Computer Organization and Assembly language

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Architecture & Organization 1

Architecture is those attributes visible to the programmer

- Instruction set, number of bits used for data representation, I/O mechanisms, addressing techniques.
- e.g. Is there a multiply instruction?

Organization is how features are implemented

- Control signals, interfaces, memory technology.
- e.g. Is there a hardware multiply unit or is it done by repeated addition?

Architecture & Organization

All **Intel** x86 family share the same basic architecture

The **IBM** System/370 family share the same basic architecture

AMD

This gives code compatibility

- At least backwards

Organization differs between different versions

3.2.1 System/370 Model 115
3.2.2 System/370 Model 125
3.2.3 System/370 Model 135
3.2.4 System/370 Model 138
3.2.5 System/370 Model 145
3.2.6 System/370 Model 148
3.2.7 System/370 Model 155
3.2.8 System/370 Model 158
3.2.9 System/370 Model 165
3.2.10 System/370 Model 168
3.2.11 System/370 Model 195
3.2.12 System/370-compatible

Intel Core 2 Duo – an example of an x86-compatible, 64-bit multicore processor

AMD Athlon (early version) – a technically different but fully compatible x86 implementation

Structure & Function

Structure is the way in which components relate to each other

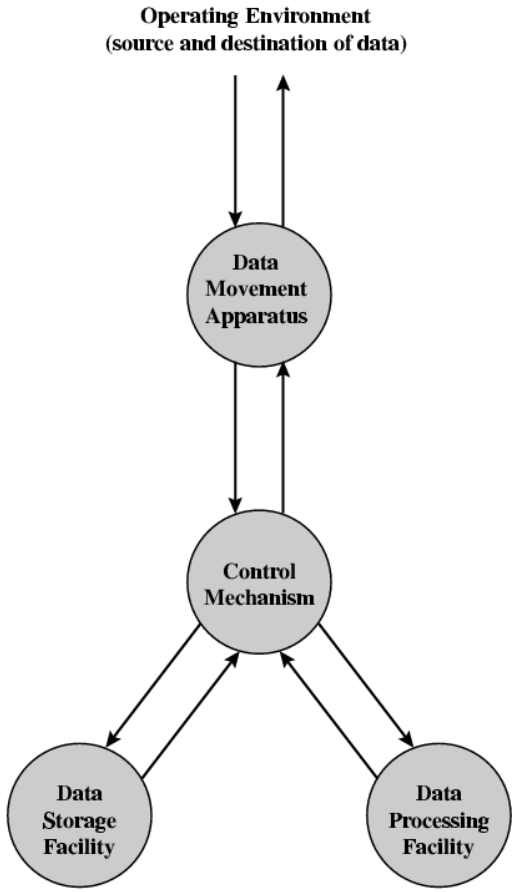
Function is the operation of individual components as part of the structure

Function

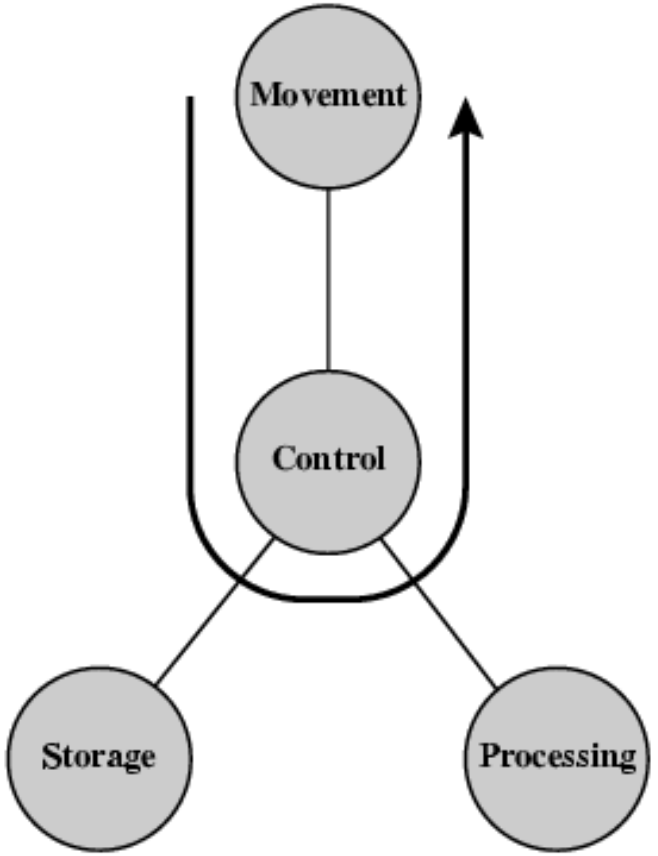
All computer functions are:

