LAB #05 Report

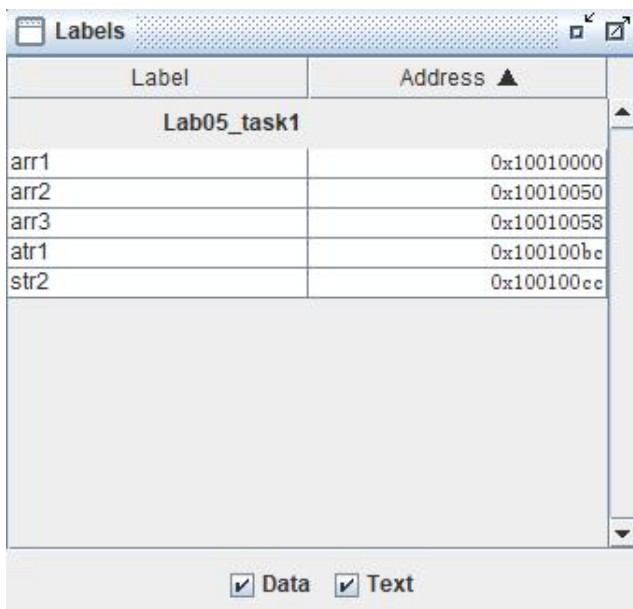Name:黄家睿   ID number:202283890036   Major:IOT

Task 1:

1. Given the following data definition statements, compute the addresses of arr2, arr3, str1, and str2, given that the address of arr1 is 0x10010000. (Show your steps of calculation.) Select "Show Labels Window (symbol table)" from the Settings menu in MARS to check the values of your computed addresses.

```
        .data
arr1: .word 5:20
arr2: .half 7, -2, 8, -6
arr3: .space 100
str1: .asciiz "This is a message"
str2: .asciiz "Another important string"
```

Solution:

Label	Address ▲
Lab05_task1	
arr1	0x10010000
arr2	0x10010050
arr3	0x10010058
atr1	0x100100bc
str2	0x100100cc

☑ Data ☑ Text

Task 2:

2. In problem 1, given that arr1 is a one-dimensional array of integers, what are the addresses of `arr1[5]` and `arr1[17]`? (Show your steps of calculation and check it in MARS.)

Solution:

For one-dimensional array of integers, one integer is 4 bits, the address of array[i] is:
$$\&array[i] = \&array + i \times 4$$
Thus, the address of arr1[5] is
$$0x10010000 + 5 \times 4 = 0x10010014$$
The address of arr1[17] is
$$0x10010000 + 17 \times 4 = 0x10010044$$

Task 3:

3. In problem 1, given that arr3 is a two-dimensional array of bytes with 20 rows and 5 columns, what are the addresses of `arr3[7][2]`, `arr3[11][4]`, and `arr3[19][3]`? (Show your steps of calculation and check it in MARS.)

Solution

For two-dimensional array of bytes, one byte is 8 bits, the address of array[i][j] is:
$$\&array[i][j] = \&array + (i \times 5 + j) \times 8$$
Thus, the address of arr3[7][2] is:
$$0x10010058 + (7 \times 5 + 2) \times 8 = 0x10010180$$
The address of arr3[11][4] is:
$$0x10010058 + (11 \times 5 + 4) \times 8 = 0x10010230$$
The address of arr3[19][3] is:
$$0x10010058 + (19 \times 5 + 3) \times 8 = 0x10010368$$