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Completed on	2022-09-08 18:35
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Question 1

Complete

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- Assume that the following 2 instructions are defined
 - ADD P1 P2 P3
 - $P1 + P2 \rightarrow P3$, Add P1 and P2 and store the result into P3.
 - You can use a register name like R1 and a memory address/symbol like A for P1, P2 and P3.
 - MUL P1 P2 P3
 - $P1 \times P2 \rightarrow P3$, Multiply P1 and P2 and store the result into P3.
 - You can use a register name like R1 and a memory address/symbol like A for P1, P2 and P3.

- A, B, C : Memory Addresses/Symbols
- R1 and R2 are special memories inside the CPU and called "Registers"

Write a sequence of instructions that carries out the following calculation.

- $A \times A + 2 \times A \times B + B \times B \rightarrow C$

Opcode [ADD/MUL]	P1	P2	P3
ADD	A	B	R1
MUL	R1	R1	C

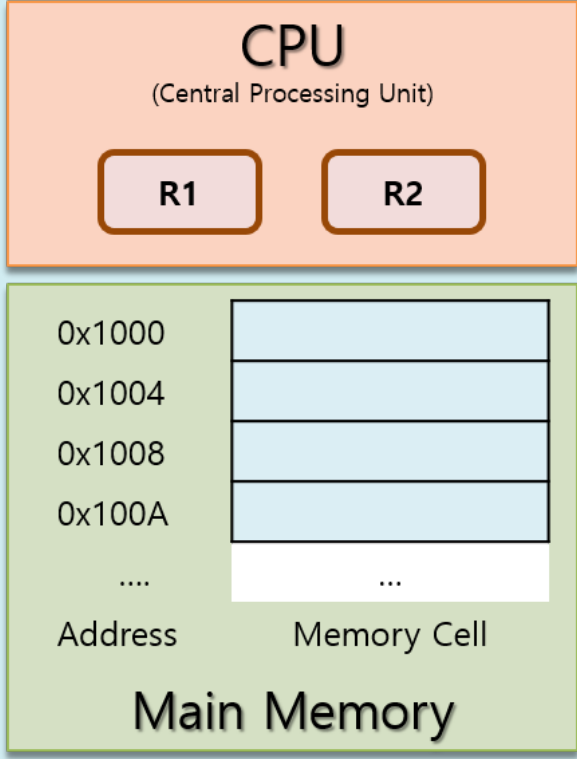
Question 2

Complete

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Consider a computer shown in the following figure.



- R1 and R2 are special memories inside the CPU and called "Registers" (R1, R2는 "Registers"라 불리는 CPU 내의 특별 메모리이다)
- Assume that the following 4 instructions are defined
 - LD [Address] Register
 - Load the value of a memory cell with the address of [Address] (주소로 [Address]를 가지는 메모리 셀의 값을 Register로 읽어 들인다)
 - Ex) LD [0x1000] R1
 - Load (Read) the value a memory cell with the address of [0x1000] into the Register R1
 - Takes 4 CPU clocks
 - ST [Address] Register
 - Store the value in the Register into the memory cell with the address of [Address] (Register의 값을 주소로 [Address]를 가지는 메모리 셀에 저장한다)
 - Ex) ST [0x1004] R2
 - Store (Write) the value of the Register R2 into the memory cell with the address of [0x1004]
 - Takes 4 CPU clocks
 - ADD Reg1 Reg2
 - Reg1 + Reg2 --> Reg2, Add the values of the Register Reg1 and Reg2 and store the result into the Reg2. The value of the Reg1 does not change after the operation (Reg1과 Reg2의 값을 더하고 그 결과를 Reg2에 저장한다. + 연산 후 Reg1의 값은 변하지 않는다)
 - Takes 1 CPU clocks
 - MUL Reg1 Reg2
 - Reg1 * Reg2 --> Reg2, Product the values of the Reg1 and Reg2 and store the result into the Reg2. The value of the Reg1 does not change after the operation (Reg1과 Reg2의 값을 곱하고 그 결과를 Reg2에 저장한다. * 연산 후 Reg1의 값은 변하지 않는다)
 - Takes 1 CPU clocks

Write a sequence of instructions that does the following operation **with the minimum number of CPU clocks**. (다음을 수행하는 sequence of instruction을 작성하라. 단 모든 instruction의 CPU Clock의 합은 최소가 되어야 한다)

- Let [0x1000] be the address of x and [0x1004] be that of y.
- Carry out $x * x + x * y$ and store the result into [0x1008] : $x * x + x * y \rightarrow [0x1008]$

Opcode [LD/ST/ADD/MUL]	operand1	operand2
LD	[0x1004]	R1
LD	[0x1000]	R2
ADD	R2	R1
MUL	R1	R2
ST	[0x1008]	R2