- Data processing
- Data storage
- Data movement
- Control

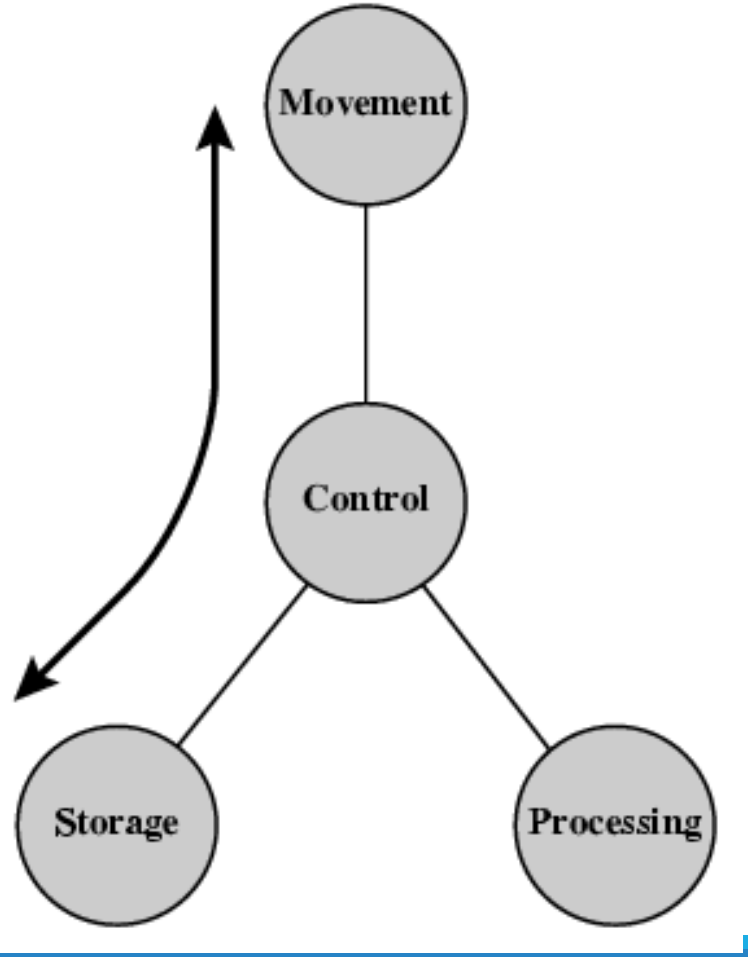
Functional View



