Computer Systems Architecture

Written exam – 31.01.2024

1a. Present the memory structure (hex dump from olly dbg) for the folowing data segment:

segment data:

    a db 13

    b dw 13, 13h

    c dd 113b3h, 13h, 3h

    d db 'bc3h', '1h+3h'

    e equ 13h

    f db 13abh

    g equ $ - e

    h dq 12

    i dd -9

1b. Present the value from registers after the following code segment is executed. If some instructions produce modification in memory please highlight also the updates

    cld

    mov edi, d+3

    mov al, byte [c+8]

    mov ah, byte [b+2]

    mov bl, -1

    imul ah

    shr bl, 3

    mov al, bl

    movsw

2a. Compare the PUSH instruction and the PUSHAD instruction (present the efect, the similarities and the differences, if exists).

2b. Present with your own words a concept that you learn and you consider important from our discipline.

3. Write the code segment to compute the next **Exp** in unsigned interpretation (natural numbers), please also add the comments with the registers that are saving the results.

Exp = (- a) / 4 + c / b − d + e

The data types are: a byte   b word   c byte   d doubleword   e quadword

4. A string of doublewords is given, integer numbers in base 16. Extract in string D all bytes which are divisible to a constant k defined in data segment. Comment your code.