Lab 3

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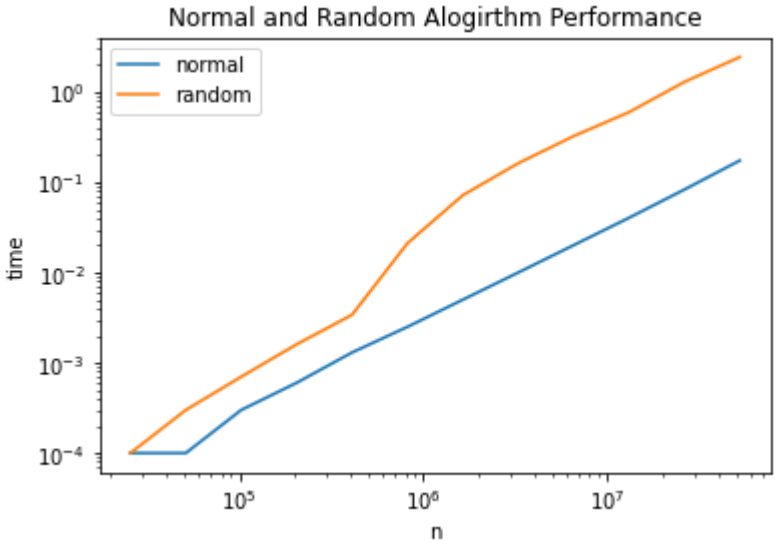
Questions

(a) Here is a table displaying the computing environments:

Item	Brand	Model	Version	Cores	L1	L2	L3	Main Memory
Dell Inspiron 7559	Intel	i7	6700HQ	4	256KB	1.0MB	6.0MB	16GB
TinkerCliffs	AMD	EPYC	7702	64	32K	512K	4096K	528215372

Table 1: Computing Environments

(b) i. log-log plot of experiment results:



ii. For the normal axpy program, I predict that the values of n from 100-12800 will fill the L1 cache, 25600-204800 will fill the L2 cache, and 409600-52428800 will fill the L3 cache. For the random axpy program,

I predict that the values of n from 100-12800 will fill the L1 cache, 25600-102400 will fill the L2 cache, and 204800-52428800 will fill the L3 cache.

iii. The values of n where I predict should cross a cache boundary are n=25600 for L1 to L2 and n=409600 for L2 to L3 for the normal program. For the random program, I predicted that the cache boundary would be crossed at n=25600 from L1 to L2 and at n=204800 from L2 to L3.

iv. I did observe a performance change in the log-log plot. The line for the random program seems to spike up around n=25000 and n=409600. The normal program has a spike around 12800, and a very small change in slope at around 409600. This matches my predictions of the cache boundary crossings.

(c) If the number of trials of each experiment were decreased to 1, I would expect the results of the random and normal axpy programs to become very similar to each other in terms of time. If it was increased to 10000, the differences between the 2 programs would be very noticeable.

(d) I used scripting to make the analysis tasks easier by creating a batch script file and running all n values from k=[0,19] and outputting it to csv files so I could read in the csv files in python and plot it as a Pandas DataFrame. Scripts and data are located in my lab repo.

(e) No other assistance given or received on this assignment.

References

[1] https://www.top-password.com/blog/find-number-of-cores-in-your-cpu-on-windows-10/: :text=Press

[2] https://www.techbout.com/check-processor-cache-memory-windows-10-48655/: :text=Right

[3] https://superuser.com/questions/837970/is-there-a-way-to-know-the-size-of-l1-l2-l3-cache-and-ram-in-ubuntu