

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 $\pm 32\text{KB}$ from the base address

MIPS Data Transfer Instructions

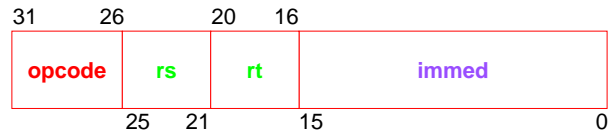
Some examples:

```
lw $8, 46($10)    # $8 = memory[$10+46]
sw $8, 46($10)    # memory[$10+46] = $8

lb $9, -256($10)  # $9 =
                  sign-extended (memory[$10-256])
lbu $9, -256($10) # $9 =
                  zero-extended (memory[$10-256])
sh $9, -256($10)  # memory[$10-256] = the least
                  significant halfword of $9
```

I-type Format

I-type format used for data transfer instructions



- **opcode** = operation
 - 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 $14, 8($sp)`

