

Instructions

Humayun Kabir

Professor, CS, Vancouver Island University, BC, Canada

Instructions: Outline

- Introduction
- Opcode
- Operands

Instructions: Introduction

- Instructs the computer to perform an operation on one or more operands.

LOAD AC, M(X)	//Load accumulator register from memory address X
MOV MQ, AC	//Move content of accumulator register to MQ register
ADD AC, MQ	//AC = AC + MQ
LSL AC	//Logical shift left AC
LSR AC	//Logical shift right AC

Instructions: Introduction

Operation	Operands
LOAD	AC, M(X)
MOV	MQ, AC
ADD	AC, MQ
LSL	AC
LSR	AC

- Operation is represented by an opcode.
- Operands are represented in many ways depending on the types of operands.

OPCODE

OPERANDS

Instructions: Opcode

- Determines the operation to be performed
- Specific to a target computer or processor
- Target processor understands and is capable to perform the operation
- Represented by a fixed width binary number
- Width depends on the target processor
- Width determines the maximum number of instructions a target processor can support

Instructions: Opcode

- Binary opcode is represented by human readable **mnemonic** in assembly language.

Opcode (8 bit)	Mnemonic	Description
0000101	ADD	Add one operand with the other operand
0000110	SUB	Subtract one operand from the other operand
00001011	MUL	Multiply one operand with the other operand
00001100	DIV	Divide one operand by the other operand

Instructions: Operands

- Represents the data on which computer operations will be performed.
- Most of the computers can perform operations on operand types: **address**, **character**, **integer number**, and **real number**.

Operand Type	Examples
address	00000000
Character	'a', 'b', 'c', 'A', 'B', 'C'
Integer Number	234, -67, 32678
Real Number	23.004, -3.14, 2e45, -3e5, 6e-23

- Each computer represents each type of data differently.
- Each address operand refers a memory location.

Operands: Numbers

- Integer Number
 - Unsigned
 - Signed
- Real Number
 - Fixed Point
 - Floating Point