UNIVERSITI TENAGA NASIONAL

CHAPTER 1
INTRODUCTION

CGMB143 COMPUTER SYSTEM

Expected Course Outcome

#	Course Outcome	Coverage
1	Explain the concepts that underlie modern computer architecture, its evolution, functions and organization.	✓
2	Identify the best organization of a computer for achieving the best performance when asked to make a selection from the current market.	
3	Demonstrate the flow of an instruction cycle.	
4	Differentiate types of memory components in terms of its technology and usage.	
5	Convert integer and floating point numbers to its internal data representation.	✓
6	Construct a series of computer instructions to perform low-level processor operations.	
7	Explain the RISC and CISC computers, and single core and multi-core computers	

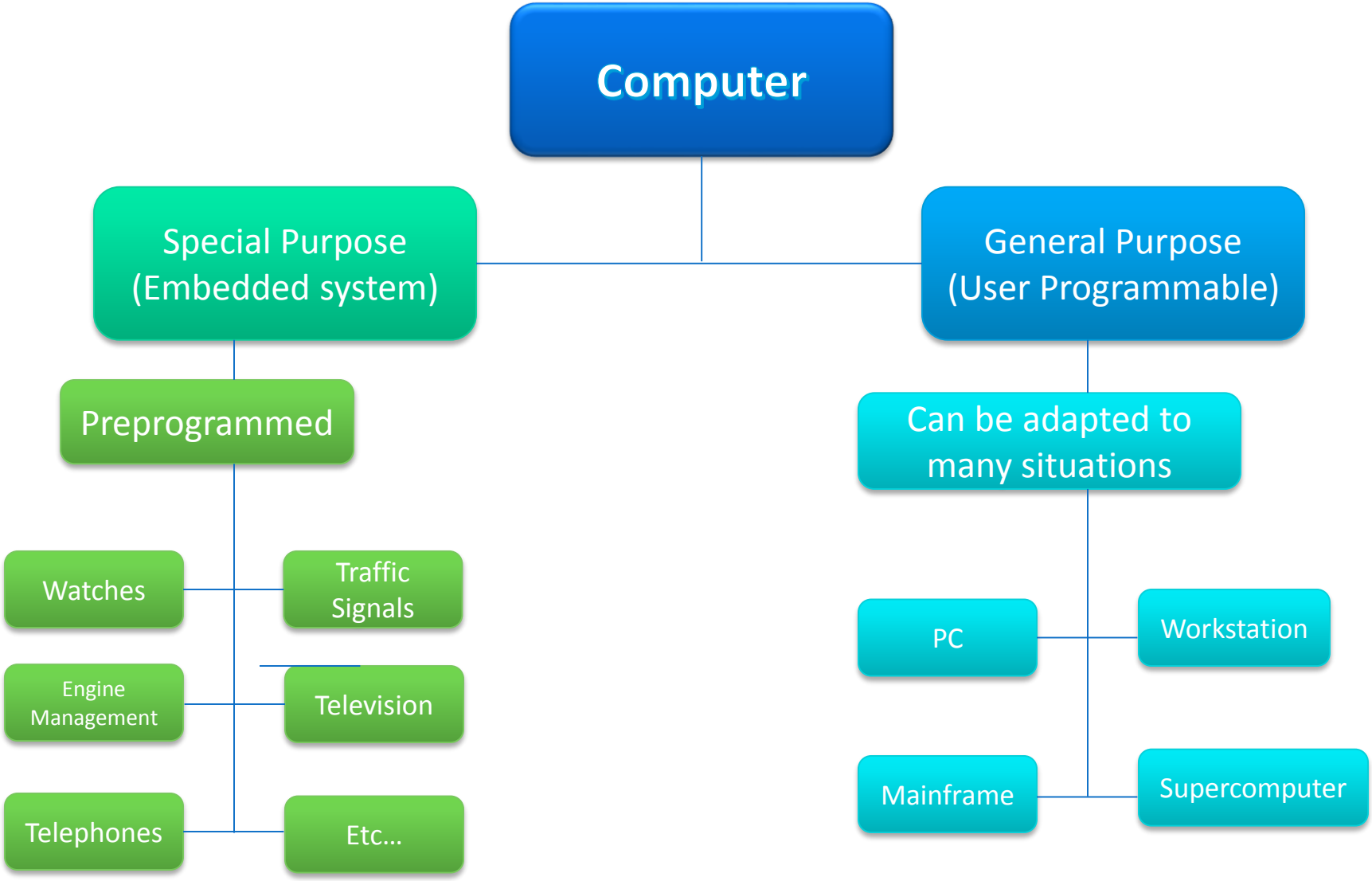
Introduction

A Computer....

- takes input
- processes it according to stored instructions
- produces results as output

Introduction

- The word computer was taken from the Latin – Computare – which means ‘calculate’ .
- Computer is a machine that only can execute instructions that given by the user and operate the data base on the related instruction. The computer will process the data to produce information .


