Check Yourself: Mouse Status

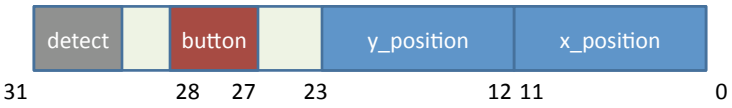
CS 0447, Spring 2011

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
```

put address into $t0

load value at mouse_stat

shift button stat

mask off upper bits

Reading the Button Status

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

builds: 0xAA0C0040

Reads: $t0 = 0xD0FF0020

Shift $t0 = 0x1A

Mask bits $t0 = 0x02

Values in $t0

```
1101 0000 1111 1111 0000 0000 0010 0000 (after lw)
0000 0000 0000 0000 0000 0000 0001 1010 (after srl)
0000 0000 0000 0000 0000 0000 0000 0010 (after andi)
```