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 ver 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 ver of base 2 (it is syntatic sugar)
* but PC’S DO NOT USE BASE 16 FOR NUMBERS!
* Main reason: bytes

What is a byte?

* 8 bits

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 elem 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

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
    - Substraction
    - Multiplication
    - Divition

We only work with addresses, no values or commands.

What we have now is also applicable 40 years ago because we need BACKWARDS COMPATIBILITY. 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. What is an instruction goes on a “command bus”. For being able to acces the pperators and operands we need the BUSS INTERFACE UNIT (BIU)

BIU

* It is responsible for grabbing from memory the opperands
* 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 number of 0 and 1. 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?

* 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

Class

Td. Function (2,4

efel, small network