



NEW YORK CITY COLLEGE OF TECHNOLOGY

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LAB REPORT

CET 3510 – OL71

(MICROCOMPUTER SYSTEMS TECHNOLOGY LABORATORY)

LAB #2

Data Movement and General-Purpose Registers

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Objective:

The objective of this lab experiment is to understand the structure of basic CPU architecture. This experiment requires programming in C/C++ and Assembly Language to create programs for data moving between CPU and RAM. The programs in this lab experiment allows to examine the relationship of AL, AH, AX and EAX; BL, BH, BX and EBX; CL, CH, CX, and ECX; DL, DH, DX, and EDX.

Materials:

- Microsoft Visual Studio C++ Community Edition 2019

Procedure:

- 1) First, launch Visual Studio Community 2019 and click to make a new project.
- 2) Then, search on the right and click Source Files
- 3) Then, click add new item and then select C++ file(cpp)
- 4) After that, type and interpret program 1 listed in the Appendix by programming in C/C++ and Assembly Language in Visual Studio Community 2019.
- 5) Search for logic errors in the code inside second `_asm{ }` and update changes.
- 6) Explain each line of the program and describe the output of the code.
- 7) Then, write code including MOV ten charr 'A', 'B', ... 'J', 'a', 'b', ... 'j' into 8-bit registers.
- 8) Swap the information stored at BH and BL
- 9) Display the BX, BH, and BL before and after the swapping
- 10) Then, compile and run the program by hovering to the top and clicking build solution.
- 11) After that, click debug and select start without debugging.
- 12) Lastly, take a screenshot of the output code.

Code:

```
#include <stdio.h>
#include <iostream>

using namespace std;

char main(void) {

    char temp;
    char r1, r2;
    short int r;

    _asm {
```

```

        mov bl, 'a';
        mov bh, 'A';
        mov r1, bl;
        mov r2, bh;
        mov r, bx;
    }

    cout << "Before swapping " << endl;
    printf("BH = %c, BL = %c\n", r2, r1);
    printf("BH = 0x%x, BL = 0x%x, BX = 0x%x\n", r2, r1, r);

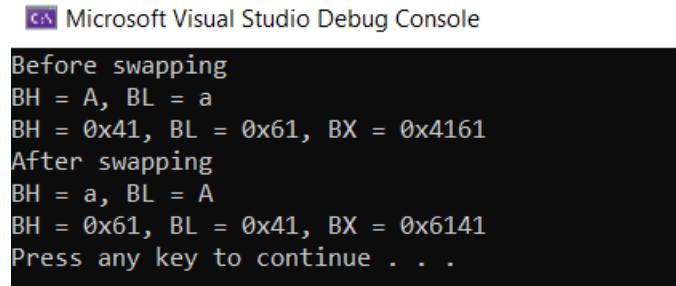
    _asm {
        mov temp, bh;
        mov bh, bl;
        mov bl, temp;
        mov r1, bl;
        mov r2, bh;
        mov r, bx;
    }

    cout << "After swapping " << endl;
    printf("BH = %c, BL = %c \n", r2, r1);
    printf("BH = 0x%x, BL = 0x%x, BX = 0x%x \n", r2, r1, r);

    system("pause");
    return 0;
}

```

Output:



Microsoft Visual Studio Debug Console

```

Before swapping
BH = A, BL = a
BH = 0x41, BL = 0x61, BX = 0x4161
After swapping
BH = a, BL = A
BH = 0x61, BL = 0x41, BX = 0x6141
Press any key to continue . . .

```

Conclusion:

Throughout this experiment, I learned how to program in C/C++ and Assembly language in Visual Studio Community 2019. I also learned about the relation of CPU architecture and data moving between a CPU and RAM. To add on, I learned how to troubleshoot the errors in the code. Most importantly, I learned about hexadecimals and 8-bit registers.