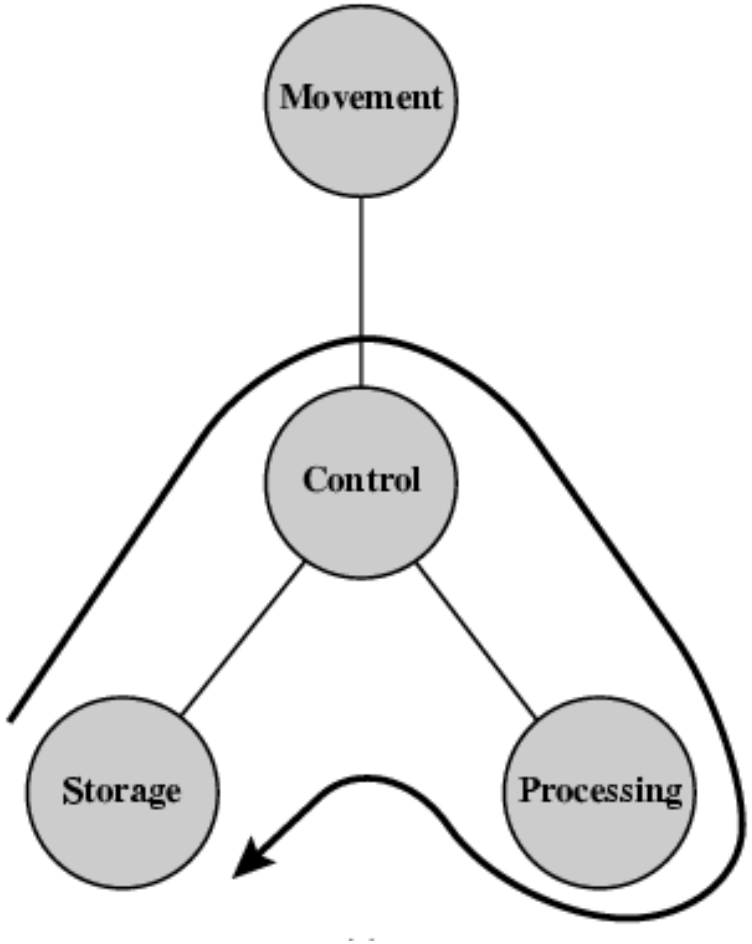
Operations (a) Data movement



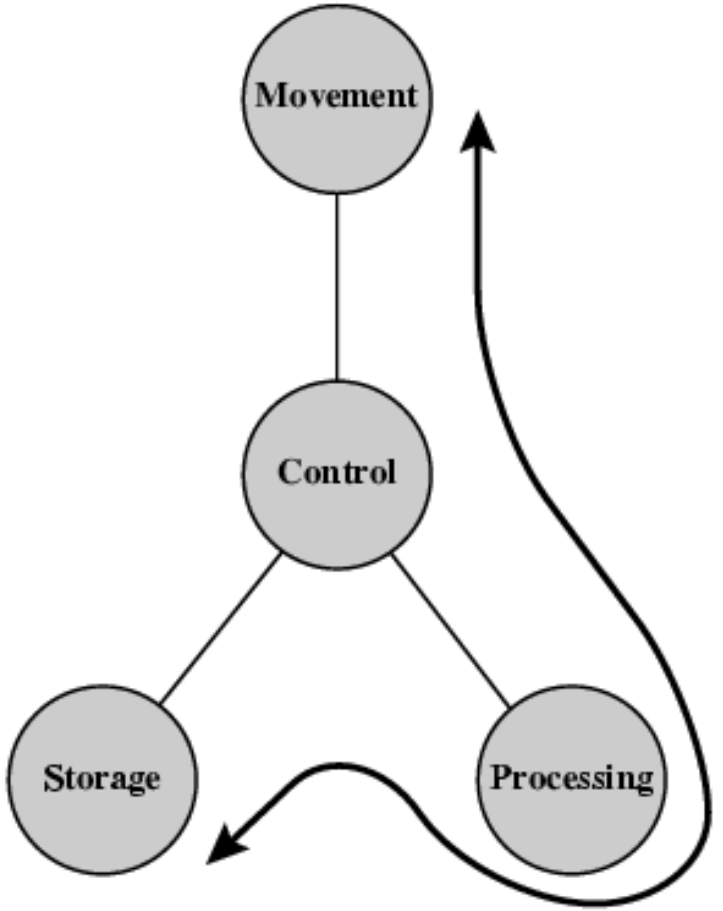
