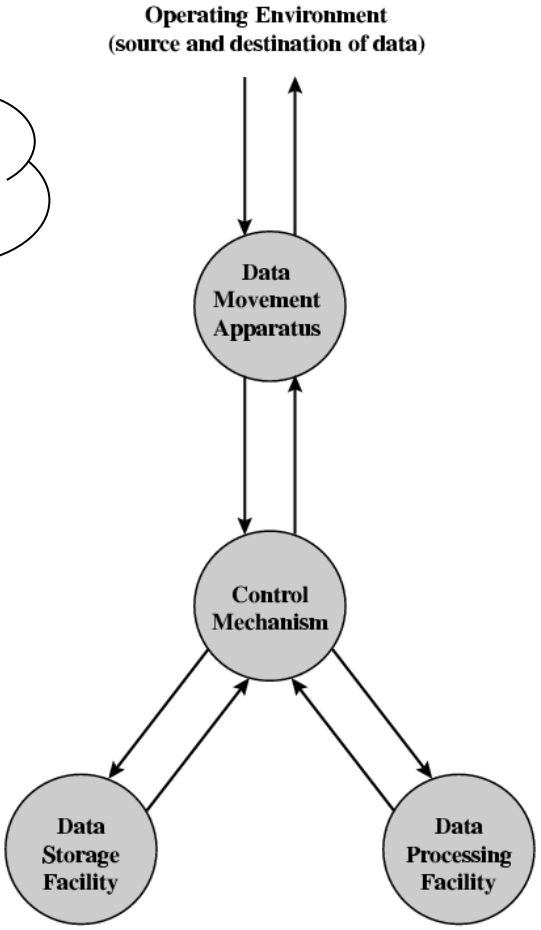


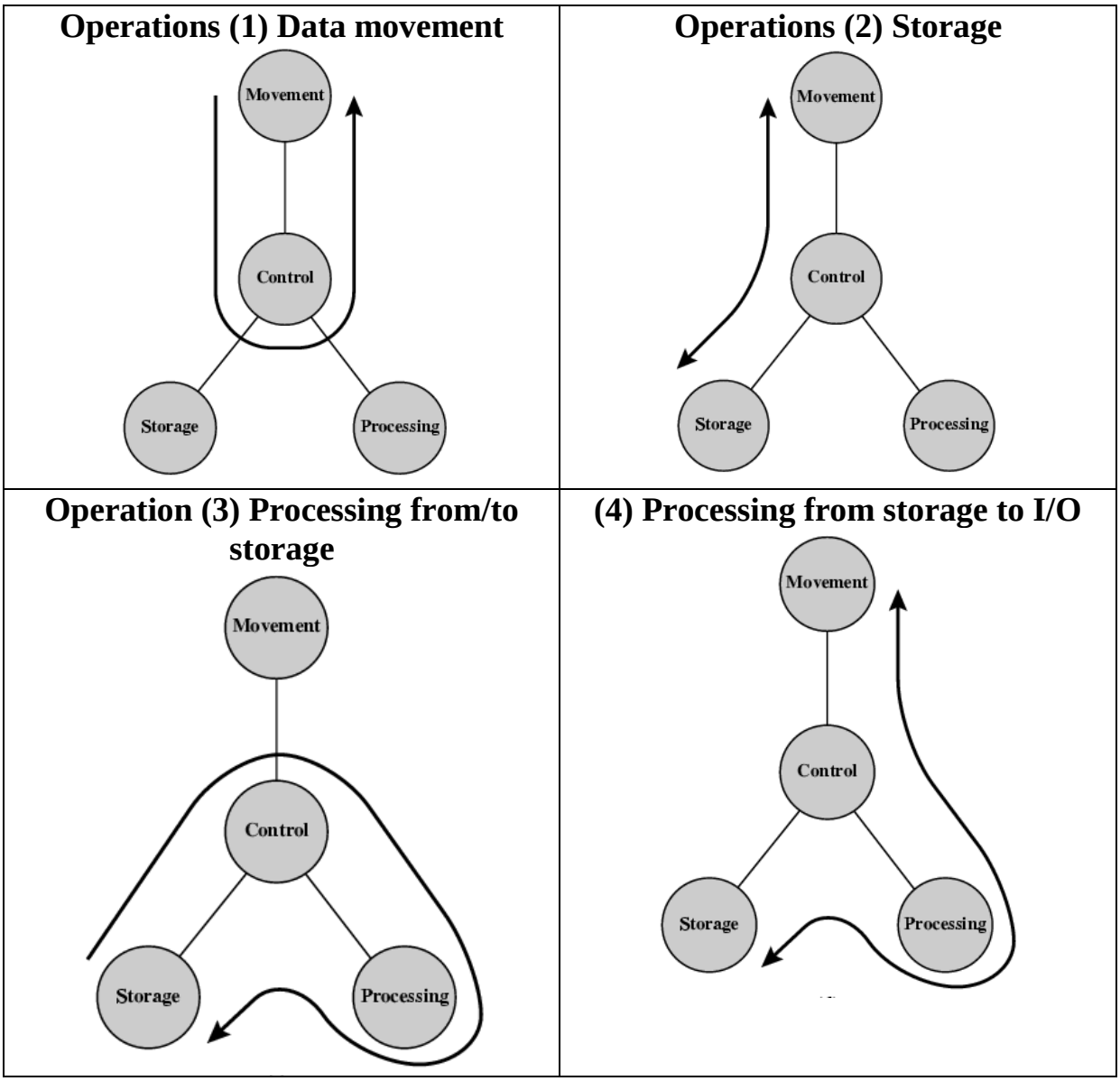
High-Level Structure of CPU



Functional view

All computer **functions** are:
- Data processing
- Data storage
- Data movement
- Control





