

SUTD 2021 50.003 Problem Set 7

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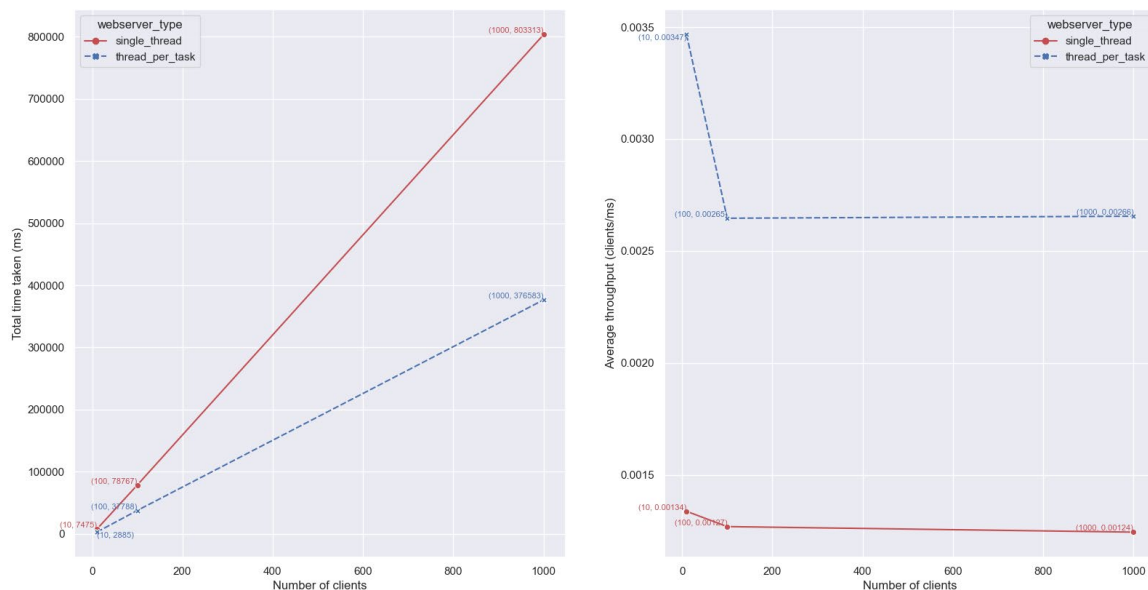
Cohort Exercise 1

Using the formula/equation obtained from Amdahl's Law, where $speedup \leq \frac{1}{F + \frac{1-F}{N}}$, we get:

N, F	Maximum Speedup (to 3 decimal places)
10, 10%	5.263
100, 10%	9.174
∞ , 10%	10.000
10, 25%	3.077
100, 25%	3.883
∞ , 25%	4.000

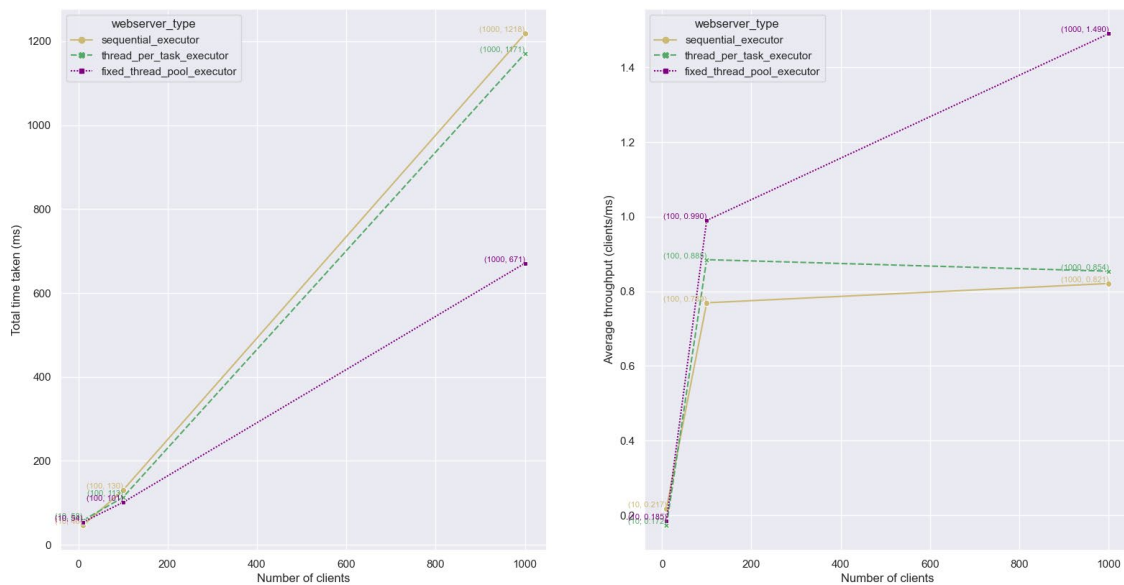
Cohort Exercise 2

These are our reported findings of the performance comparison between `SingleThreadWebServer.java` and `ThreadPerTaskWebServer.java` with the larger input ("239839672845043") as the number of clients vary in terms of total time taken and average throughput (raw data collected is in `non_executor_webservers.csv`):



Cohort Exercise 3

These are our reported findings of the performance comparison between `SequentialExecutorWebServer.java`, `ThreadPerTaskExecutorWebServer.java` and `ExecutorWebServer.java` with the smaller input (“4294967297”) as the number of clients vary in terms of total time taken and average throughput (raw data collected is in `executor_webservers.csv`):



Cohort Exercise 4

After some manual tuning, we found that for our specific machine (ASUS ROG Zephyrus G14 GA401IV, AMD Ryzen 9 4900HS CPU and NVIDIA GeForce RTX 2060 GPU with 8 CPU cores and 16 logical processors) and environment (Java SE 15 & JDK 15 on Windows 10 Home), 3 threads seem to be the optimal thread pool size for the thread per task executor with 5 clients and the bigger input (“239839672845043”).

Cohort Exercise 5-8

Solutions to these Cohort Exercises are included with this document in these respective code files: `SPMDEExerciseSolution.java`, `GDesktopWithThreadPool.java`, `CacheV3.java` and `StripedMapSolution.java`.