Operations (b) Storage



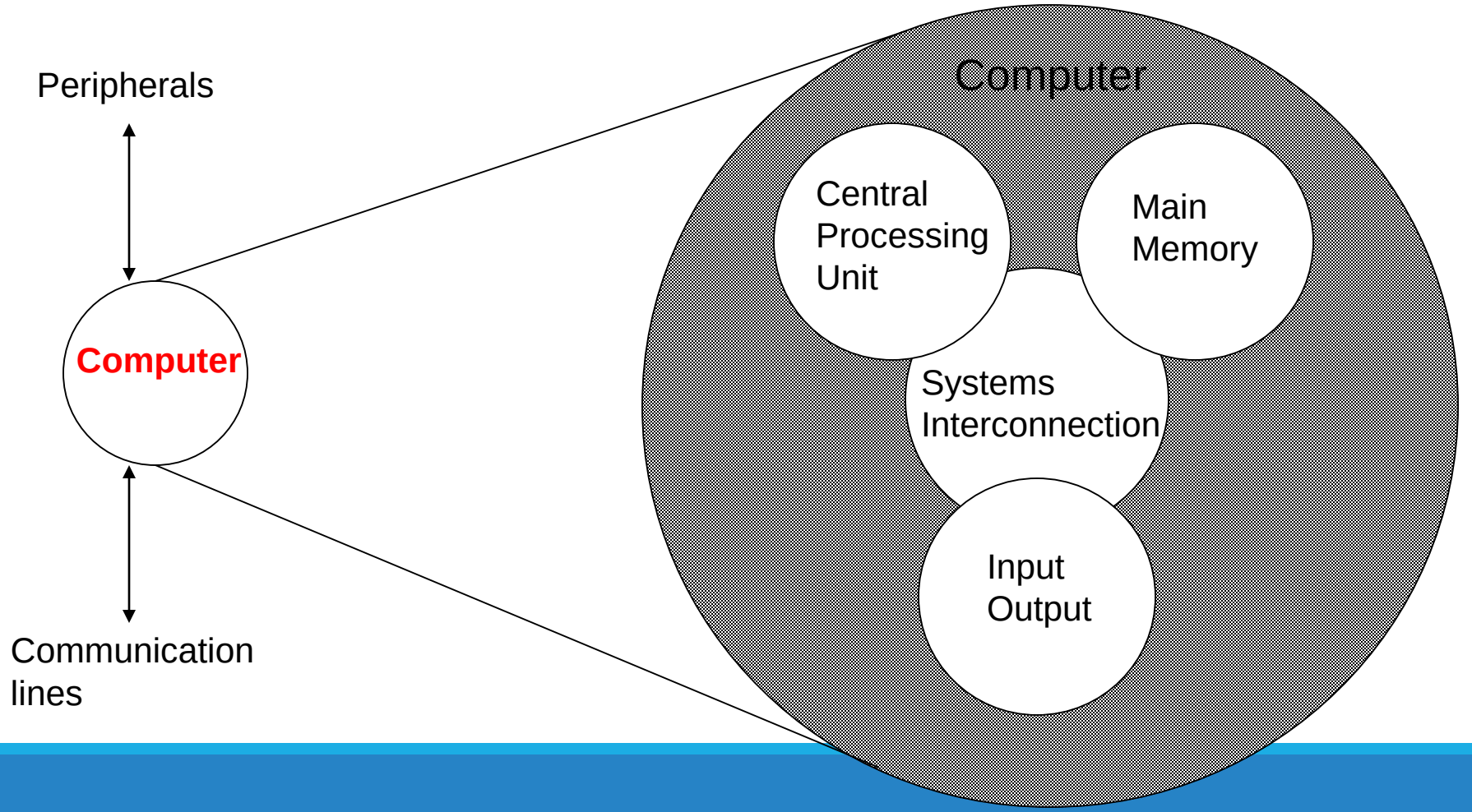
Operation (c) Processing from/to storage