Computer
Special Purpose (Embedded system)
General Purpose (User Programmable)
Preprogrammed
Can be adapted to many situations
Watches
Traffic Signals
Engine Management
Television
Telephones
Etc...
PC
Workstation
Mainframe
Supercomputer

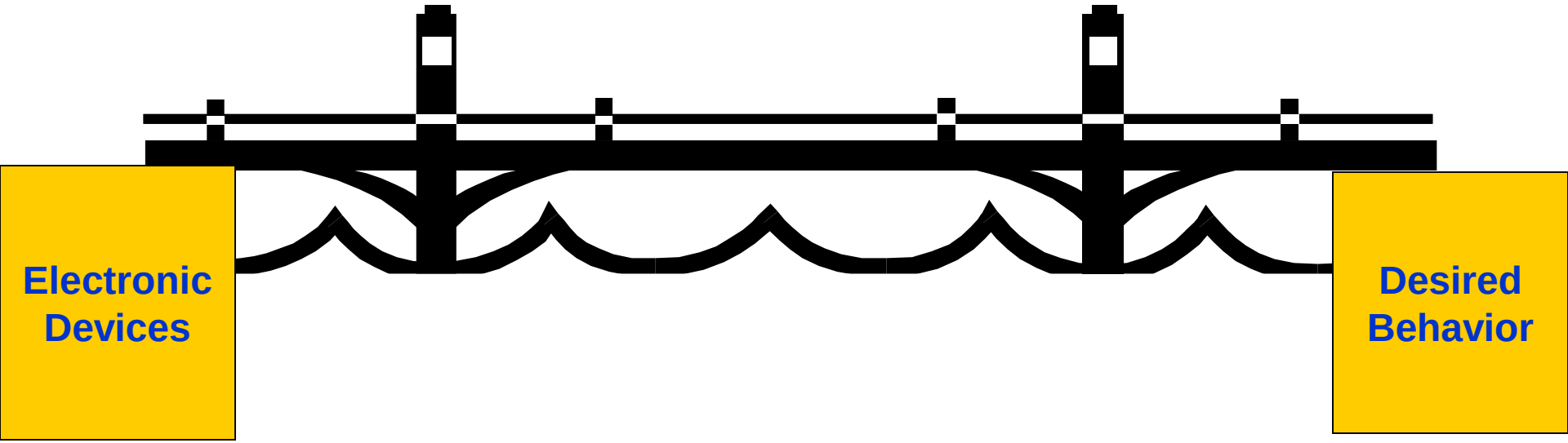
This course is about:

- **What computers consist of**
- **How computers work**
- **How they are organized internally**
- **What are the design tradeoffs**
- **How design affects programming and applications**

Not:

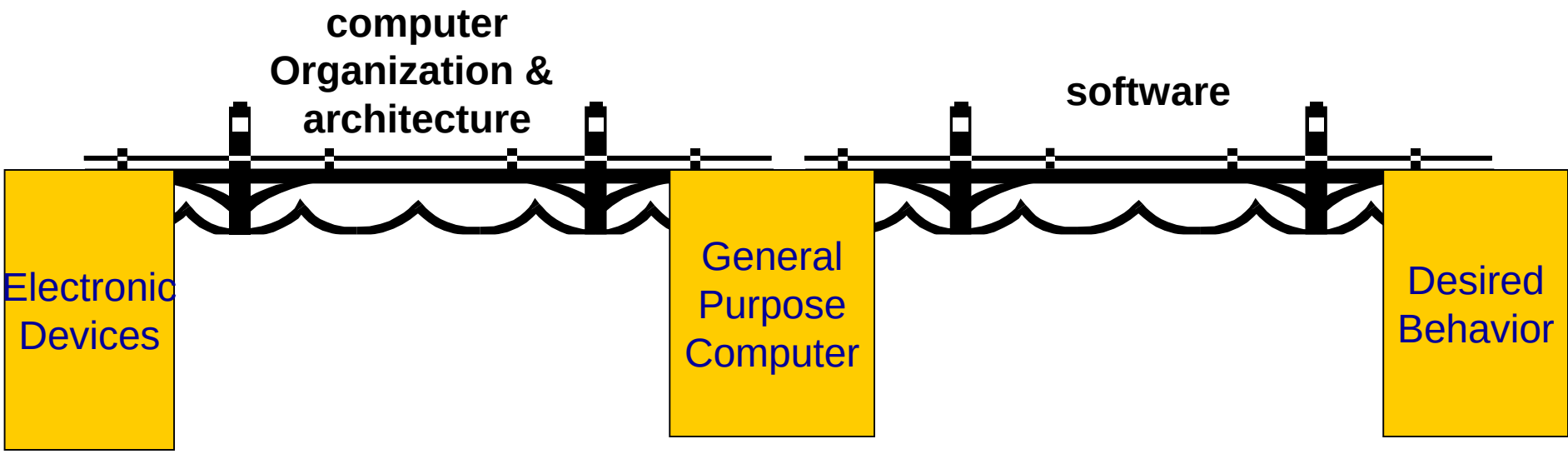
- **How to fix computers**
- **How to build myself one real cheap**

What is Computer Organization?



… a very wide semantic gap between the intended behavior and the workings of the underlying electronic devices that will actually do all the work.

