# Experiments No:03

**Title:** To find the largest of given Byte/Word/Dword/64-bit numbers.

**Problem Statement:** Write an X86/64 ALP to find the largest of given Byte/Word/Dword/64-bit numbers.

**Objective:**

- To understand assembly language programming instruction set
  To understand different assembler directives with example
- To apply instruction set for implementing X86/64 bit assembly language programs

**Outcomes:** On completion of this practical ,students will be able to

**C218.1:** Understand and apply various addressing modes and instruction set to implement assembly language programs

**Hardware Requirement: NA**

**Software Requirement: OS:**Ubuntu Assembler: NASM version 2.10.07 Linker: ld

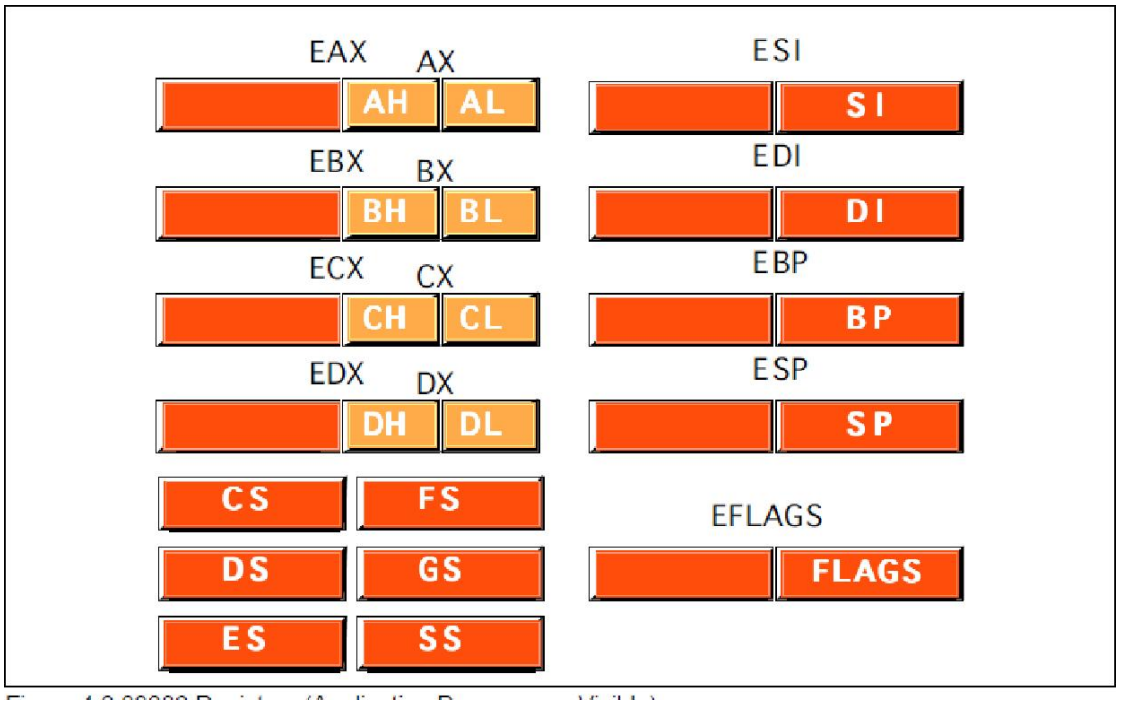
**Theory Contents :Datatype in 80386:**

The 80386 supports the following data types they are

- Bit
- Bit Field: A group of at the most 32 bits (4bytes)
- Bit String: A string of contiguous bits of maximum 4Gbytes in length.
- Signed Byte: Signed byte data
- Unsigned Byte: Unsigned byte data.
- Integer word: Signed 16-bit data.
- Long Integer: 32-bit signed data represented in 2's complement form.
- Unsigned Integer Word: Unsigned 16-bit data
- Unsigned Long Integer: Unsigned 32-bit data
- Signed Quad Word: A signed 64-bit data or four word data.
- Unsigned Quad Word: An unsigned 64-bit data.
- Offset: 16/32-bit displacement that points a memory location using any of the addressing modes.

- Pointer: This consists of a pair of 16-bit selector and 16/32-bit offset.
- Character: An ASCII equivalent to any of the alphanumeric or control characters.
- Strings: These are the sequences of bytes, words or double words. A string may contain minimum one byte and maximum 4 Gigabytes.
- BCD: Decimal digits from 0-9 represented by unpacked bytes.
- Packed BCD: This represents two packed BCD digits using a byte, i.e. from 00 to 99.

**Registers in 80386:**



- General Purpose Register: EAX, EBX, ECX, EDX
- Pointer register: ESP, EBP
- Index register: ESI, EDI
- Segment Register: CS, FS, DS, GS, ES, SS
- Eflags register: EFLAGS
- System Address/Memory management Registers : GDTR, LDTR, IDTR
- Control Register: Cr0, Cr1, Cr2, Cr3
- Debug Register : DR0, DR,1 DR2, DR3, DR4, DR5, DR6, DR7
- Test Register: TR0, TR,1 TR2, TR3, TR4, TR5, TR6, TR7

| | | |
|---|---|---|
| EAX | AX | AH,AL |
| EBX | BX | BH,BL |
| ECX | CX | CH,CL |
| EDX | DX | DH,DL |
| EBP | BP | |
| EDI | DI | |
| ESI | SI | |
| ESP | | |

**Size of operands in an Intel assembler instruction**

- Specifying the size of an operand in Intel
- The size of the operand (byte, word, double word) is conveyed by the operand itself
  - EAX means: a 32 bit operand
  - AX means: a 16 bit operand
  - AL means: a 8 bit operand The size of the source operand and the destination operand must be equal

**Addressing modes in 80386:** The purpose of using addressing modes is as follows:

1. To give the programming versatility to the user.
2. To reduce the number of bits in addressing field of instruction.

1. Register addressing mode: MOV EAX, EDX
2. Immediate Addressing modes: MOV ECX, 20305060H

3. Direct Addressing mode: MOV AX, [1897 H]
4. Register Indirect Addressing mode MOV EBX, [ECX]
5. Based Mode MOV ESI, [EAX+23H]
6. Index Mode SUB COUNT [EDI], EAX
7. Scaled Index Mode MOV [ESI*8], ECX
8. Based Indexed Mode MOV ESI, [ECX][EBX]
9. Based Index Mode with displacement EA=EBX+EBP+1245678H
10. Based Scaled Index Mode with displacement MOV [EBX*8] [ECX+5678H], ECX
11. String Addressing modes:
12. Implied Addressing modes:

**Assignment Questions:**

1. Explain Types of Addressing mode instruction?
2. Write five basic instructions which are used in ALP?
3. How to find the largest number from a given number?

**Conclusion:**

Hence we find largest number from given number

**MPL Practical Oral Question Bank**

| Sr No | BL | Questions | Oral 1 | Oral 2 (improvement) | Remark |
|---|---|---|---|---|---|
| 1 | 1 | What are the type of instruction? | | | |
| 2 | 2 | What is difference between byte,word and double word? | | | |
| 3 | 1 | What is format of instruction? | | | |
| 4 | 2 | What is use of label in instruction? | | | |

**Sign of Student**