

5.9 a)

9 Either seven or eight microinstructions are executed, depending on the value of IR[13]:

IR[13] = 0: (Eight microinstructions) 0, 1, 1584, 1585, 1586, 1587, 1603, 2047.

IR[13] = 1: (Seven microinstructions) 0, 1, 1584, 1586, 1587, 1603, 2047.

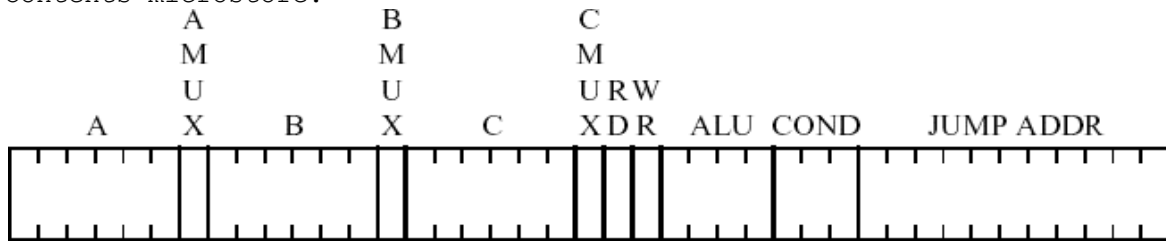
5.14

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1612: R[temp0] <- SIMM13(R[IR])
      IF IR[13] THEN GOTO 1614; / Is second source operand immediate?
1613: R[temp0] <- R[rs2];
1614: R[temp1] <- R[rs1]; GOTO 21
      21: R[temp2] <- ORN(R[0], R[temp0]); / Get complement of B in temp2
      22: R[temp3] <- ORN(R[0], R[temp1]); / Get complement of A in temp3
      23: R[temp1] <- AND(R[temp1], R[temp2]); / temp1 gets AND(A, B')
      24: R[temp2] <- AND(R[temp0], R[temp3]); / temp2 gets AND(A', B)
      25: R[rd] <- ORCC(R[temp1], R[temp2]); GOTO 2047; / Extract rs2 operand

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Contents microstore:



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1612:100101 0 ----- - 100001 000 1011 101 11001001110
/ R[IR] R[temp0] SIMM13 ir[13] 1614
1613:000000 0 ----- 1 100001 000 1000 000 -----
/ R[0] R[rs2] R[temp0] ADD next address
1614:----- 1 000000 0 100010 000 1000 110 00000010101
/ R[rs1] R[0] R[temp1] ADD jmp adr 21
21:000000 0 100001 0 100011 000 0111 000 -----
/ R[0] R[temp0] R[temp2] ORN next address
22:000000 0 100010 0 100100 000 0111 000 -----
/ R[0] R[temp1] R[temp3] ORN next address
23:100010 0 100011 0 100010 000 0101 000 -----
/ R[temp1]R[temp2] R[temp1] AND next address
24:100001 0 100100 0 100011 000 0101 000 -----
/ R[temp0]R[temp3] R[temp2] AND next address
25:100010 0 100011 0 ----- 100 0001 110 11111111111
/ R[temp1]R[temp2] R[rd] ORCC jmp adr 2047

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Note: I added the RTL description beneath the contents of a micro address. “- - -” means that any value is possible (don’t care).