

Experiments No:05

Title: Count number of positive and negative numbers from the array.

Problem Statement: Write an X86/64 ALP to count number of positive and negative numbers from the array.

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 :

Mathematical numbers are generally made up of a sign and a value (magnitude) in which the sign indicates whether the number is positive, (+) or negative, (–) with the value indicating the size of the number, for example 23, +156 or -274. Presenting numbers in this fashion is called “sign-magnitude” representation since the left most digit can be used to indicate the sign and the remaining digits the magnitude or value of the number.

Sign-magnitude notation is the simplest and one of the most common methods of representing positive and negative numbers either side of zero, (0). Thus negative numbers are obtained simply by changing the sign of the corresponding positive number as each positive or unsigned number will have a signed opposite, for example, +2 and -2, +10 and -10, etc.

But how do we represent signed binary numbers if all we have is a bunch of one's and zero's. We know that binary digits, or bits only have two values, either a “1” or a “0” and conveniently for us, a sign also has only two values, being a “+” or a “–”.

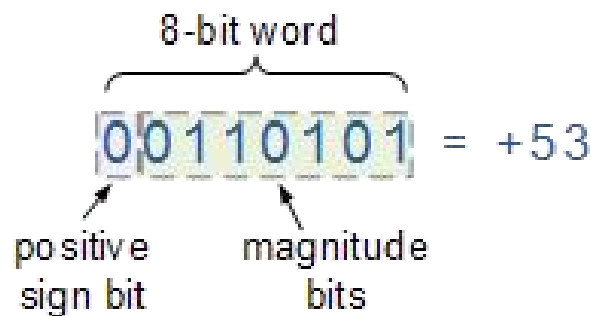
Then we can use a single bit to identify the sign of a *signed binary number* as being positive or negative in value. So to represent a positive binary number (+n) and a negative (-n) binary number, we can use them with the addition of a sign.

For signed binary numbers the most significant bit (MSB) is used as the sign bit. If the sign bit is

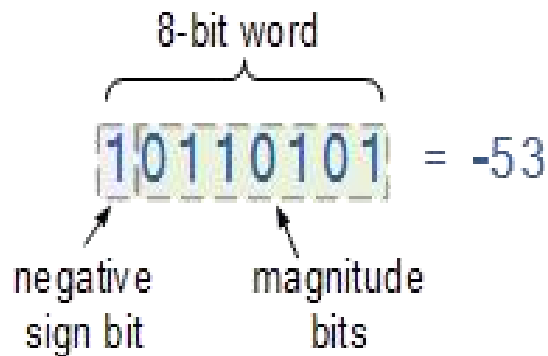
“0”, this means the number is positive in value. If the sign bit is “1”, then the number is negative in value. The remaining bits in the number are used to represent the magnitude of the binary number in the usual unsigned binary number format way.

Then we can see that the Sign-and-Magnitude (SM) notation stores positive and negative values by dividing the “n” total bits into two parts: 1 bit for the sign and n–1 bits for the value which is a pure binary number. For example, the decimal number 53 can be expressed as an 8-bit signed binary number as follows.

Positive Signed Binary Numbers



Negative Signed Binary Numbers



LIST OF INTERRUPTS USED: 80h

LIST OF ASSEMBLER DIRECTIVES USED: equ, db

LIST OF MACROS USED: print

ALGORITHM:

STEP 1: Initialize index register with the offset of array of signed numbers

STEP 2: Initialize ECX with array element count

STEP 3: Initialize positive number count and negative number count to zero

STEP 4: Perform MSB test of array element

STEP 5: If set jump to step 7

STEP 6: Else Increment positive number count and jump to step 8

STEP 7: Increment negative number count and continue

STEP 8: Point index register to the next element

STEP 9: Decrement the array element count from ECX, if not zero jump to step 4, else continue

STEP 10: Display Positive number message and then display positive number count

STEP 11: Display Negative number message and then display negative number count

STEP 12: EXIT

Assignment Questions:

1. Write Down Write, Read, Exit System Call for 32bits Operating System?
2. What is the difference between Macros & Procedure?
3. Explain BT Instruction?
4. Explain Significance of Sign Bit?
5. Explain How Loop Instruction Works?
6. Explain resb,resw,resq,db,dw,dq?
7. Explain the role of Section .data, section .bss, section .text?

Conclusion:

Hence we counted and displayed the number of positive and negative numbers from the array of signed numbers.

MPL Practical Oral Question Bank

Sr No	B L	Questions	Oral 1	Oral 2 (improvement)	Remark
1	1	What is use of Write, Read, Exit System Call ?			
2	2	Difference between sign number and unsigned number?			
3	1	What is the use of resb,resw,resq, db, dw,dq?			
4	2	What is the role of Section .data, section .bss, section .text?			

Sign of Student