

Performance Analysis

Basic on the crawler.c, the performance of the program showing how performance changes as the number of workers threads increases by 1, 2, 3, 4, 10, and 30. The test is basic on same given variables of host address and searching depth. The time changing are showing below:

Host address: www.cosc.canterbury.ac.nz Depth: 5 Notes: All tests are running on lab computer, which is Xeon 4 cores 8 threads			
Commands	Real	User	Sys
time ./crawler www.cosc.canterbury.ac.nz 5 1	0m4.786s	0m0.672s	0m0.392s
time ./crawler www.cosc.canterbury.ac.nz 5 2	0m4.748s	0m0.396s	0m0.268s
time ./crawler www.cosc.canterbury.ac.nz 5 3	0m4.655s	0m0.696s	0m0.324s
time ./crawler www.cosc.canterbury.ac.nz 5 4	0m4.394s	0m0.316s	0m0.160s
time ./crawler www.cosc.canterbury.ac.nz 5 10	0m4.686s	0m0.412s	0m0.216s
time ./crawler www.cosc.canterbury.ac.nz 5 30	0m7.364	0m0.652s	0m0.424s

*Real---wall clock timer, time from start to finish of the call.

*User---the amount of CPU time spent in user-mode code (outside the kernel) within the process.

*Sys---the amount of CPU time spent in the kernel within the process.

According to the table, column of "Real" showing the time of whole thread processing consumed. Significantly, the web scraper were running more efficiently by the increasing of threads. However, when the number of threads more than 4, such that 10 worker threads which will slow down the processing of the program, the reason of that is the CPU only got 4 cores when it processing the number of worker threads which more than 4 that will cause the inefficient threading processes.

The optimal number of worker threads in my case is 4, and it may be different when the user running on other computer. Either real, user, or sys, all showing that when worker threads is 4, the web scraper processing on the most efficient way.

According to the structure of queue, the length of the concurrent queue is basic on the number of worker threads, since

```
pthread_t thread[NUM_THREADS];
```

```
Queue *queue = queue_alloc(NUM_THREADS);
```

Therefore, when the workers threads is 4 the queue size is 4.