CPSC 240: Computer Organization and Assembly Language
Assignment 06, Fall Semester 2024

CWID: 885024539 Name: Riley Blacklock

Quiz Questions:

From the textbook "X86-64 Assembly Language Programming with Ubuntu," study quiz questions 4 and 5 on page 149. Students do not need to submit answers to the quiz questions as they are found in Appendix D of the textbook.

Programming:

1. Download the “CPSC-240 Assignment06.docx” document.
2. Design the "print.asm" program to calculate the sum of "1+2+3+…+99" and displays the result in a terminal window. NOTE: variable sizes and program functions should be equivalent to C/C++ instructions.

```
Calculates  1+2+3+...+99 and displays the result in a terminal window
char str1[] = "1+2+3+...+99=";          // use db to declare 8-bit string array
short sum = 0;                          // use dw to declare 16-bit variable
char ascii[5] = "0000\n";               // use db to declare 8-bit string array
register short cx = 1;                  // no need to declare register cx
for(cx=1; cx<=99; cx++)
   sum += cx;
ascii = itoa(sum);
cout << str1 << ascii;
```

3. Assemble the "print.asm" file and link the "print.o" file to get the "print" executable file.
4. Run the "print" file to display the conversion results of ascii in Terminal Emulator window.
5. Insert source code (print.asm) and simulation results (Terminal Emulator window) at the bottom of the document.
6. Save the file in pdf format and submit the pdf file to Canvas before the deadline.

[Insert print.asm source code here]

```
; print.asm;
; Calculates 1 + 2 + 3 + ... + 99 and displays the result;
; char string[1] = "1+2+3+...+99=";
; short sum = 0;
; char ascii[5] = "0000\n";
; register short cx = 1;
; for(cx = 1; cx <= 99; cx++)
; sum += cx;
```

```
; ascii = itoa(sum);
; cout << str1 << ascii;

section .data
string      db "1+2+3+...+99=", 0
ascii       db "0000", 10, 0

section .bss
sum         resd 1

section .text
  global _start

_start:
  mov       dword[sum], 0
  mov       ecx, 1

calculate_sum:
  add  dword[sum], ecx
  inc   ecx

  cmp ecx, 100
  jl     calculate_sum

  mov eax, [sum]
  call  itoa

  mov eax, 4
  mov ebx, 1
  mov ecx, string
  mov edx, 14
  int    0x80

  mov eax, 4
  mov ebx, 1
  mov ecx, ascii
  mov edx, 5
  int    0x80

  mov eax, 1
```

```
  xor   ebx, ebx
  int   0x80

itoa:
  mov edi, ascii + 3
  mov ecx, 10

itoa_loop:
  xor edx, edx
  div ecx
  add dl, '0'
  mov [edi], dl
  dec edi
  test eax, eax
  jnz itoa_loop

  ret
```

[Insert print simulation result (Terminal Emulator Window) here]

```
riley@theWeakest:~/Downloads/Riley Blacklock - Coding Portfolio/CPSC240 - Assembly/Assignment 6$ ./print
1+2+3+...+99=4950
```

[Insert the simulation result verification here]

CPSC240 - Assembly > Assignment 6 > C printsimulation.c > main(int, char * [])

```c
#include <stdio.h>

int main(int argc, char *argv[]) {
    char * string = "1+2+3+...+99=";
    int sum = 0;

    for(int i = 1; i < 100; i++) {
        sum += i;
    }

    printf("%s%d\n", string, sum);

    return 0;
}
```

PROBLEMS OUTPUT DEBUG CONSOLE TERMINAL PORTS COMMENTS bash - Assignment 6

```
riley@theWeakest:~/Downloads/Riley Blacklock - Coding Portfolio/CPSC240 - Assembly/Assignment 6$ ./printsimulation
1+2+3+...+99=4950
```