

# Chapter 04: Instruction Sets and the Processor organizations

## Lesson 02

### **Register transfers**

# Objective

- Learn a stack organised computer and a GPRs based computer

# Register transfer

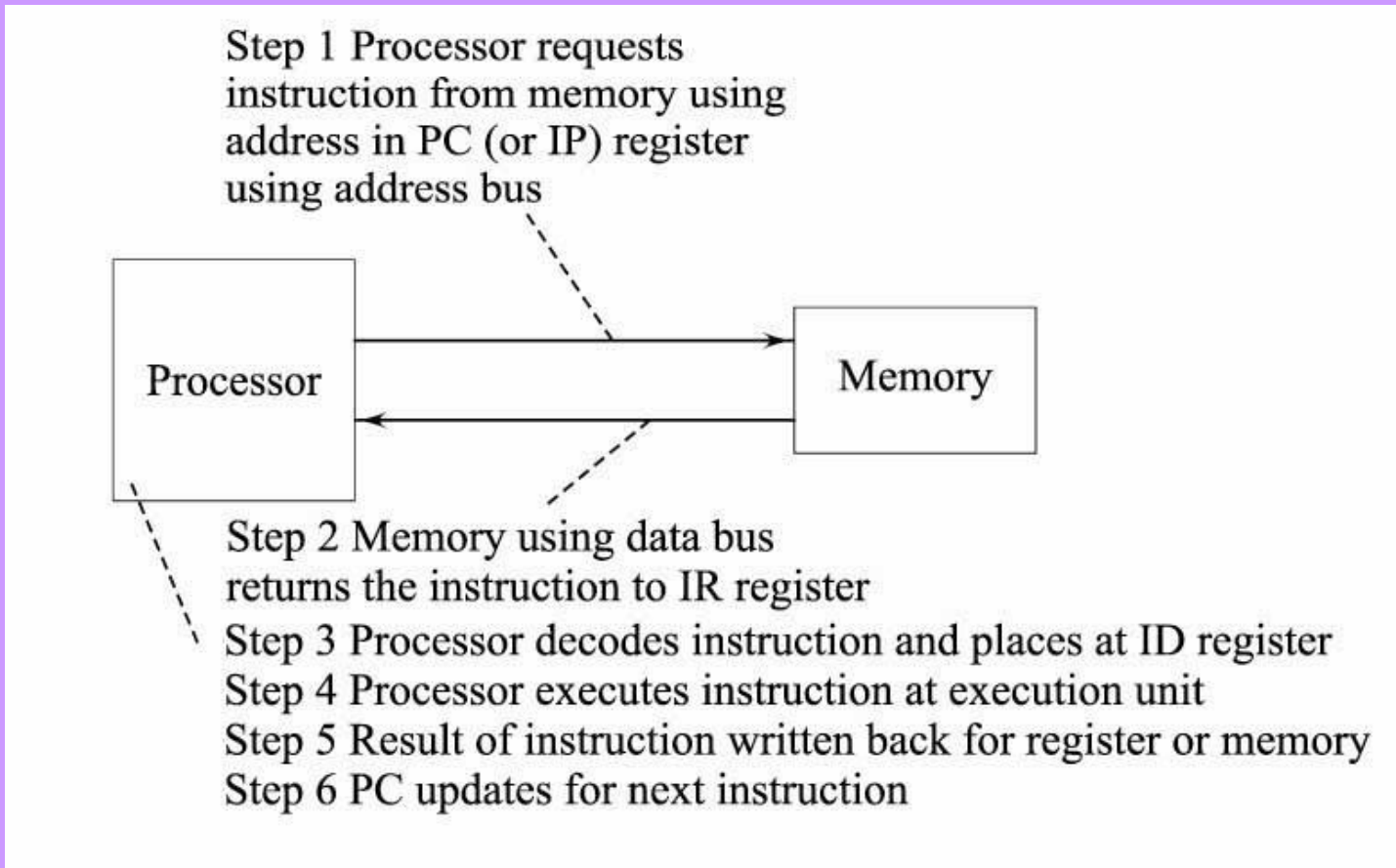
# Register transfer or register move or load

- Register transfer or register move— sending the information bits to a register from other register
- Register load— means sending the information bits to a register from memory

# Representing an instruction for register transfer

- MOV r1, r2
- The r2 and r1 are called the operands
- The r1 and r2 are the registers that store the bytes required for the operation
- The registers r1 and r2 are the source and destination operands, respectively

