

Solution to RISCy Business

By Edwin Lai

All 6 blocks are machine code for various RISC architectures. The flavor text hints at the possible architectures to choose from, namely MIPS, SPARC, Alpha, and Power PC, as well as that the code is written with the most significant bit on the left (31...0). Determine what architecture each block corresponds to and then execute that code. The executed code will produce a number [1...26] which corresponds to a letter. The letters spell out **SULTRY**.

S – Alpha

Instruction	Binary	Hex	Results
Xor r20 r20 r20	01000110100101000000100000010100	46940814	R20 = 0
Bis r20 r20 1	01000110100000000011010000010100	46803414	R20 = 1
Sll r21 r20 2	01001010100000000101011100110101	4A805735	R21 = 4
Sll r22 r20 4	01001010100000001001011100110110	4A809736	R22 = 16
Sll r23 r20 5	01001010100000001011011100110111	4A80B737	R23 = 32
Sub r20 r21 r20	01000010101101000000010100110100	42B40534	R20 = 3
Sub r20 r22 r20	01000010110101000000010100110100	42D40534	R20 = 13
Sub r20 r23 r20	01000010111101000000010100110100	42F40534	R20 = 19 = 'S'

U – SPARC

Instruction	Binary	Hex	Results
Andi r1 r1 0	10000010000010000110000000000000 00	82086000	R1 = 0
Addi r1 r1 1	10000010000000000011000000000000 01	82006001	R1 = 1
Addi r4 r1 3	10001000000000000011000000000000 11	88006003	R4 = 4
Addi r8 r1 7	10010000000000000011000000000001 11	90006007	R8 = 8
Sub r7 r8 r1	10001110001000100000000000000000 1	8E220001	R7 = 7
Sub r3 r4 r1	10000110001000010000000000000000 01	86210001	R3 = 3
Mulx r2 r3 r7	100001000100100011000000000000111	8448C007	R2 = 21 = 'U'

L – MIPS

Instruction	Binary	Hex	Results
Sub r8 r8 r8	0000000100001000010000000001000 10	01084022	R8 = 0
Sub r9 r9 r9	00000001001010010100100000010001 0	01294822	R9 = 0
Addi r8 r8 20	00100001000010000000000000000101 00	21080014	R8 = 20
Addi r9 r9 4	00100001001010010000000000000010 0	21290004	R9 = 4

L – MIPS (continued)

Instruction	Binary	Hex	Results
Sll r9 r9 1	00000001001000000100100001000000	01204840	R9 = 8
Sub r8 r8 r9	00000001000010010100000000100010	01094022	R8 = 12 = 'L'

T – PPC

Instruction	Binary (31 ... 0)	Hex	Results
Xor r10 r10 r10	00011110010010100101001010111110	1E4A52BE	R10 = 0
Xor r9 r9 r9	00011110010100101001010010111110	1E5294BE	R9 = 0
Addi r10 r10 1	10000000000000000101001010011100	8000529C	R10 = 1
Addi r9 r9 2	01000000000000000100101001001100	4000949C	R9 = 2
Slw r10 r10 r9	00001100000100100101001010111110	0C1252BE	R10 = 4
Addi r11 r10 1	10000000000000000101011010011100	8000569C	R11 = 5
Mullw r12 r10 r11	01101011100110100101000110111110	6B9A51BE	R12 = 20 = 'T'

R – MIPS

Instruction	Binary	Hex	Results
Andi r8 r8 0	00110001000010000000000000000000	31080000	R8 = 0
Andi r9 r9 0	00110001001010010000000000000000	31290000	R9 = 0
Ori r8 r8 1	00110101000010000000000000000000	35080001	R8 = 1
Ori r9 r9 1	00110101001010010000000000000001	35290001	R9 = 1
Sll r8 r8 3	00000001000000000100000011000000	010040C0	R8 = 8
Add r8 r8 r9	00000001001010000100000000100000	01284020	R8 = 9
Sll r9 r9 1	00000001001000000100100001000000	01204840	R9 = 2
Mult r8 r9	00000001001010000000000000011000	01280018	Hi = 0 Lo = 18
Mflo r10	00000000000000000101000000010010	00005012	R10 = 18 = 'R'

Y – PPC

Instruction	Binary (31 ... 0)	Hex	Results
Subf r5 r5 r5	00001010000101001010010100111110	0A14A53E	R5 = 0
Subf r6 r6 r6	00001010000011000110001100111110	0A0C633E	R6 = 0
Addi r5 r5 2	01000000000000000101001010001100	4000A51C	R5 = 2
Addi r6 r6 3	11000000000000000110001100011100	C000631C	R6 = 3
Add r7 r5 r6	00101000001101000110011100111110	2834673E	R7 = 5
Mullw r8 r7 r7	01101011100111001110000010111110	6B9CE0BE	R8 = 25 = 'Y'