

ICS Homework 1

Feb 25, 2021

1 HCL

Please write down the HCL expressions for the following signals.

Example: Show if the two input signals **a** and **b** are equal

```
bool eq = (a&&b) || (!a && !b);
```

1. The HCL expression for a signal **nand**, which is equal to **NAND** of inputs **a** and **b**, the truth table is given, and you should only use **NOT** (!) and **OR** (||) operators.

NAND	0	1
0	1	1
1	1	0

2. The HCL expression for a three-way xor called **XOR3**. If and only if all the inputs are the same, output will be true. Each input and output is one-bit wise. The three input signals are **a**, **b** and **c**. Hint: You can use boolean expressions or case expressions.

2 Y86

0x000:	.pos 0
0x000:	init:
0x000: 30f40002000000000000	irmovq stack, %rsp
0x00a: _____[1]_____	irmovq stack, %rbp
0x014: 801e00000000000000	call main
0x01d: 00	halt
0x01e:	main:
0x01e: 30f70003000000000000	irmovq list, %rdi
0x028: 30f60300000000000000	_____[2]_____
0x032: 803c00000000000000	call calculate
0x03b: 90	ret
0x03c:	calculate:
0x03c: 6300	_____[3]_____
0x03e: 30f30800000000000000	irmovq \$8, %rbx
0x048: 2072	rrmovq %rdi, %rdx
0x04a: 706d00000000000000	jmp test
0x053:	loop:
0x053: 50120000000000000000	_____[4]_____
0x05d: 6010	addq %rcx, %rax
0x05f: _____[5]_____	andq %rsi, %rax
0x061: 6032	addq %rbx, %rdx
0x063: 50220000000000000000	mrmovq (%rdx), %rdx
0x06d:	test:
0x06d: 6222	andq %rdx, %rdx
0x06f: 745300000000000000	jne loop
0x200:	_____[6]_____
0x200:	stack:
0x300:	
0x300:	.pos 0x300
0x300:	.align 8
0x300:	list:
0x300: 0800000000000000	.quad 0x8
0x308: 2003000000000000	.quad _____[7]_____
0x310: 0900000000000000	.quad 0x9
0x318: 0000000000000000	.quad 0x0
0x320: 0a00000000000000	.quad 0xa
0x328: 1003000000000000	.quad 0x310

1. Please fill in the blanks within above Y86 binary and assembly code.
2. Please calculate the value of **%rax** after the program **HALT**.