Check Yourself: Mouse Status

CS 0447, Spring 2011

I/O Devices

• Input/output devices interact with program

• Need a way to get a value from device
  – Input values mapped into memory
  – Known addresses hold the values (I/O address)

• Use loads and stores to read/write the values
  – Load /store on the known I/O address
Mouse

• Consider mouse button status
  – input word from mouse at address 0xAA0C0040
  – button status in bits 28,27 of 0xAA0C0040
  – 4 combinations:
    • none pressed 00
    • left pressed 01
    • right pressed 10
    • left and right pressed 11

Reading the Button Status

• How should we get the status?
  – Load the mouse input value into a register
  – Shift the value to the right, putting button status in the two least significant bits (bits 1,0)
  – Mask off remaining value

• Instructions we’ll need
  – lui, ori, lw, srl, andi
Reading the Button Status

```
.text
lui   $t0, 0xAA0C
ori   $t0, $t0, 0x0040
lw    $t0, 0($t0)
srl   $t0, $t0, 27
andi  $t0, $t0, 0x3
```

puts address into $t0
loads value at mouse_stat
shifts button stat
masks off upper bits

builds: 0xAA0C0040
reads: $t0 = 0xD0FF0020
shift $t0 = 0x1A
mask bits $t0 = 0x02

Values in $t0

|   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

(after lw)

|   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 0 |

(after srl)

|   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

(after andi)