Lab Assignment Week 06

CSC 3320 – System-level Programming

Week of February 12th, 2024

Introduction

Welcome to the 6th programming lab of CSC 3320! Today, we will be covering the following topics:

1. System Calls
    - File I/O
    - Buffered vs Unbuffered I/O

Lab Policies

- Attendance is mandatory.
- Labs must be completed **individually.**
- TAs are here to help you. Ask them for help!
- Lab assignments are due at midnight on the day of your lab.

Deliverables:

1. The C Code for your program. (.c file).
2. A screenshot of the output in the Terminal.

If you have any questions, please do not hesitate to ask your TA.

Program: Benchmarking Buffered IO

Buffered IO can be a time saver when your program is writing to a file (or the terminal) multiple times in quick succession. With each call of the write(), the system call suspends your program. Buffered IO functions can save time by batching multiple prints into a single write to reduce the time your program is suspended.

For today's lab, you will need to write two programs that write a string into a file 1 million times using buffered and unbuffered IO functions. Your first program should use the open() and write() system calls. Your second program should use the fopen() and fprintf() functions from the standard library. You will need to use the time() function that is part of the <time.h> standard library. You will need to record the time before and after writing to the file 1 million times.

Your programs should output a message each time the write() or print () function is called and, in the end, output the time elapsed to write to the file 1 million times to the terminal.

Example Output

```
999996: Called write(3, str_to_write, 13) which returned that 13 bytes were written.
999997: Called write(3, str_to_write, 13) which returned that 13 bytes were written.
999998: Called write(3, str_to_write, 13) which returned that 13 bytes were written.
999999: Called write(3, str_to_write, 13) which returned that 13 bytes were written.
Unbuffered IO Time Elapsed: 87 seconds
```

```
999996: 13 characters written to buffered.txt
999997: 13 characters written to buffered.txt
999998: 13 characters written to buffered.txt
999999: 13 characters written to buffered.txt
Buffered IO Time Elapsed: 57 seconds
```

Deliverables

For today's lab, you will need to upload the C program code for your buffered and unbuffered I/O experiments and its output in the terminal on iCollege. Please name your C code and screenshot as follows:

- C Files
  - lastname_firstname_filename.c
  - For example: **hawamdeh_faris_unbuffered.c**
- Screenshots
  - lastname_firstname_filename.png
  - For example: **hawamdeh_faris_unbuffered.png**