Role of General Purpose Computers



A general purpose computer is like an island that helps span the gap between the desired behavior (application) and the basic building blocks (electronic devices).

Architecture

- Attributes visible to the programmer
  - Instruction set
  - Number of bits used for data representation
  - I/O mechanisms
  - Addressing techniques
- Compatibility - Sharing basic architecture
  - Intel x86 family
  - IBM system / 370 family

Organization

- Implementing the features
  - Control signals
  - Interfaces
  - Memory technology

Organization differs between versions

Structure

- Method in which components relates to each other
- how each component/unit of computer communicates with each other

Function

- Operation of individual components as part of the structure
- 4 computer functions
  a. Data movement
  b. Control
  c. Data storage
  d. Data processing

Functional View

Operating Environment *(source and destination of data)*

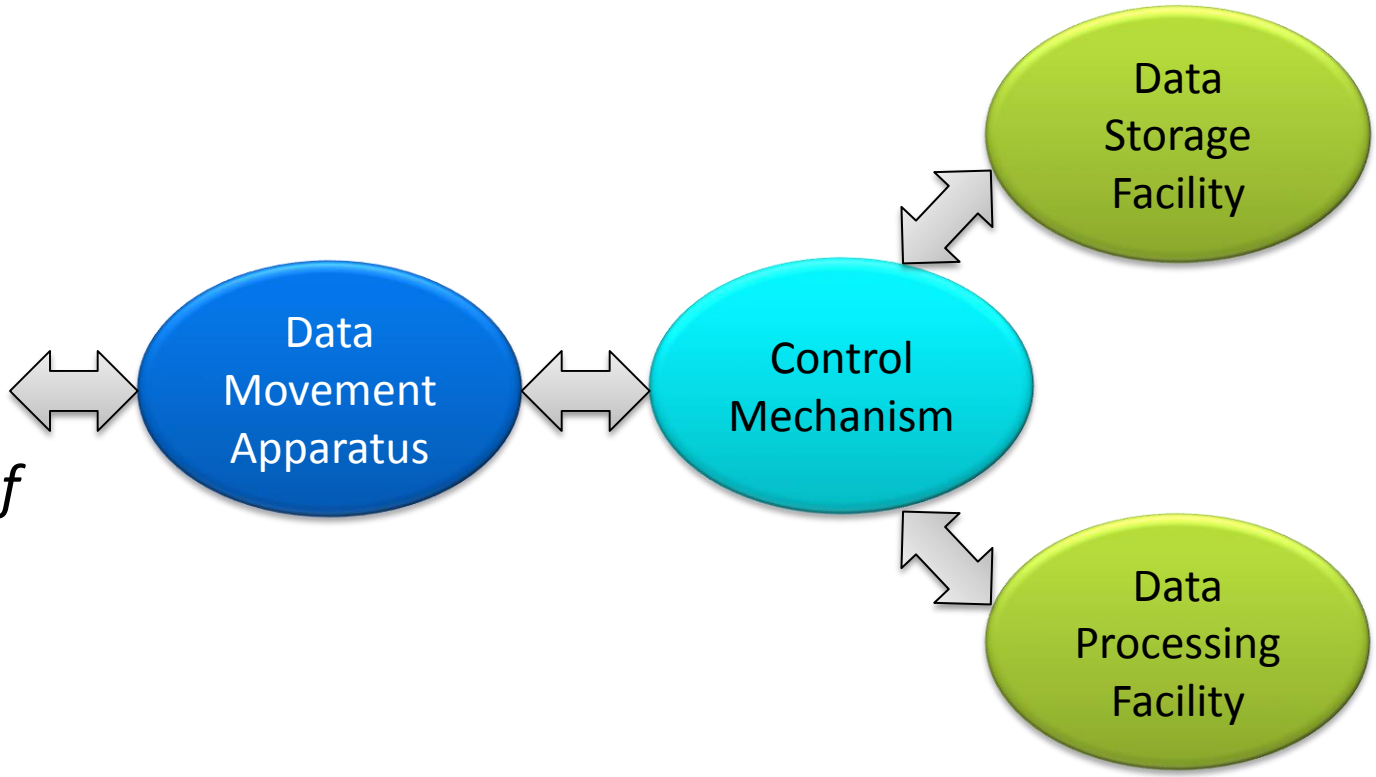


Figure 1: Four computer functions

a) Data Movement

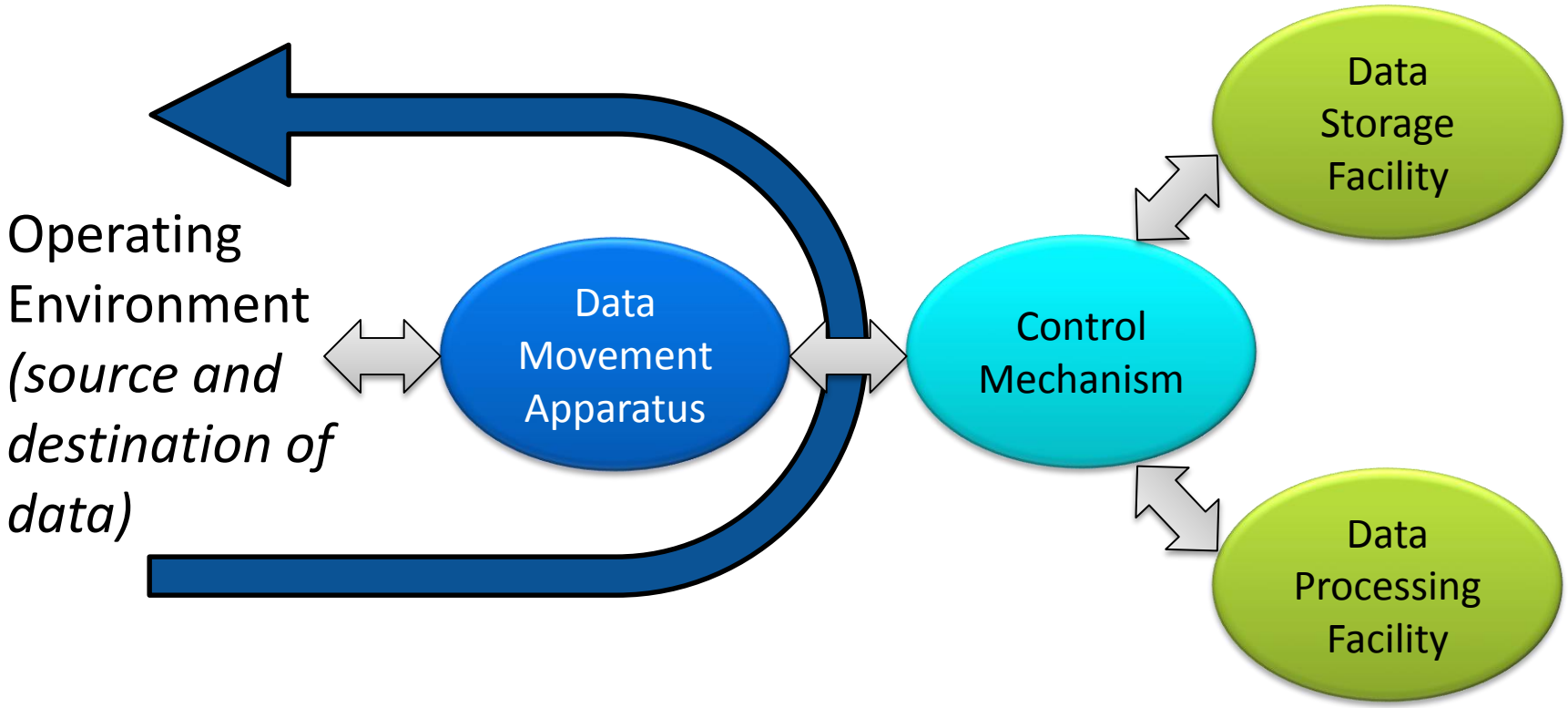


Figure 2: Four computer functions – Data Movement

b) Storage

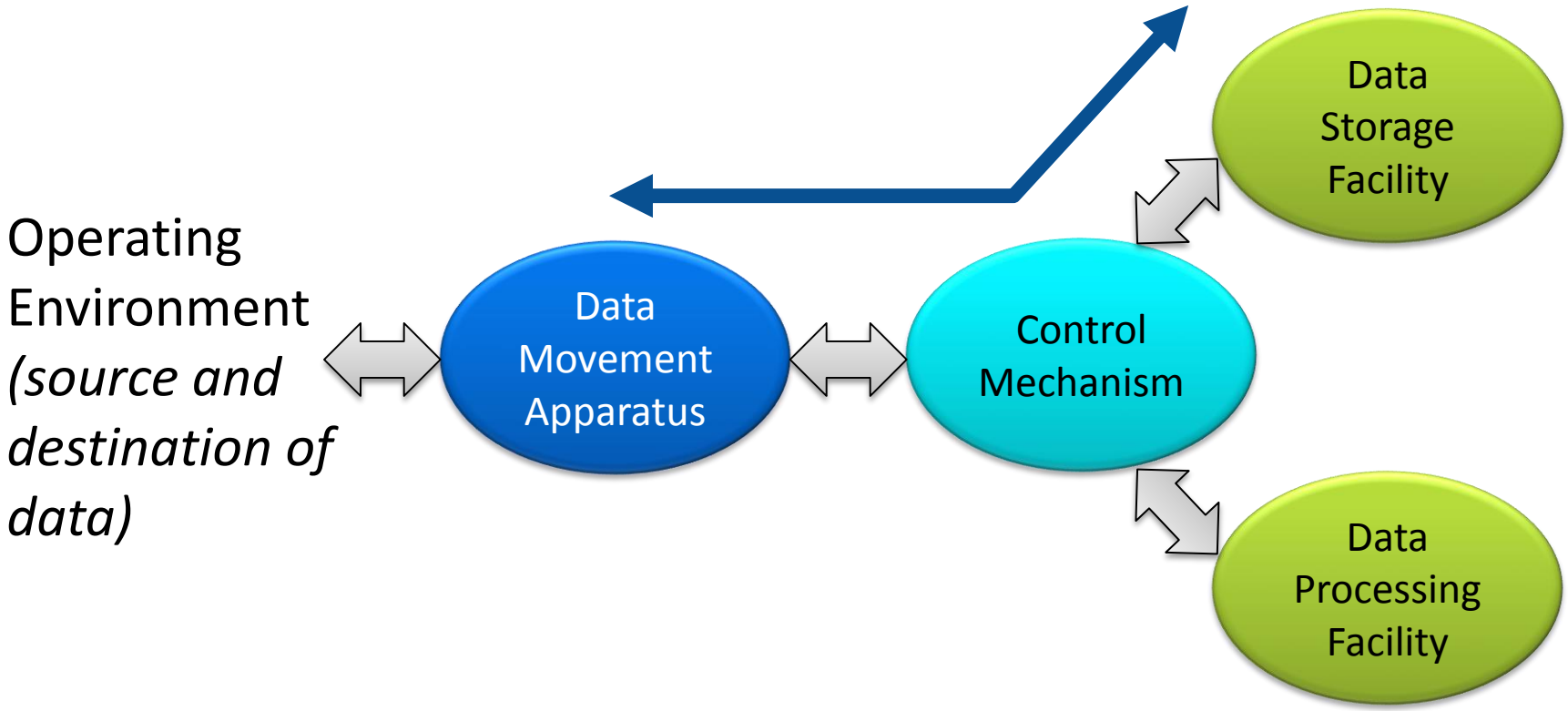


Figure 3: Four computer functions - Storage

