-

UNIT 2.
ARCHITECTURE AND COMPONENTS
ACTIVITIES

Computer Systems
CFGS DAM

Autores: Alfredo Oltra / Sergio Garcia

Adaptado: Aarón Martín Bermejo

a.martinbermejo@edu.gva.es

2022/2023

Versión:231016.1254

Licencia

Nomenclatura

A lo largo de este tema se utilizarán distintos símbolos para distinguir elementos importantes dentro del contenido. Estos símbolos son:

Importante

Atención

Interesante

Actividad opcional. Normalmente hace referencia a un contenido que se ha comentado en la documentación por encima o que no se ha hecho, pero es interesante que le alumno investigue y practique.

Atención. Hace referencia a un tipo de actividad donde los alumnos suelen cometer equivocaciones.

UD02. Architecture and Components
Activities

1. 🎖️ Investigate the "Harvard Architecture". Post the main differences with "Von Neumann architecture" in the forum and discuss them with your classmates.
2. Follow this tutorial https://sites.google.com/site/kotukotuzimiti/ in order to understand how a 2 bit fictitious computer works. Share your solutions and ask your doubts using forum.
3. 👁️ We have a hypothetical computer with this instruction format:

OP_CODE	**OPERAND 1**	**OPERAND2**
4 BITS	4 BITS	4 BITS

And this memory (address and content)

Addr0	0000	0xC2
Addr1	0001	0x19
Addr2	0010	0x5A
Addr3	0011	0x2
Addr…	…	…

SUM [Addr1], [Addr2] 1001xxyy
Add the contents of memory address Addr1 to the contents of memory address Addr2 and stores it in Addr1

a) What is the result after executing this instruction?

b) Which will be the state of the memory after the execution of this instruction?

c) What would be the result if operand 2 uses immediate addressing mode?

4. We have a computer with this instruction set:

Code	Instruction	Description
ENT M(m)	000mmmmm	Read data from keyboard to memory.
SAL M(m)	001mmmmm	Show data on screen from memory.
CAR R0, M(m)	010mmmmm	Store content a memory address in register R0.
ALM M(m), R0	011mmmmm	Store content of R0 in a memory address.
MOV Rx, Ry	1000xxyy	Copy content of RY to RX **(X, Y are register numbers).**
SUM Rx, Ry	1001xxyy	Add RX+RY and it is stored in RX.
RES Rx, Ry	1010xxyy	Subtract RX-RY and it is stored in RX.
MUL Rx, Ry	1011xxyy	Multiply RX * RY and it is stored in RX.
DIV Rx,Ry	1100xxyy	Divide RX / RY and it is stored in RX.

Following the instruction sequence:

00001011 *(The user enters an 1 from the keyboard) (input A)*

00001100 *(The user enters an 2 from the keyboard) (input B)*

00010001 *(The user enters an 3 from the keyboard) (input C)*

00011100 *(The user enters an 4 from the keyboard) (input D)*

And then this instruction sequence:

01001011 10000100 01011100 10001100 01010001 10001000 10111110 10101101 01001100 10001000 10011110 01010001 10001000 11001110 10000011 01101101 00101101

Where A, B, C, D represents the input using the keyboard and their values

a) What is the result shown on screen?

b) What is the state of memory?

c) What is the formula associated to inputs A, B, C, D? (for example, result = A + B + C * D)

d) If Program Counter (PC) initial value was 258… Which is it actual value?

e) How many registers of general purpose (RX) has our architecture?

Share your solution and your doubts in the forum!!! If a classmate has problems with it, try to help him.

5. The next table shows part of the technical specifications of a MoBo. Given the specifications, answer the following questions:

Storage Interface	South Bridge • 1 x IDE connector supporting ATA- 133/100/66/33 and up to 2 IDE devices • 6 x SATA 3 Gb/s connectors supporting up to 6 SATA 3Gb/s devices • Support for SATA RAID 0, RAID 1 and RAID 10 ITE IT8720 chip • 1 x floppy disk drive connector supporting up to 1 floppy disk drive

a) How many hard drives can connect?

b) How many SATA drives can connect?

c) Can we connect a floppy drive? and two?

6. We have a 3k euros budget to buy computers for the CEED. Teachers told us that the requirements for the computers are the next ones:
   - 2 SSDs per computer to boot dually in Linux-Windows, at least 256GB each
   - At least 16GB RAM
   - At least i3-7100 or similar CPUs in benchmarking. Needs support for virtualization.
   - 2 monitors

a) Choose components from a store to build those computers. Build an estimation for it. Think about the compatibility among all of them, specially the motherboard, connectors, power, etc.

b) How many computers with those specifications can we buy?

c) Which requirements should we change so more computers can be bought?

Share your solution and your doubts in the forum!!! If a classmate has problems with it, try to help him.