

Homework Assignment 1

(Due 2:10pm, Sep. 15, email to daehyun.kim@wsu.edu or submit a hardcopy)

Use the following register file and memory maps for the problems.

R9	0x0040
R8	0x0038
R7	0x0034
R6	0x0030
R5	0x0028
R4	0x0024
R3	0x0020
R2	0x0010
R1	0x0008
R0	0x0000

Register file

0x0040	0x0040
0x003C	0x0040
0x0038	0x0040
0x0034	0x000C
0x0030	0x0008
0x002C	0x0038
0x0028	0x0010
0x0024	0x002C
0x0020	0x0040
0x001C	0x001C
0x0018	0x0018
0x0014	0x0020
0x0010	0x0004
0x000C	0x0030
0x0008	0x001C
0x0004	0x0020
0x0000	0x0004

Main memory

1. (20 points) What's the value of R7 after the following code is executed?

LDR R1, [R5]: R1 has 0x0010.

ADD R2, R1, R2: R2 has 0x0020.

LDR R1, [R2]: R1 has 0x0040.

ADD R7, R6, R1: R7 has 0x0070.

2. (20 points) What's the value of R5 after the following code is executed?

LDR R5, [R5]: R5 has 0x0010.

LDR R5, [R5]: R5 has 0x0004.

LDR R5, [R5]: R5 has 0x0020.

LDR R5, [R5]: R5 has 0x0040.

3. (20 points) What's the value of R0 after the following code is executed?

LDR R6, [R6]: R6 has 0x0008.

STR R8, [R6]: @(0x0008) = 0x0038.

LDR R0, [R0]: R0 has 0x0004.

ADD R0, R0, R0: R0 has 0x0008.

LDR R0, [R0]: R0 has 0x0038.

LDR R0, [R0]: R0 has 0x0040.

4. (40 points) Write an assembly code to calculate $16 \times k$. Use the followings:

- k is stored in main memory (address: 0x8000).
- Register R3's value is 0x8000.
- Ignore overflows.
- The result of $16 \times k$ should be stored in Register R0.
- You can use "ADD" and "LDR" only.
- You can use R0 and R3 only.

LDR R0, [R3]: R0 has k .

ADD R0, R0, R0: R0 has $2k$.

ADD R0, R0, R0: R0 has $4k$.

ADD R0, R0, R0: R0 has $8k$.

ADD R0, R0, R0: R0 has $16k$.