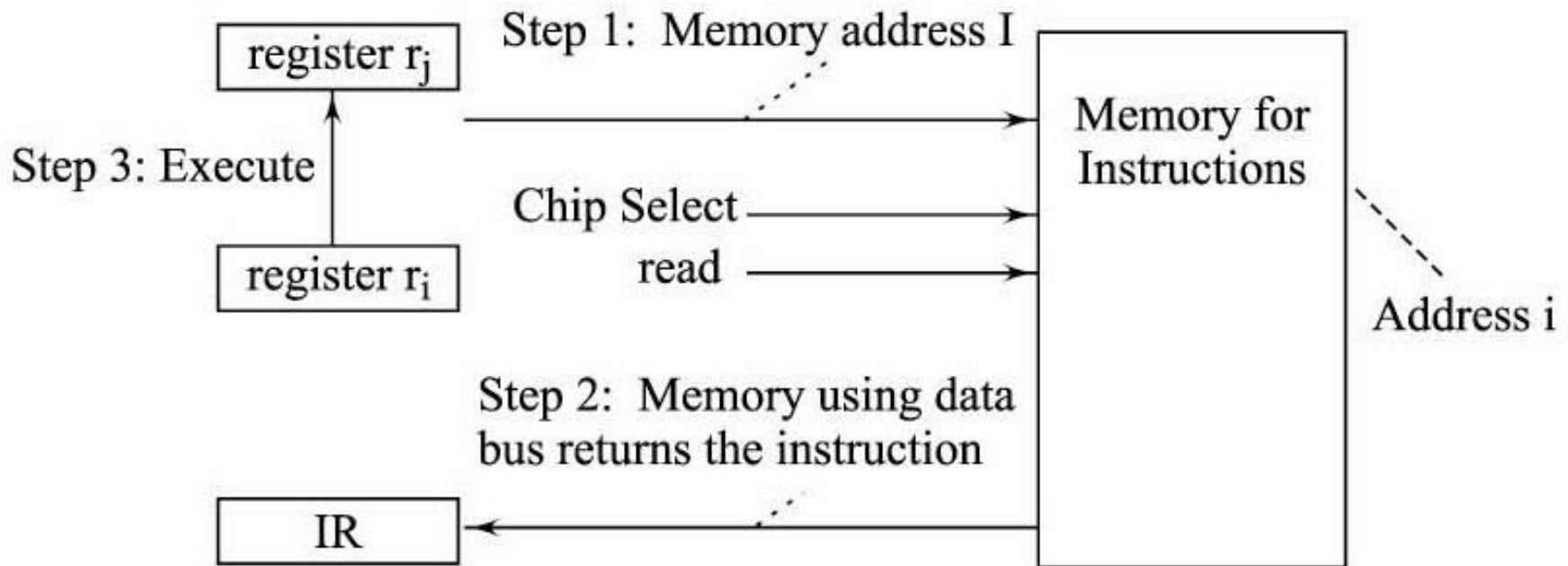
# Steps in an instruction execution execution steps



# Register Move (transfer) Instructions

Operation	Code	Function
Move (transfer)	MOV	Move the input operand at a register to the second by a word copy

# MOV rj, ri in three steps





# Register transfer language

# Register transfer language

- $r1 \leftarrow r2$ . The arrow shows the direction (right to left) of transfer from  $r2$  to  $r1$
- $r1 \rightarrow r2$ . The arrow shows the direction (right to left) of transfer from  $r1$  to  $r2$

# Register transfer language

- Data bus  $\leftarrow$  r1 means from r1 the data bits are placed at the data bus
- Address bus  $\leftarrow$  PC means from program counter register the data bits are placed at the data bus

# Register transfer language

- MOV:  $r1 \leftarrow r2$  or T:  $r1 \leftarrow r2$  means register to register transfer from  $r2$  to  $r1$  on the control signal activation for instruction MOV execution or control signal T
- LD:  $r1 \leftarrow Maddr$  means load  $r1$  by data bits transfer from memory  $Maddr$  on the control signal activation for instruction LD
- ST:  $Maddr \leftarrow r1$  means store data bits at memory by transfer from  $r1$  on the control signal activation for instruction ST

# Destination first

- Certain processors, for example, INTEL-processor instructions, are represented with destination operand first after the opcode and source operand next
- MOV r1, r2 is when the bits from a register r2 are transferred (copied) into r1
- It means  $r1 \leftarrow r2$ . The arrow shows the direction (right to left) of transfer from r2 to r1

# Destination last

- Other processors, for example, Motorola-processor instructions represent with source operand first after the opcode and destination operand next
- MOV r2, r1 is when bits from a register r2 are transferred (copied) into r1
- It means  $r2 \rightarrow r1$  arrow shows the direction of transfer from r2 to r1

# Assumed convention

- In future discussions let us use the convention that unless otherwise stated the destination operand is written first after the opcode and then next source operand

# Summary



# We Learnt

- Register transfer
- Register transfer shown by left directed or write directed arrow
- Control signal or Instruction prefixed arr

End of Lesson 02 on  
**Register transfers**