بِسْمِ ٱللَّهِ ٱلرَّحْمَٰنِ ٱلرَّحِيمِ

CSE211s:

Introduction to Embedded Systems

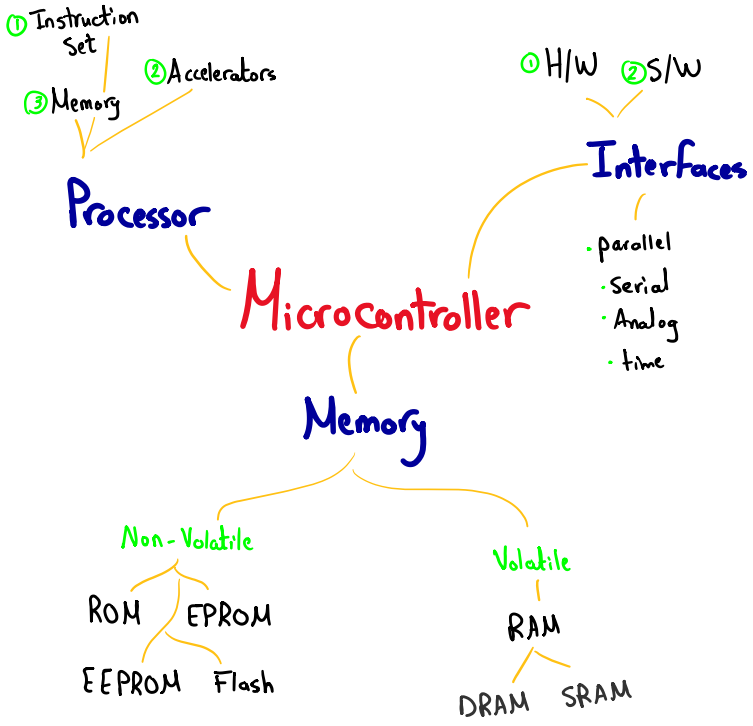
Introduction

﴿يَرْفَعِ ٱللَّهُ ٱلَّذِينَ ءَامَنُوا۟ مِنكُمْ وَٱلَّذِينَ أُوتُوا۟ ٱلْعِلْمَ دَرَجَٰتٍ﴾

* Embedded System:

→ it's any device that includes a programmable Computer but it's not itself intended to be general-purpose Computer

↳ Thus, a PC is not itself an embedded Computing system, although PCs are often used to build embedded Computing systems, But a fax machine or a clock built from a microprocessor is an embedded Computing system

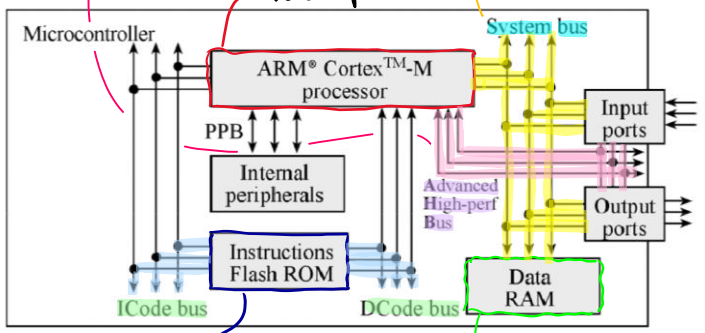


* ARM Cortex M4-based System:

the advanced high-performance bus Connects the processor with I/O ports

the basic processor

the system bus which Connects the processor with Data RAM & with input/output ports



* Contains the instructions to be executed
* Connected to two buses — ICode bus, DCode bus

Contains the data that will temporarily stored

* Flash ROM remembers data after power is turned off

* this microcontroller system has a harvard architecture
↳ meaning that we have two separate buses one for data & one for instructions

* More connections on the bus means slower data rate

Condition Code Bits		Indicates
N	negative	Result is negative
Z	zero	Result is zero
V	overflow	Signed overflow
C	carry	Unsigned overflow

* ARM ISA:

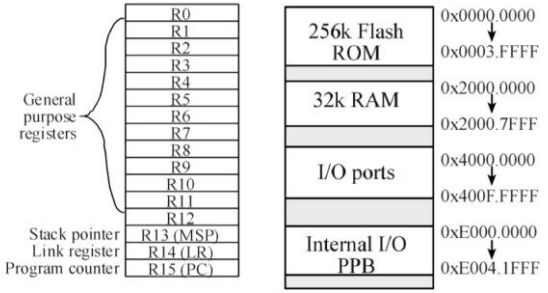
① Registers:

→ it has 16 Registers each of 32-bit

- 13 of them are general-purpose registers (R0 → R12)
- 3 of them are special-purpose registers
  - R13: Stack pointer (MSP)
  - R14: link Register (LR)
  - R15: Program Counter (PC)

② Memory-Map:

1. Flash-ROM → it size is 256kB
   ↳ Contains instructions
2. the RAM → it size is 32kB
3. I/O ports → it's a memory-mapped ports
4. Internal I/O PPB → Some memory locations are allocated for internal modules such as timers



* Test yourself → QUIZ