Lab 2 - Memory

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CS311 - Computer Architecture 1

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The second laboratory exercise requires you to assign and transcribe different data types in assembly language.

Please create a file named `memory.asm` in EBE.

Using the codes from Chapter 2 and 3, create a segment as `.data` in your file.

Question 1 - `.data` section.

The first exercise requires you to code different numbers in the `.data` segment. There are generally four different types:

- `db` - byte (1 byte)
- `dw` - word (2 bytes)
- `dd` - double word (4 bytes)
- `dq` - quad word (8 bytes)

The task is the following:

1. Choose one integer within this range $[2^5, (2^7 - 1)]$. Allocate this one number using the three different types of `db`, `dw` and `dd`. Use labels `a`, `b` and `c`.
2. Choose a floating point number within this range $[2^4, 2^6]$. Use at least three decimal points (non-zero values). Allocate this number using the `dd` type. Use label `d`.
3. Given the decimal number 94962, assign it using the minimum data type in base-16. Use label `e`.

Question 2 - `.bss` section.

The second exercise requires you to reserve different numbers in the `.bss` segment.

1. Reserve 20 words. Use label `g`.

2. Reserve an array of 30 bytes. Use label `h`.

3. Reserve an array of 5 double words. Use label `i`.

Computation

Use either the **ebe** interface to generate the machine code as `memory.lst`. In this file, you will have three fields (columns). The first columns is the memory locations, the second columns is the values translated into base-16, however reversed. The third columns is the instructions itself.

For each instruction in Question 1, convert the number into base-16 and verify it with column 2. Save this computation in the file `computation.doc`. Please follow the example as in `Chapter_3_example_03.pdf` and show all working and explanation.

Secondly, compute the memory displacement and verify it with column 1. Save this computation in the file `computation.doc`. Please follow the example as in `Chapter_3_example_03.pdf` and show all working and explanation.

Submission

All submitted files **MUST** have the **student name**, **student CWU ID** and the **honor code** in them.

The student must submit the following files in a single ZIP file to canvas:

1. `memory.asm`

2. `memory.lst`

3. `computation.doc`

The three files must be submitted through Canvas before 5pm October 11, 2024. The grading rubric is given in Table 1.

Table 1: Grading rubric

File	Aspects	Points
`memory.asm`	Compiles	5
	Correct values used	25
	Documentation	10
`memory.lst`	Submission	5
`computation.doc`	Correct translation to base-16	25
	Correct translation of memory	15
	Proper explanation	15