MIPS Data Transfer Instructions

Opcode rt, immed (rs)

- rt: the loaded or stored value
- immed (rs): the memory address
  - rs: base address
  - immed: signed 16-bit offset value (displacement)
- full address = base + offset
  - allows a full 32 bit address
  - can address ± 32KB from the base address

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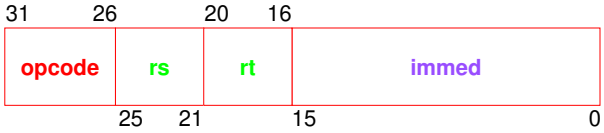
Some examples:

```
lw  $t0, 46($t2)      # $t0 = memory[$t2+46]
sw  $t0, 46($t2)      # memory[$t2+46] = $t0

lb  $t1, -256($t2)    # $t1 =
                        sign-extended (memory[$t2-256])
lbu $t1, -256($t2)    # $t1 =
                        zero-extended (memory[$t2-256])
sh  $t1, -256($t2)    # memory[$t2-256] = the least
                        significant halfword of $t1
```

I-type Format

I-type format used for data transfer instructions



- **opcode** = data transfer instruction
- **rs** = base address
- **rt** = register value that is loaded from or stored to memory
- **immed** = address offset in bytes, $\pm 2^{15}$
  - sign-extended when used (replicate msb)

`lw $t6, 8($sp)`

35	29	14	8