SNS COLLEGE OF ENGINEERING

Kurumbapalayam (Po), Coimbatore – 641 107

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DEPARTMENT OF COMPUTER SCIENCE AND TECHNOLOGY

COURSE NAME : 19IT301 COMPUTER ORGANIZATION AND ARCHITECTURE

II YEAR / III SEMESTER

Unit 1 : **BASIC STRUCTURE OF COMPUTER**

Topic 2: Basic operational Concepts

Basic Operational Concepts

- To perform a given task, an appropriate program consisting of a list of instructions is stored in the memory.
- Individual instructions are brought from the memory into the processor, which executes the specified operations.
- Data to be used as instruction operands are also stored in the memory.

- Example:
- Add LOCA, R0
- This instruction adds the operand at memory location LOCA to the operand which will be present in the Register R0.
- The above mentioned example can be written as follows:
- Load LOCA, R1
- Add R1, R0

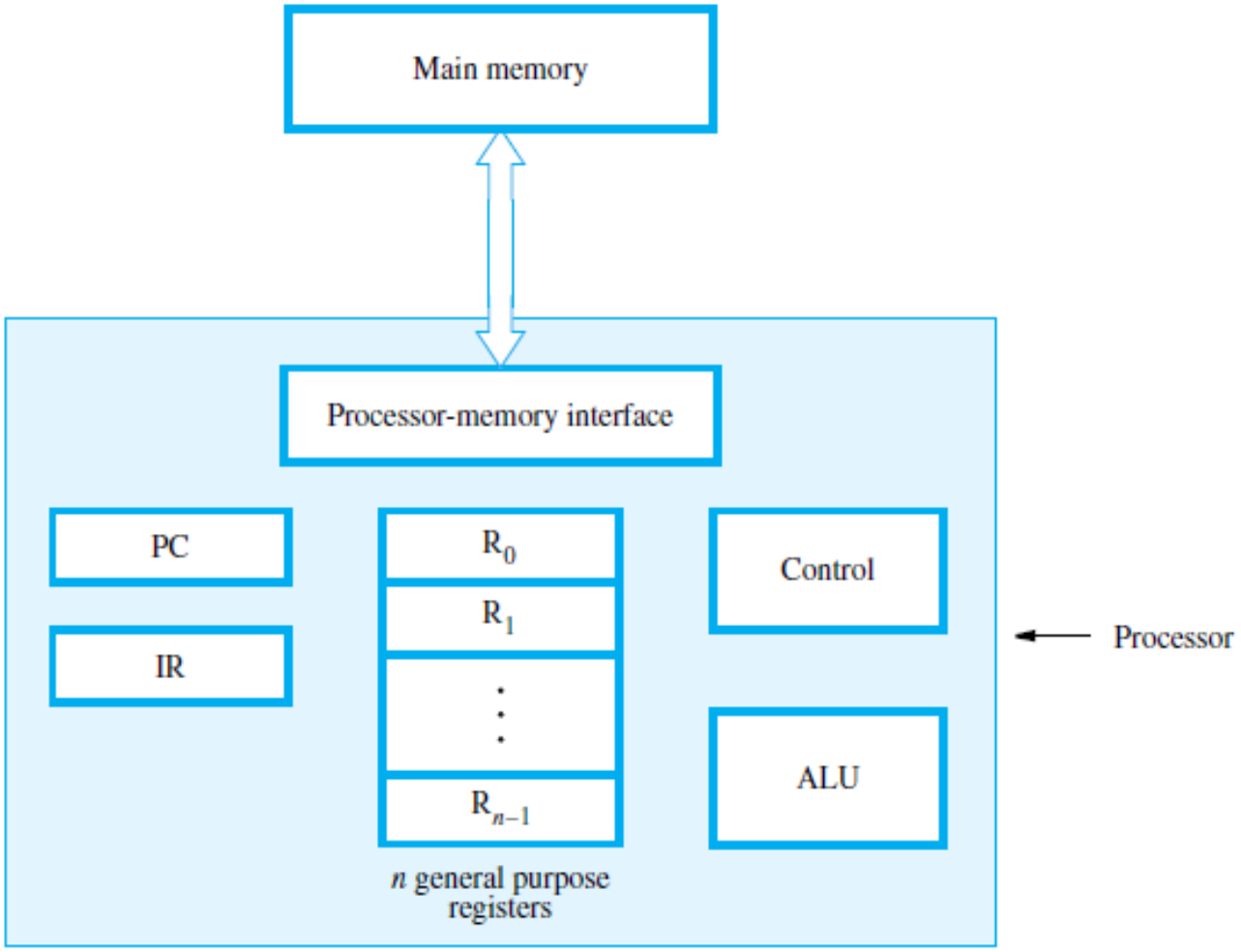
Let us see a typical instruction

ADD LOCA, R0

This instruction adds the operand at memory location LOCA to the operand which will be present in the register R0.

The above mentioned example can be written as follows:
Load LOCA, R1
Add R1, R0

1. Instruction sends the contents of the memory location LOCA into processor register R0
2.The second instruction adds the contents of register R1 and R0 and places the output in the register R1.



Connection between the processor and the main memory.

- The memory and the processor are swapped and are started by sending the address of the memory location to be accessed to the memory unit and issuing the appropriate control signals.
- The data is then transferred to or from the memory.

Analyzing how processor and memory are connected :–

Processors have various registers to perform various functions :-

- **Program counter** :-

  It contains the memory address of next instruction to be fetched.