c) Processing - Storage

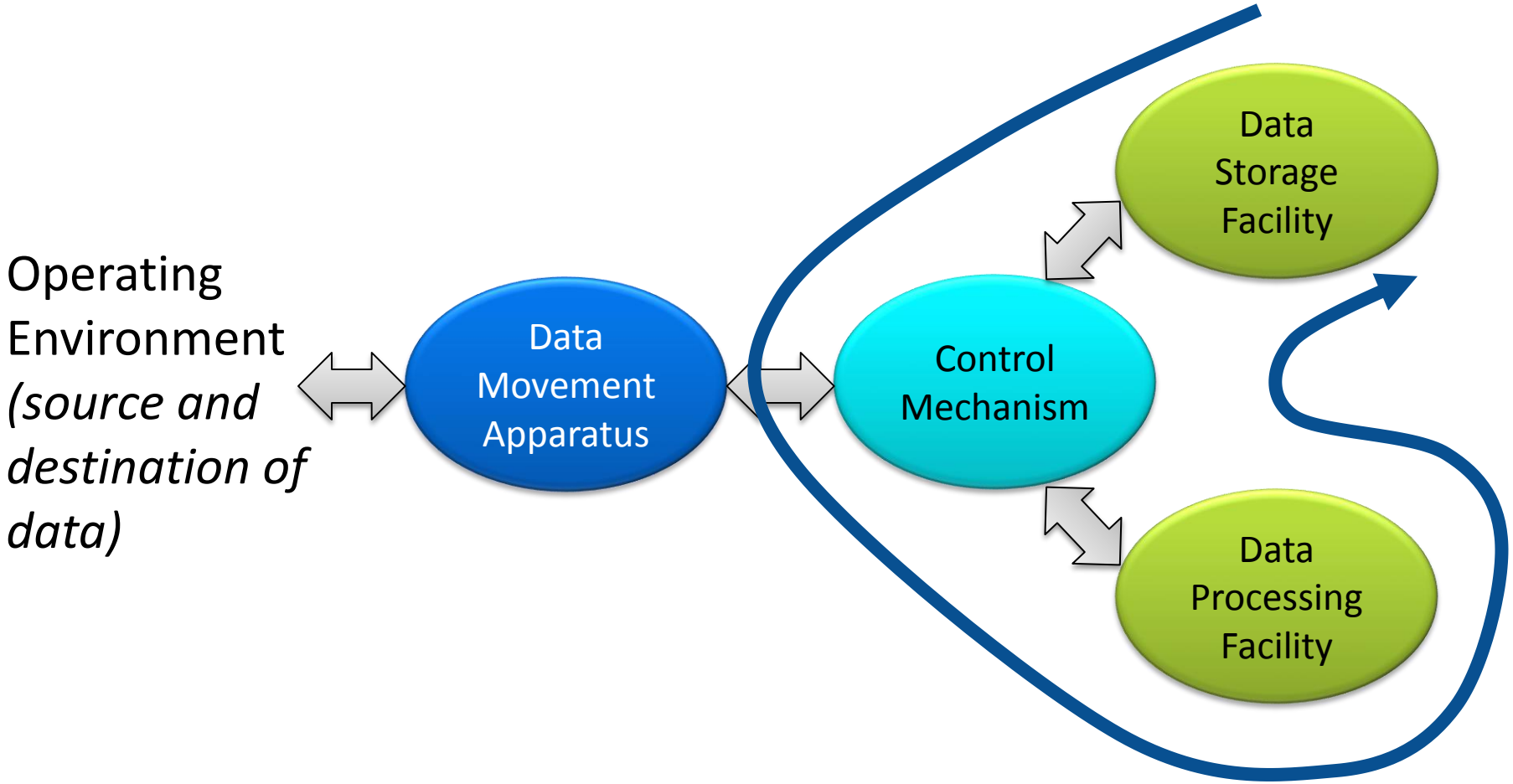


Figure 4: Four computer functions – Processing from/to Storage

d) Processing: Storage – I/O

Operating Environment *(source and destination of data)*

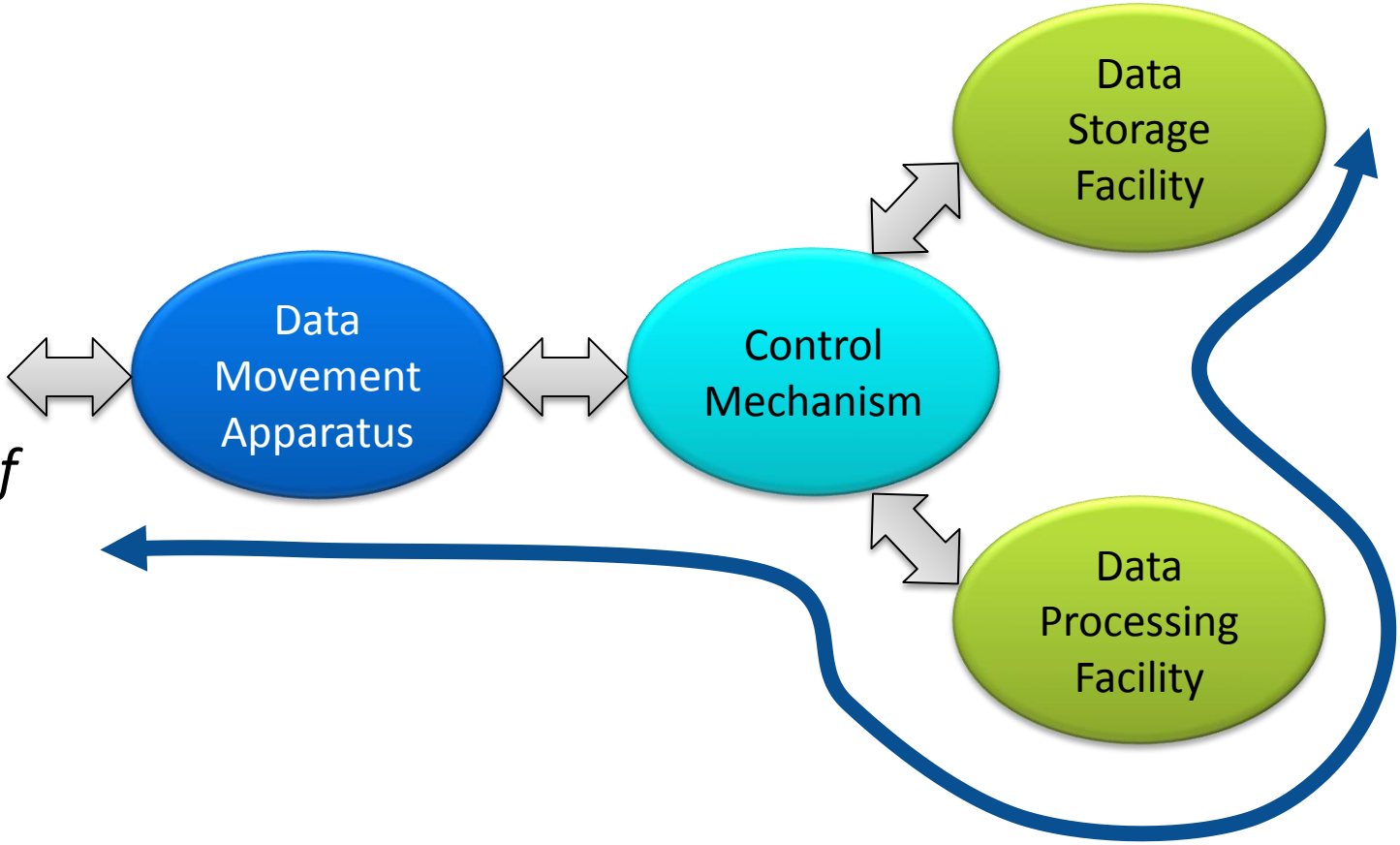
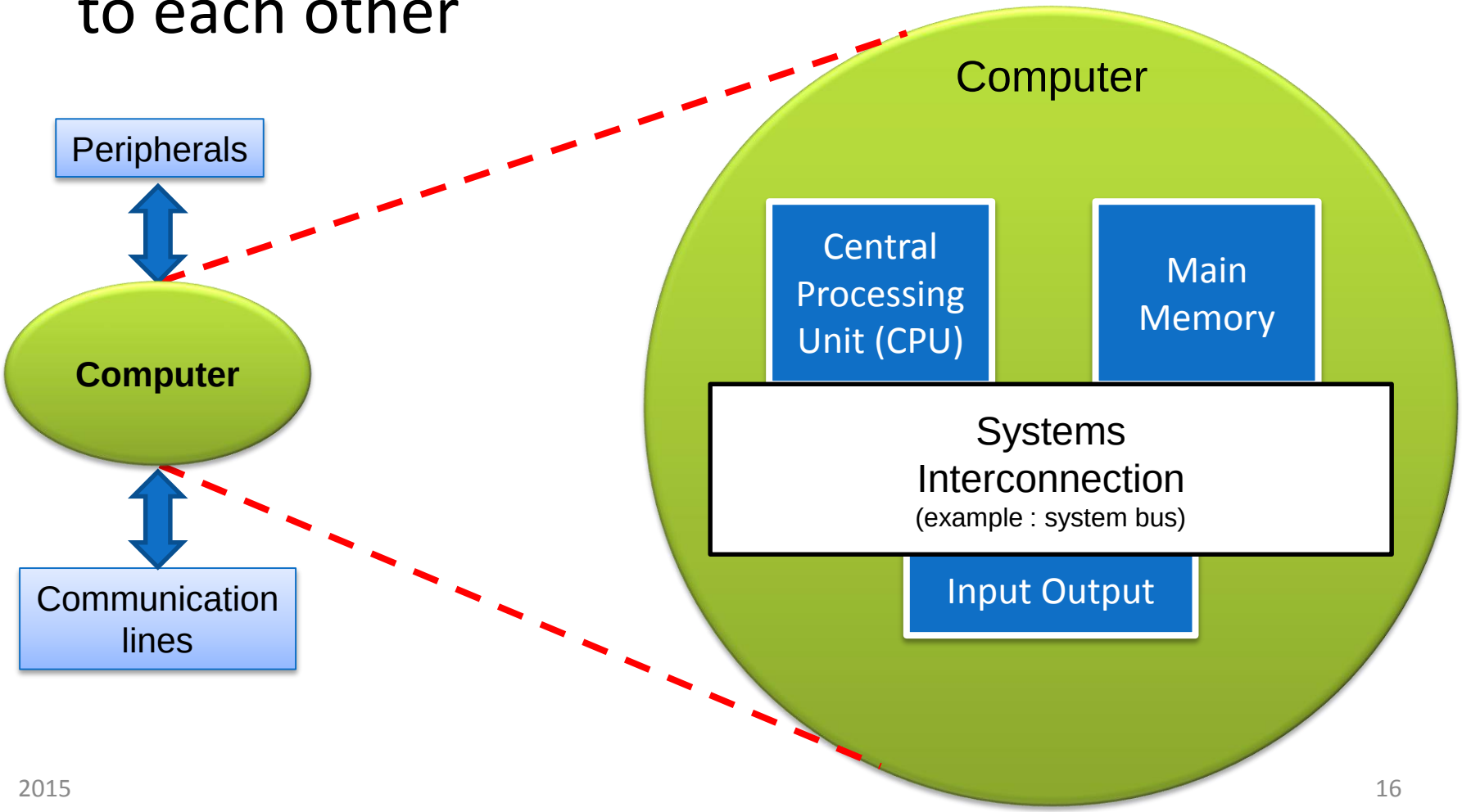


