# Lab 1C Report

Cristen Anderson, UID <904400797>

## Introduction

In this lab, I compared three different methods of executing the same commands: bash, execline, and simpsh, which was a shell that I implemented myself. I used three different benchmarks to compare them, and took the average of 5 different trials for each benchmark per method. Each benchmark test gave an output of both system and user time. The benchmarks and their translations across the different methods are listed in the README file, here I will only include the bash versions for reference:

```
1) $ cat a | sed "s/a/\n/g" | sort | grep b > o
2) $ cat a | sed "s/a/\n/g" | uniq > o
3) $ cat a | sed "s/a/\n/g" | tr 'a-z' 'A-Z' > o
```

Unfortunately, execline implements pipes by creating child processes, which are not factored into the system or user time of execution. This means that the times for execline are extremely underestimated. In order to get the time for simpsh, I used the --profile option that I implemented to give the time for each option individually. Then I added up all these times to get a final result.

## Data

Here is a table listing the times for each benchmark for each method. The times listed are the average of 5 different trials. All times are recorded in seconds.

| Benchmark # | Bash | Execline | Simpsh |
|---|---|---|---|
| **1: System** | 0.642 | 0.116 | 0.606447 |
| **1: User** | 15.0654 | 0.243 | 14.634810 |
| **2: System** | 0.322 | 0.165 | 0.311135 |
| **2: User** | 1.834 | 0.820 | 1.841143 |
| **3: System** | 0.350 | 0.173 | 0.328794 |
| **3: User** | 1.139 | 0.113 | 1.135132 |

## Conclusion

Though the data for execline is inconclusive since it does not include the time spent in child processes, I am still able to make a comparison between bash and simpsh. It appears that for all the benchmarks, simpsh outperforms bash, for both system and user time. This is an encouraging result given the amount of time spent implementing simpsh. The difference will be greater on bigger applications, like benchmark 1, compared to the other two benchmarks.