

### EXAMPLE 3

**Instruction Memory's file:** 5th\_fig421\_MemEx4/inst.rom

The user should set initial register values (linear) and DataRam (linear + 2). No data values are required.

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

LW r1,0(r4)  
LW r2,4(r4)  
ADD r3,r1,r2  
SW r3, 8(r4)

**LW r1,0(r4)** – type I instruction

opcode = 35   rs = 4   rt = 1   immediate = 0  
100011   00100   00001   0000000000000000  
**0x8C810000**

**LW r2,4(r4)** – type I instruction

opcode = 35   rs = 4   rt = 2   immediate = 4  
100011   00100   00010   0000000000000100  
**0x8C820004**

**ADD r3,r1,r2** – type R instruction

opcode = 0   rs = 1   rt = 2   rd = 3   sh = 0   func = 32  
000000   00001   00010   00011   00000   100000  
**0x00221820**

**SW r3,8(r4)** – type I instruction

opcode = 43   rs = 4   rt = 3   immediate = 8  
101011   00100   00011   0000000000001000  
**0xAC830008**

The hexadecimal code example is:

LW r1,0(r4)   – **0x8C810000**  
LW r2,4(r4)   – **0x8C820004**  
ADD r3,r1,r2   – **0x00221820**  
SW r3, 8(r4)   – **0xAC830008**

*Calculations check (with linear initial register values):*

1. LW r1,0(r4)   – R1 = M[1] = 3
2. LW r2,4(r4)   – R2 = M[2] = 4
3. ADD r3,r1,r2   – R3 = 7
4. SW r3, 8(r4)   – M[3] = 7