Figure 5: Four computer functions – Storage to I/O

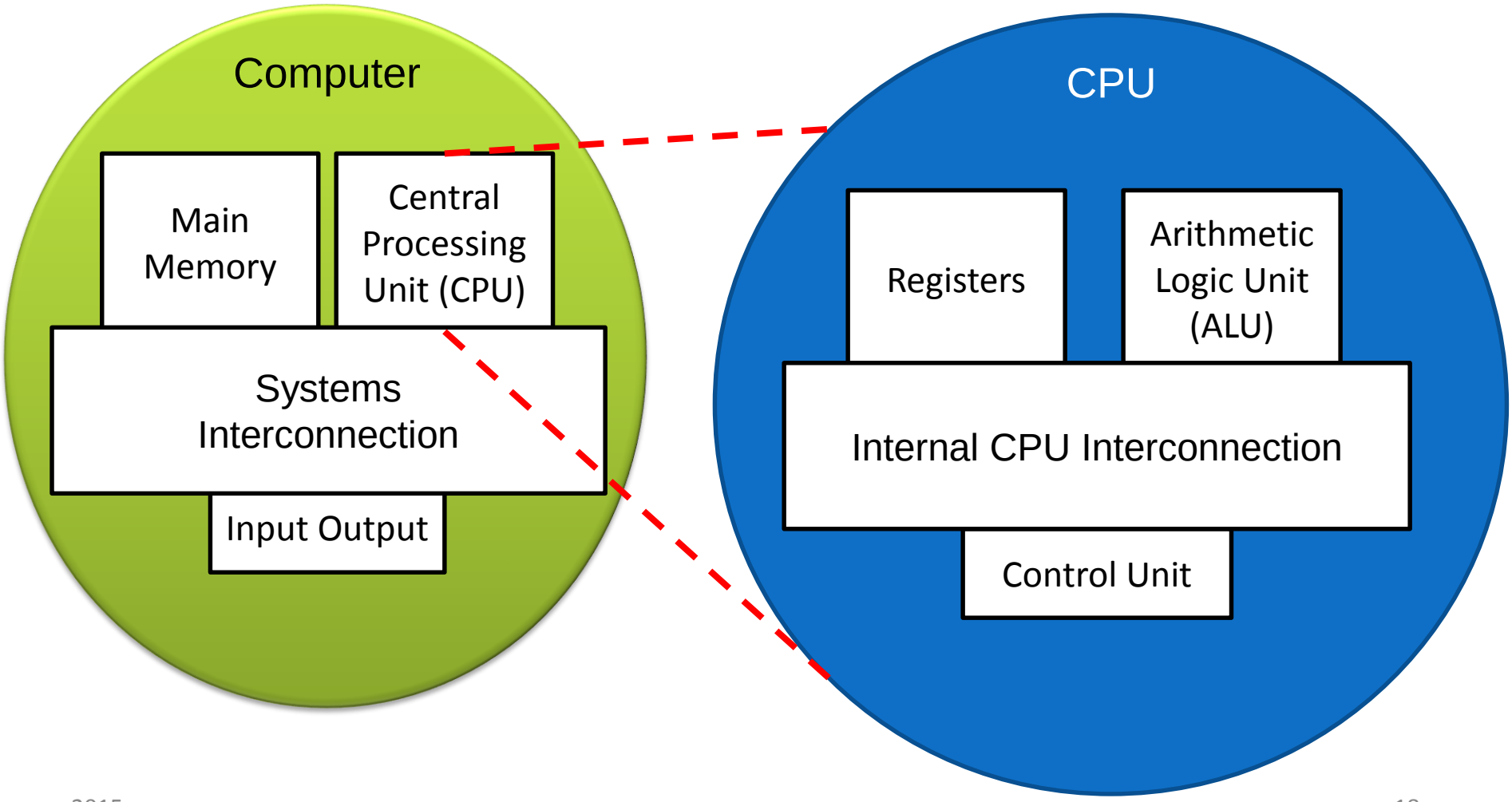
Structure – Top Level

- *Recap:* Method in which components relates to each other

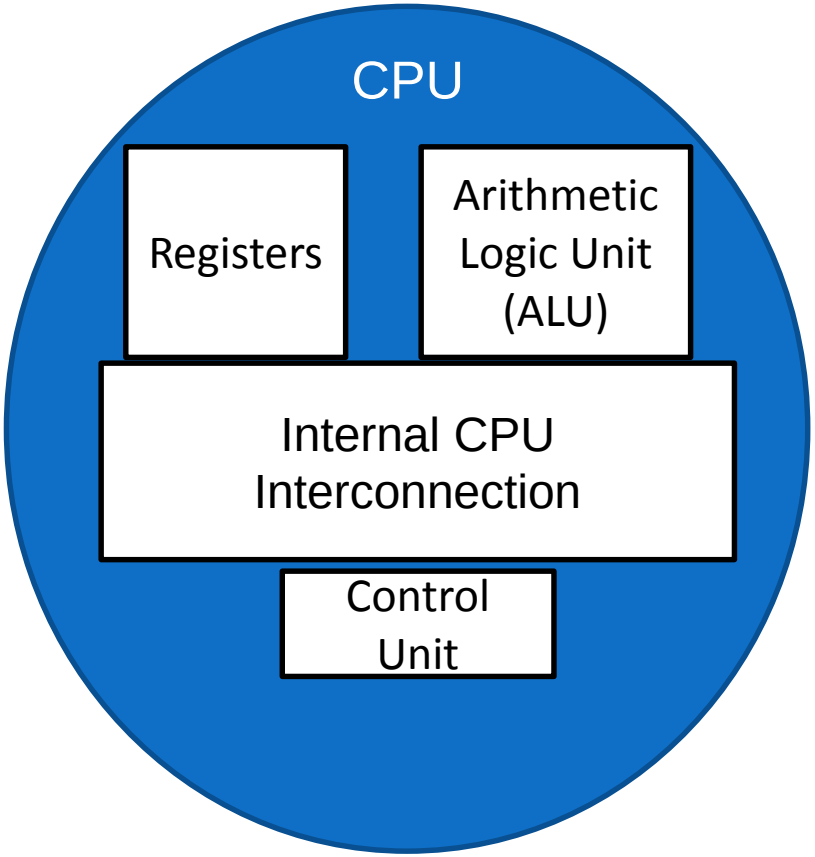


- Central Processing Unit To process data and control the computer operations.
- Main Memory To keep data during process.
- Systems Interconnection The mechanism which is use to communicate between CPU, main memory and I/O.
- Input Output To move data and information between computer and external environment

Structure – Computer > CPU



Structure – Computer > CPU



Registers : Provide storage internal to the CPU

Arithmetic Logic Unit (ALU) : Performs the computer's data processing functions

Control Unit : Control the operations of the CPU

CPU Interconnections : provide mechanism for communication among CU, ALU and registers

Structure – Computer > CPU > Control Unit