

Project #4

Debugging and Experimental Design

due: December 7th, 2018, at 17:00 EST

1 Objective

The objective of this project is to introduce the class to research methods in computer science and to apply a knowledge of operating systems to design a performance experiment(s).

2 Instructions and Evaluation

The rubric for the project can be found in the repository.

You may propose your own topic, or use one of the topics below:

1. What options effect the maximum effective bandwidth of different IPC methods.
2. What factors effect maximum effective read/write speed of different file systems.
3. What if any impact do the POSIX madvise calls have of different workloads?
4. What filesystem performs best for a web server or database workload?
5. Which network attached storage (iSCSI, object storage, etc ...) method offers the highest IOPS?
6. Which disk scheduling algorithm performs best for random, strided, or sequential work flows?
7. What is the impact of the TCP congestion control strategy on network latency in the presence of congestion?
8. Which parallel or distributed filesystem is best for serving VM images?
9. Which compression algorithm implemented by ZFS provides the best IOPS for different media types?
10. Which mutex lock implementation is the fastest amongst commonly implemented designs?
11. What affect does firewall rule order have on the throughput of a firewall?
12. What is the fastest implementation of an encrypted file system?
13. What is the effect of tunable on `sysctl`s on file systems or network performance?

Please note that these questions are currently not worded sufficiently well to receive full credit. You should expound upon them to better define your experiment to receive full points. Your paper should document experimental validation of your any claims you make.

3 Format

The assignment will be graded out of 100 points.

- Each Excellent is worth 20 points.
- Each Great is worth 17 points.
- Each Good is worth 15 points.
- Each Fair is worth 10 points.
- Each Poor is worth 0 points.

Your submissions are to be in typeset using L^AT_EX using the IEEE format. The IEEE format template for latex can be found on the IEEE Website. Failure to follow IEEE format may result in a 0 at the instructor's discretion.

Your paper must have an abstract and a title. Failure to have an abstract will result in a 10 point penalty. Failure to have a title will result in a 10 point penalty.

Your paper must make appropriate citations to related work or documentation. Papers should have at least 5 citations. Failure to consider related work will result in points being taken from the “hypothesis” section of the rubric. Failure to properly attribute work may be considered academic dishonesty.

Submission must be at least 4 pages in length and should be less than 8. Submissions with an excessive number of pages will lose points for clarity or succinctness.

Submissions should include at least one figure. Submission with an excessive figures will lose points for clarity or succinctness.

Submissions must have no more than two authors. Submissions must list all authors. Failure to disclose all authors will be considered a form of academic dishonesty. The submissions must be submitted to TurnItIn on Canvas by the due date above. Failure to submit on time will result in a 0 on the assignment.