National University of Computer and Emerging Sciences

Lab Manual

Computer Organization and Assembly Language



Lab 04

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| **Class** | CS3 |
| **Sections** | B |
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Fast School of Computing

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# Objectives

* How to interpret the different types of jumps
* How to use the different types of registers and how to manipulate them in assembly language
* How to perform arithmetic operations with registers and conditional jumps
* How to use the debugger for viewing the available registers and their function

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**Note for all questions**: You can make as many memory variables as you need

## ACTIVITY 1:

Initialize with last 4 digits of your roll number (for example, if your roll number is 16L-1105 then should be initialized with 1105).

Once initialized, write a program to swap every pair of bits in the AX register as shown in **Table** below:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **AX** | **Contents of AX (Your Roll #)** | | | |
| **Before** | **0000** | **0100** | **0101** | **0001** |
| **After** | **0000** | **1000** | **1010** | **0010** |

## ACTIVITY 2:

Modify your program in Activity 1 to swap two bits as shown in **Table** below:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **AX** | **Contents of AX (Your Roll #)** | | | |
| **Before** | **0000** | **0100** | **0101** | **0001** |
| **After** | **0000** | **0001** | **0101** | **0100** |

## ACTIVITY 3

Modify your program in Activity 1 & 2 to swap two nibbles as shown in **Table** below:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **AX** | **Contents of AX (Your Roll #)** | | | |
| **Before** | **0000** | **0100** | **0101** | **0001** |
| **After** | **0100** | **0000** | **0001** | **0101** |

## ACTIVITY 4:

Initialize with last 4 digits of your roll number (for example, if your roll number is 16L-1105 then should be initialized with 1105). Store in . Make a memory variable , initialize it with 0 and compute

is bitwise OR operation, && is bitwise AND operation whereas is bitwise XOR operation.

## ACTIVITY 5:

Initialize with last 4 digits of your roll number (for example, if your roll number is 16L-1105 then should be initialized with 1105). Store in . Make a 32-bit memory variable , initialize it with 0 and compute

is **Multiplication** operation, is **Addition** operation whereas **concatenates** 16-bit **A** and **B** to form **32-bit** number.

## ACTIVITY 6:

Differentiate between Near, Far and Short Jumps. Write your own assembly language programs and demonstrate how these jumps have been taken.

## REFERENCES

* "http://www.dosbox.com/download.php?main=1

* <http://sourceforge.net/projects/nasm>

* <http://www.nasm.us/>

* [http://www.programmersheaven.com/download/21643/download.aspx (AFD)](http://www.programmersheaven.com/download/21643/download.aspx)