EFREI CA2023F

Computer Architecture Lab 5 – Data in memory

# This exercise focuses on how different types of data are arranged in memory

# X86 memory organization – little endian - LSB @ lower address

# In SASM default location of .data section is 0x402000

To see content of memory with GDB we may use command: **x /32bx 0x402000 .** If we need to see more, we may use **x /32bx.**

# Integer variables in memory

## Word (16 bit data)

Consider following declaration:

.data

.word 0xBEEF, 54321,27 ,-34,-31245

Use SASM ang debug command (GDB) to investigate how this data are stored in memory.

To see memory content use this GDB command: **x /32bx 0x402000**

Explain memory content in short report.

## long word (32-bit data)

Consider following declaration:

.data

num\_i32: .long 0xABCDDEAF

.long 1678

num\_i32s: .long -24786

Use SASM ang debug command (GDB) to investigate how this data are stored in memory.

Explain memory content in short report.

## quad word (.quad)

Consider following declaration:

# 64-bit integer data

.data

.word 0x55aa

.quad 0xABCDDEAF12345678

.align 8

.quad 0xDEAFBEEF87654321

Use SASM ang debug command (GDB) to investigate how this data are stored in memory. Explain memory content.

What is the role of ”.align 8” directive?

Put your own negative quad word value and explain their memory representation.

## positive and negative value of word, long word quad world

Explain how the negative values are represented

## .tfloat number

.tfloat is a type of data that is used to represent extended double FP number (80bit floating point) .

Consider following declaration:

.data

.tfloat 23.7

Use SASM ang debug command (GDB) to investigate how this data are stored in memory. Explain memory content, format of this type of data and representation of this particular number.

# String type variable

Use example program readstr.asm.

With SASM and GDB display memory dump of the area where the entered data was placed.

Explain how the siting is stored in memory?

What is the difference between .ascii and .asciz directive?

Prepare declaration of memory content organized in .long that will contain your full name when you treat this data as a string.