

Computer Registers: A register is a very small amount of very fast memory that is built into the CPU (central processing unit) in order to speed up its operations by providing quick access to commonly used values.

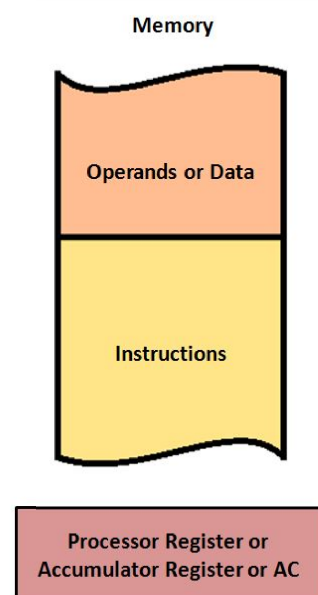
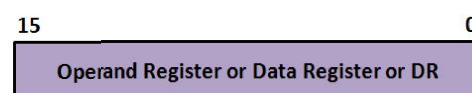
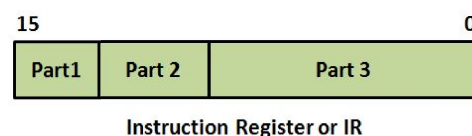
Registers are used for performing various operations. While we are working on the system then these registers are used by the CPU for performing the operations. When we give some inputs to the system then the input is stored into the registers and when the system gives us the results after processing, then the result again comes from registers. Thus registers work like memories that are used by the CPU for processing the data which is given by the user.

Among of the Mostly used Registers some names are Accumulator or AC, Data Register or DR, Address Register or AR, Program counter or PC, Memory Data Register or MDR etc. Consider the following table:

Register Symbols	Number of bits	Register Names	Functions
DR	16	Data Register	Holds the Operand coming from memory
IR	16	Instruction Register	Holds the Instruction code
AC	16	Accumulator Register	Holds data that is being processed
TR	16	Temporary Register	Holds Temporary data
AR	12	Address Register	Holds address for memory
PC	12	Program Counter	Holds address of next Instruction
INPR	8	Input Register	Holds data coming from Input devices
OUTR	8	Output Register	Holds data going for Output devices

The simplest way to organize a computer is to have:

- ✓ A Processor Register or Accumulator Register or AC.
- ✓ An Instruction register with a specific format.
- ✓ A Operand Register or Data Register or DR and
- ✓ A memory of certain size.

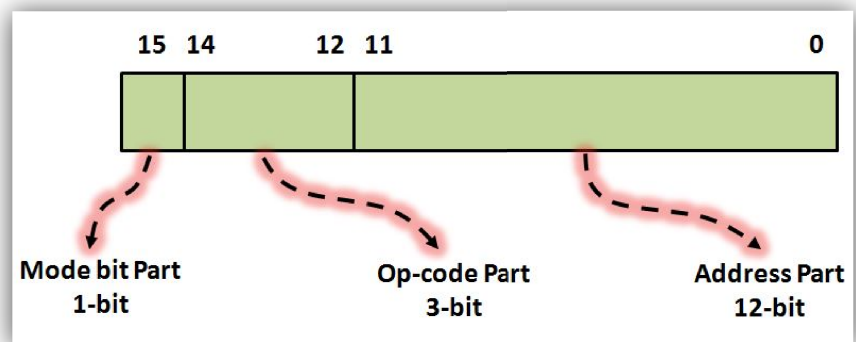


Stored Program execution: A stored program simply refers to a program that is stored somewhere in the memory. A program of this kind puts much of its instructions inside of the memory. A single instruction (related to that program) is fetched out from the memory with the help of PC and AR registers. The instruction is taken to IR register where it is decoded with the help of a decoder and a one single flip-flop. After the instruction is decoded, control unit is now aware of what to do exactly. Execution of instruction starts hereafter.

Basic Computer Instruction: A

basic computer uses an instruction format with three essential parts. These are:

- Address
- Op-code
- Mode bit



The proposed instruction format and its parts are based on a 16-bit register size.

- **Address:** It is a significant part of the instruction a computer processes. For a 16-bit instruction register (IR) size, address part is of 12-bit.
- **Op-code:** Op-code specifies the different operations that can be performed over the data found on the memory address. Here in 16-bit IR, it takes 3 bits. Note that using 3-bit pattern, a total of 8 different operations can be specified.
- **Mode bit:** The single MSB bit of IR is known as Mode Bit and it works just to specify whether the address provided in the address part of IR is DIRECT or INDIRECT.

Assignment:

- 1.** What are different computer registers?
- 2.** What are the three parts of an instruction code?