EXAMPLE 2

Instruction Memory's file: 5th_fig421_MemEx4/inst.rom

The user should set initial register values (linear). No data values are required.

Description: A simple sequence of three instructions with no data hazard.

ADD r1,r1,r1
SLT r2, r15, r1 // EXE HAZARD
BEQ r2,r0, -3 //EXE HAZARD

ADD r1,r1,r1 – type R instruction
opcode = 0 rs = 1 rt = 1 rd = 1 sh = 0 func = 32
000000 00001 00001 00001 00000 100000
0x00210820

SLT r2,r15,r1 – type R instruction
opcode = 0 rs = 15 rt = 1 rd = 2 sh = 0 func = 42
000000 01111 00001 00010 00000 101010
0x01E1102A

BEQ r2,r0,-3 – type I instruction
opcode = 4 rs = 2 rt = 0 imediate = -7
000100 00010 00000 1111111111111101
0x1040FFFD

The hexadecimal code example is:

ADD r1,r1,r1 – 0x00210820
SLT r2, r15, r1 – 0x01E1102A
BEQ r2,r0, -3 – 0x1040FFFD

Calculations check (with linear initial register values):

1. ADD r1,r1,r1 – R1 = 2
2. SLT r2, r15, r1 – R2 = 0
3. BEQ r2,r0, -3 – BACK TO THE FIRST INSTRUCTION
    1. ADD r1,r1,r1 – R1 = 4
    2. SLT r2, r15, r1 – R2 = 0
    3. BEQ r2,r0, -3 – BACK TO THE FIRST INSTRUCTION
        1. ADD r1,r1,r1 – R1 = 8
        2. SLT r2, r15, r1 – R2 = 0
        3. BEQ r2,r0, -3 – BACK TO THE FIRST INSTRUCTION
            1. ADD r1,r1,r1 – R1 = 16
            2. SLT r2, r15, r1 – R2 = 0
            3. BEQ r2,r0, -3 – BRANCH IS NOT TAKEN
            4. End.