- **Instruction register**:-

  It holds the instruction which is currently being executed.

Memory Data Register (MDR) :

- It facilities communication with memory.
- It contains the data to be written into or read out of the addressed location.

Memory Address Register (MAR):

- It holds the address of the location that is to be accessed
- There are n general purpose registers that is R0 to Rn-1

Operating steps are

1. Programs reside in the memory & usually get these through the I/P unit.
2. Execution of the program starts when the PC is set to point at the first instruction of the program.
3. Contents of PC are transferred to MAR and a Read Control Signal is sent to the memory.
4. After the time required to access the memory elapses, the address word is read out of the memory and loaded into the MDR.

5. Now contents of MDR are transferred to the IR & now the instruction is ready to be decoded and executed.

6. If the instruction involves an operation by the ALU, it is necessary to obtain the required operands.

7. An operand in the memory is fetched by sending its address to MAR & Initiating a read cycle.

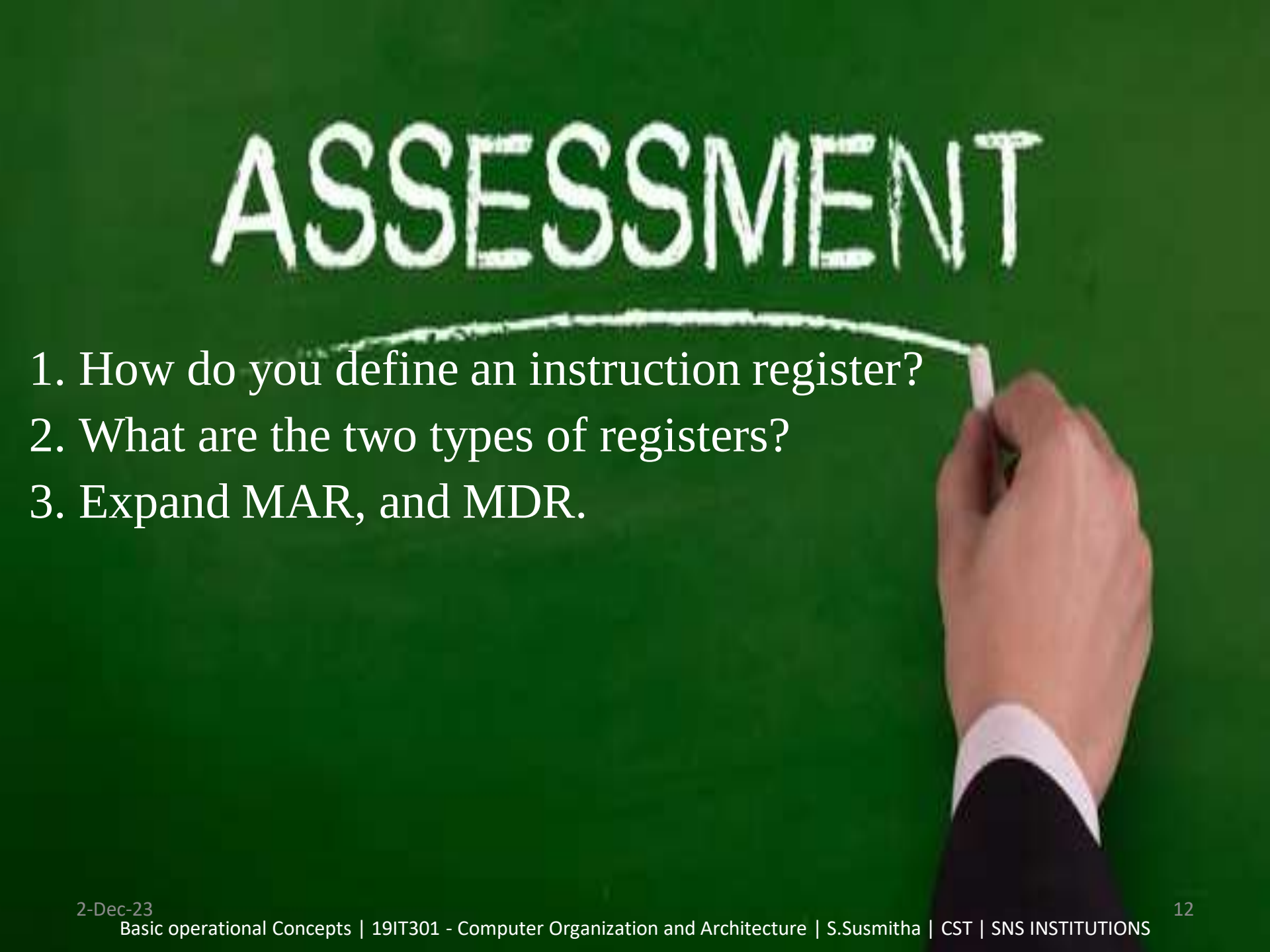
8. When the operand has been read from the memory to the MDR, it is transferred from MDR to the ALU.

9. After one or two such repeated cycles, the ALU can perform the desired operation.

10. If the result of this operation is to be stored in the memory, the result is sent to MDR.

11. Address of location where the result is stored is sent to MAR & a write cycle is initiated.

12. The contents of PC are incremented so that PC points to the next instruction that is to be executed.



1. How do you define an instruction register?
2. What are the two types of registers?
3. Expand MAR, and MDR.

Reference

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Thank You!