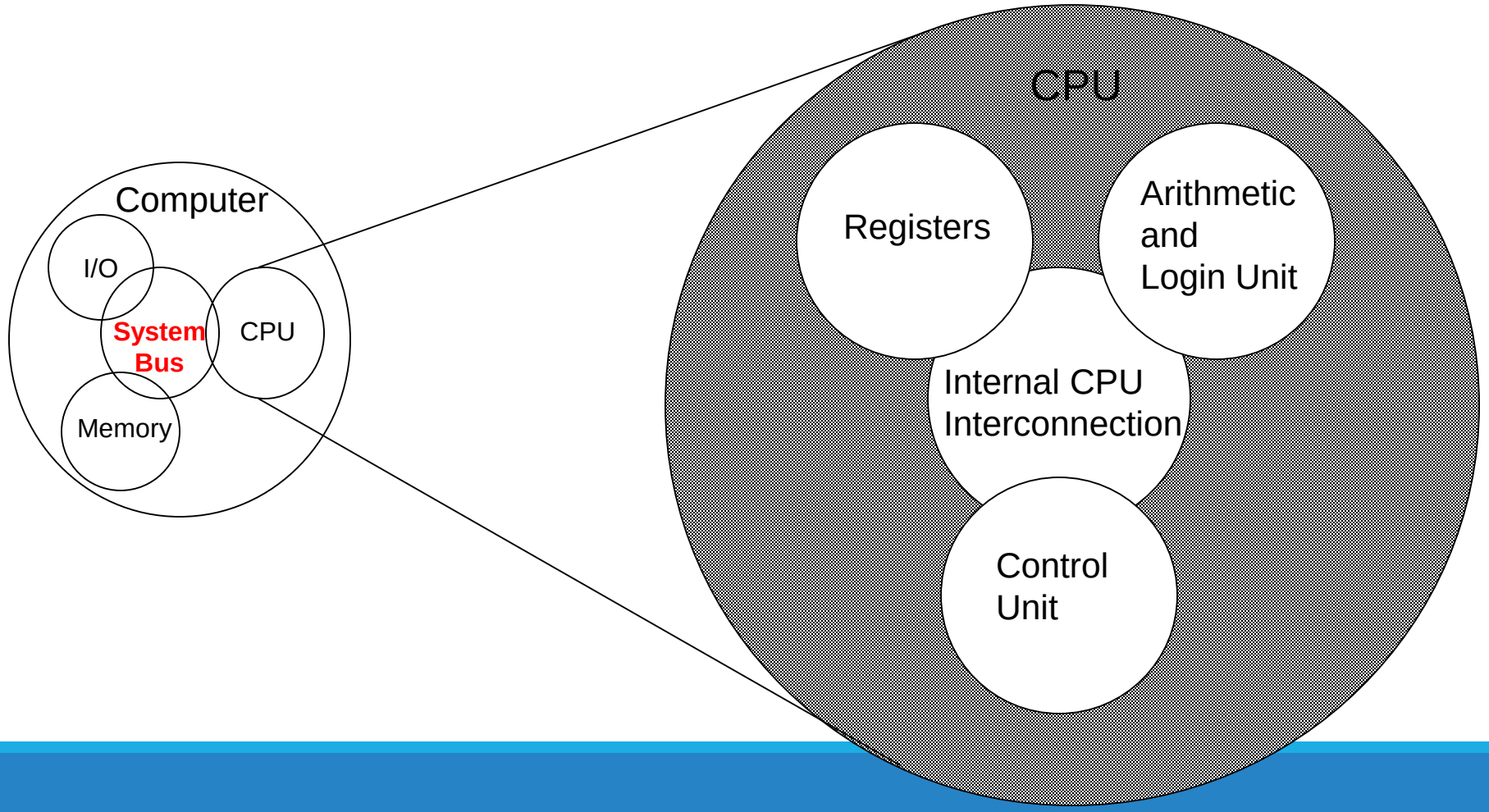
Operation (d)
Processing from storage to I/O