0.9 Von Neumann architecture

It is completed in1952 at Princeton **Institute for Advanced Studies (IAS) with Stored Program** concept. ALU operating on **binary data.** Control unit interpreting instructions from memory and executing. Input and output equipment operated by control unit

It has1000 x 40 bit words

Binary number

2 x 20 bit instructions

Set of registers (storage in CPU)

- Accumulator (**AC**)
- Multiplier Quotient (**MQ**)
- Memory Buffer Register (**MBR**)
- Memory Address Register (**MAR**)
- Instruction Buffer Register (**IBR**)
- Instruction Register (**IR**)
- Program Counter (**PC**)

اصحى صحصح فووق

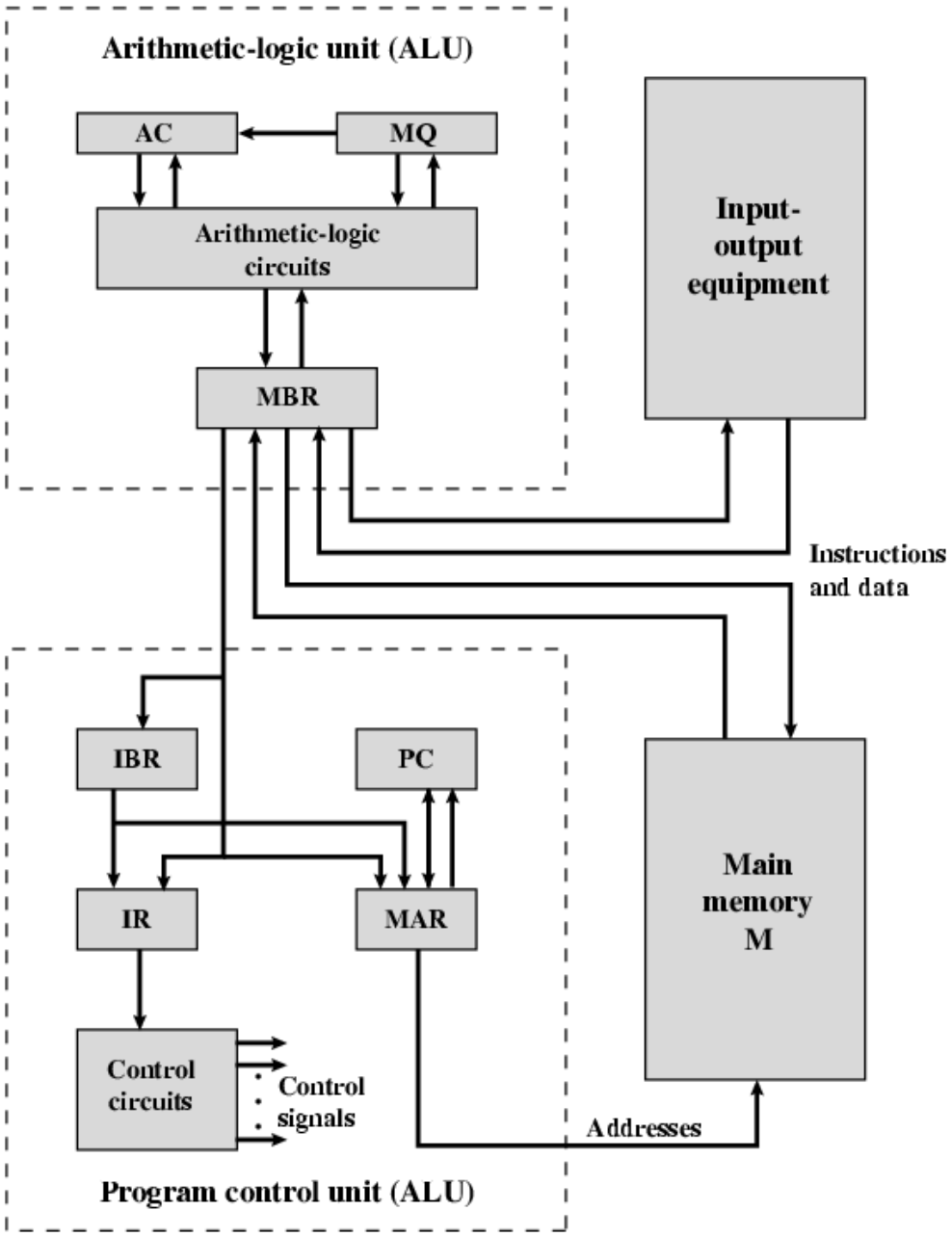
جمع

ضرب

٢ ميموري (بفر و أدرس)

٢ إنستركشن(بفر و بس)

واحد بروجرام



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