CS 218
Homework, Asst. #11 – Part B

Purpose: Become more familiar with file input/output buffering concepts.
Due: Tuesday (3/26)
Points: 50

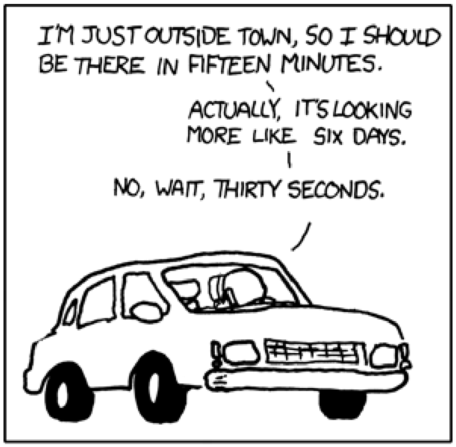
<u>Assignment:</u>

Update the assignment #11 code to change the buffer size from 300,000 to 3. Execute the original program from assignment #11 A (buffer of 300,000) and the modified assignment #11 B (buffer of 3).

Execute the assignment #11 program using both the 'large' and 'small' buffer size options using the Unix time[1] command (to provide the execution times). For example, the following commands will execute the assignment #11 program and provide timing results (for both the 'large' and 'small' buffer options):

```
ed-vm% time ./wordCountLB -w of -c -f plot.list
ed-vm% time ./wordCountSB -w of -c -f plot.list
```

To simplify this process, a script file is provided to execute the program three (3) times with each of the two executable files. The timing results are placed in a file '`a11Btimes.txt`'.


I'M JUST OUTSIDE TOWN, SO I SHOULD BE THERE IN FIFTEEN MINUTES.
ACTUALLY, IT'S LOOKING MORE LIKE SIX DAYS.
NO, WAIT, THIRTY SECONDS.

THE AUTHOR OF THE WINDOWS FILE COPY DIALOG VISITS SOME FRIENDS.

- Summarize your results for assignment #11 B. Edit the script file output (a11Btimes.txt) and add the following information. (10 pts)
  - Briefly describe your machine (one sentence). Include the machine type (desktop/laptop/mini), processor speed, and memory.
  - Compute the average '***real***' time for the three 'large' buffer size executions. Leave the original three results and add the final averaged result.
  - Compute the average '***real***' time for the three 'small' buffer size executions. Leave the original three results and add the final averaged result.
  - State which was faster and by how much. Include the time difference and the percentage faster or slower. The percentage change[2] should be calculated as follows:

$$\textbf{\textit{percentChange}} = \left(\frac{(\textbf{\textit{small buffer average}}) - (\textbf{\textit{large buffer average}})}{(\textbf{\textit{large buffer average}})} \right) * \mathbf{100}$$

- Explain the results. Specifically, explain the impact of the buffer size on the execution speed of the program. Explanation should not exceed 200 words. *Note, any explanations exceeding 200 words will not be graded and scored as a 0.* (40 pts)

[1] For more information, refer to: http://en.wikipedia.org/wiki/Time_(Unix)
[2] For more information, refer to: http://en.wikipedia.org/wiki/Percent_change

Submission:

When complete, submit:

- A copy of the **source file** via the class web page (assignment submission link) by 11:55 PM. ***Assignments received after the due date/time will not be accepted.***

Assignment #11B Script

The provided script file will execute the assignment #11 three times for the 'large' buffer size and three times for the 'small' buffer size and place the time results in a file. You can download the script file, set the permission, and execute as follows:

```
ed-vm$ chmod +x a11Btimer
ed-vm$ ./a11Btimer  wordCountLB  wordCountSB
```

Where **`wordCountLB`** is the assignment #11 A executable (large buffer) and **`wordCountSB`** is the assignment #11 B executable (small buffer).

You will need to perform the averaging using a calculator or spreadsheet. Be careful of the minutes and seconds times when adding the values! It may be easiest to convert all times to seconds.

Unix Time Command

The Unix Time command will provide some details on how long a program or command took to execute. For example, if you have a program **`./someProg`** then in the shell you can type:

```
ed-vm$ time ./someProg
```

The output (shown below) details how long the code took to run:

```
real   1m10.951s
user    0m2.390s
sys     0m1.705s
```

- Real time - Elapsed time from beginning to end of program (or wall clock time)
- CPU time - Divided into User time and System time
  - User time - time used by the program itself including all functions
  - System time - time used by the system service calls invoked by the program (directly or indirectly)

At the terminal prompt, you can type **`man time`** to see the manual page for time.