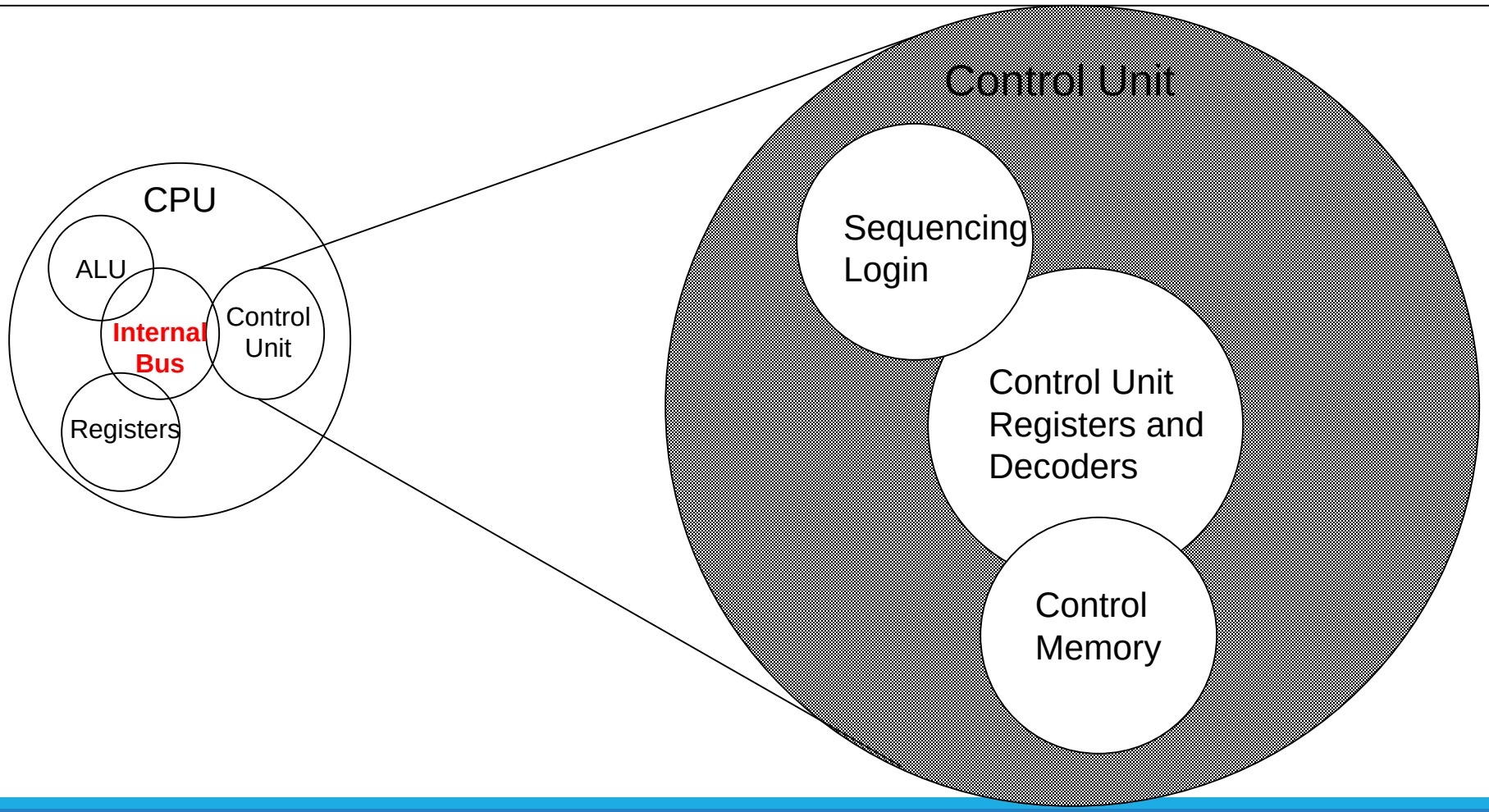
Structure - Top Level



Structure - The CPU



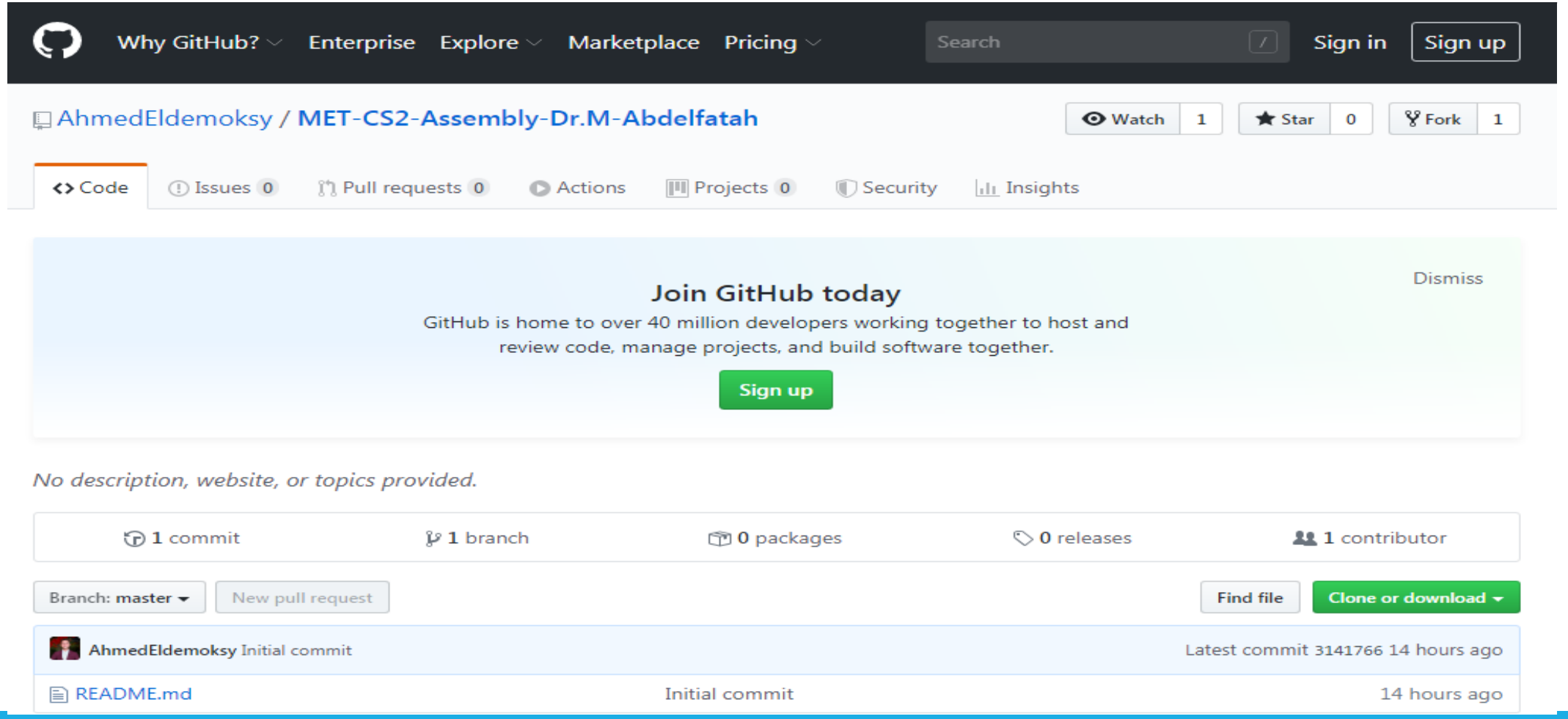
Structure - The Control Unit



Outline of the Book

- Computer Function and interconnection structure.
- Computer Memory
- Input/output
- Assembly language

Internet Resources - Github



Internet websites