ARHITECTURA CALCULATOARELOR LIMBAJUL DE PROGRAMARE - BOOK
SE GASESTE IN BIBLIOTECA LA UBB SI IN BIBLIOTECA CENTRALA UNIVERSATARA DE LANGA CASA DE CULTURA
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ARHITECTURA SISTEMELOR DE CALCUL

- Importance
- Impact

By the end of semester we see how we combine multi-level programming: high level programming(c) with assembly language

- Assembly language
    - human version of machine language
    - formed of 0 and 1

why do pc use 0 and 1

- we can block electricity or let it through
- it was a limitance, they cannot build it practically another way

why do we use base 10

- YEAHHHHH
- In ancient times people used fingers for calculating and counting

What is base 16 and why are we using it

- We use it to shorten numbers
- it is a power of 2 so it works
- basically, it is a zipped version of base 2 (it is syntactic sugar)
- but PC'S DO NOT USE BASE 16 FOR NUMBERS! (interpreteisan)
- Main reason: bytes

What is a byte?

- 8 bits

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What is a bit?

- The bit is a basic unit of representing information inside a computer
- It can have a value of 0 or 1

The memory of a pc is constructed of bits, but it is organized in bigger elements called bytes

The region where you declare data is separate because

- What you write in a high level programming language is sent to a data segment
- All the continuous lines of code go to a code set
- The data segment IS NOT EXECUTABLE, IT IS "DEAD"

This is why we use the termen virus

- The "virus" is attached to what is alive in a pc, the executable, the code

Adresses

- Naming memory locations create variables
- If we want to use them inside our program, we need their address, it is COMPLETELY NECESSARY
- this is an addressing sequence that requires multiple steps
- In real life, we have an address exactly because we need to be located by authorities. We provide, in order: country, judet, city, street, number and everything stops THERE. This is a byte.
- The rules are bits. For example: I live in the living room that has 3 beds. I sleep on second bed. We cannot use a rule to label every bit in a processor. That is why the addressing processor had to be developed with the byte in mind

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A byte

- Smallest unit of information that can be accessed and addressed by a microprocessor

What do the sequence of 0 and 1 mean?

Alu – Arithmetic and logic unit

- It can do arithmetic and logic operations
- It can also apply the instruction code and activate a circuit where, just like a **washing machine**, utilizes a already fixed program
- What kind of operations?
    - The native architecture does not work with real numbers, only integer numbers
    - The task to use real numbers is done by mathematical co-processor
    - It works with:
        - Addition
        - Subtraction
        - Multiplication
        - Division

We only work with addresses, no values or commands.

What we have now is also applicable 40 years ago because we need **BACKWARDS COMPATIBILITY (based on what was created before)**. We cannot change the basic architecture. This is true in software and hardware

The 0 and 1 can be forced by processors to be interpreted and represented into data. For not being in the danger of mixing everything, any kind of info flows on

different channels, like **highways**. An instruction goes on a "**command bus**". For being able to acces the operators and operands we need the **BUSS INTERFACE UNIT (BIU)**

BIU

- It is responsible for grabbing from memory the operands
- it needs addresses to work

Registers

- they are storage capacities, very small in terms of size (8, 16, 32 , 64, 128 bits), but very fast as the excess speed, used for temporary store, the information with which a processor works currently (commands, codes, data, addresses)

the numbering of bits inside of registers start from 0 and go to 31, they are numbered **from right to left**. Why?

- You cannot read it except from right to left and starting from the UNITS because of the sheer(multe) number of 0 and 1(because of arithmetic operations). The position is also determined by power of 2 (it helps with transforming from base 2 to base 10)

What does computer on n bits?

- The size of a memory word
- The size of communication channels

What is a word?

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- Data type, 16 bits

What is a data type?

- A meaning of trying to interpret and give info about something
- From a constructive and logical point of view, a data type is a couple of structure + associated operations

Interface – consists of variable and functions

Implementation – we put variable and functions that are private