CS315-01 RISC-V Emulation Dev

Project04 out today
Project03 exam problems
OH today 12pm to 2:30pm

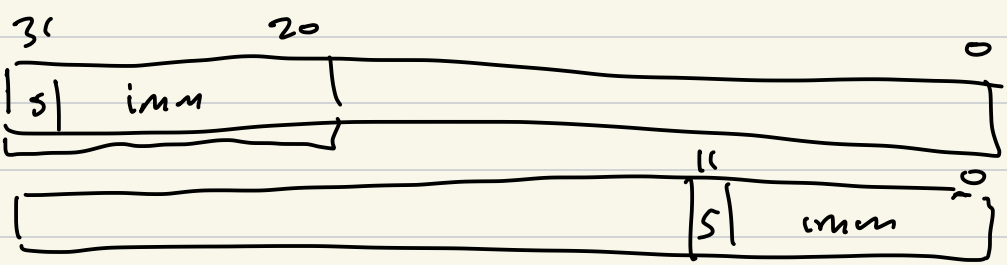
rv_emu.c given 97
rv_emu.c sol 203

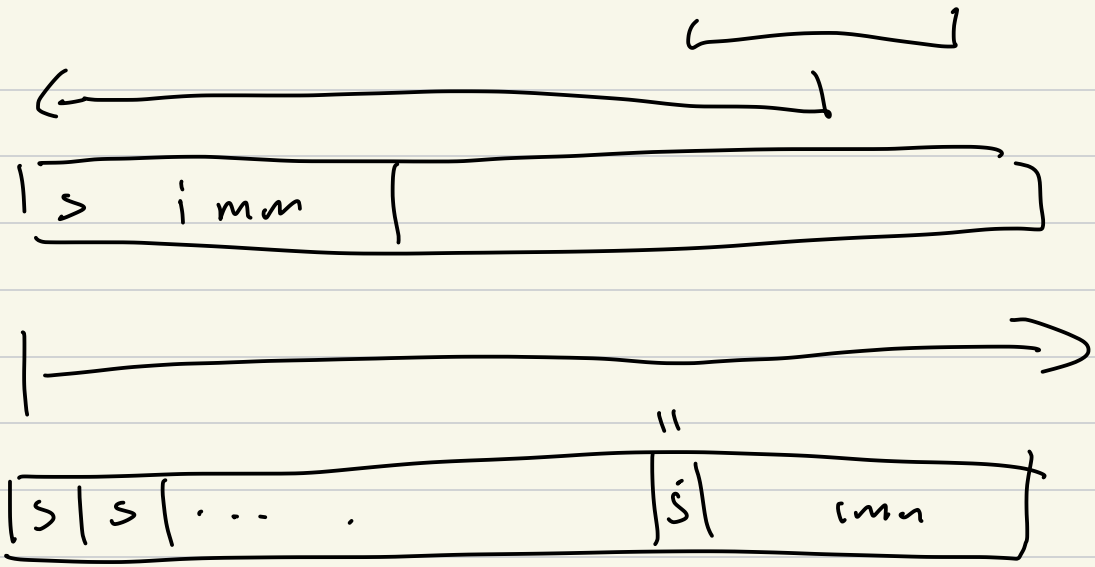
li a0, 99 ←

0x06300513

0000 0110 0011 0000 0000 0101 0001 0011

f3 rd opcode
000





Branches

Extract fields

- funct3
- rs1
- rs2

imm

branch immediate

1) get parts
2) combine parts
3) sign extend

1) get parts

```
uint32_t  imm_12 = get_bits(iw, 31, 1);
uint32_t  imm_11 = get_bits(iw, 7, 1);
uint32_t  imm_10_5 = get_bits(iw, 25, 6);
uint32_t  imm_4_1 = get_bits(iw, 8, 4);
```

2) combine parts

```
uint64_t immu;

immu = (imm_12 << 12) | (imm_11<<11)
     | (imm_10_5) << 5) | (imm_4_1 <<1) | 0
```

3) sign extend

```
int64_t imm = sign_extend(immu, 12);
```

JAL Jump and Link

jumps (j)

jal/call for function calls

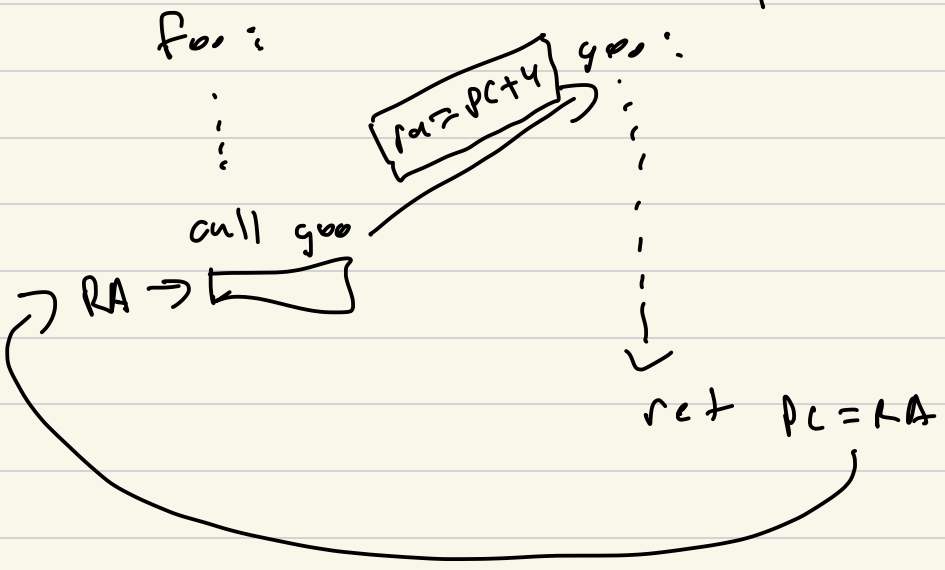
j offset → jal x0, offset

dest

zero

jal/call → jal ra, offset

x1



Loads and Stores

`lw a0, offset(a1)`

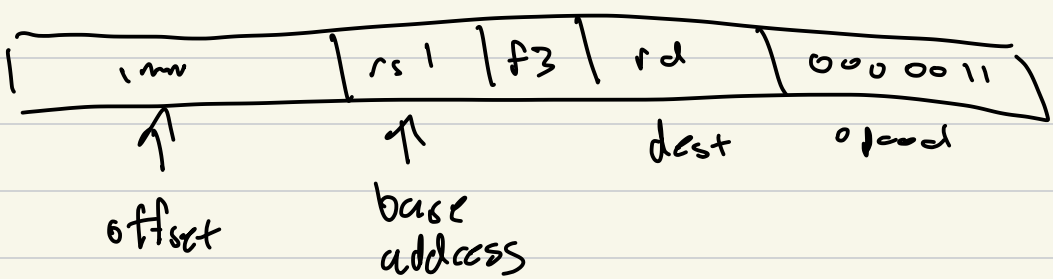
```
a0 = *a1

uint32_t a0;
a0 = *((uint32_t *) a1);
```

target address (TA)

```
TA = a1 + offset

rd = *((uint32_t *) TA);
```



lb	uint8_t *
lw	uint32_t *
ld	uint64_t *

Store

sw a0, offset(a1)

TA = a1 + offset

((uint32_t) TA) = a0;