

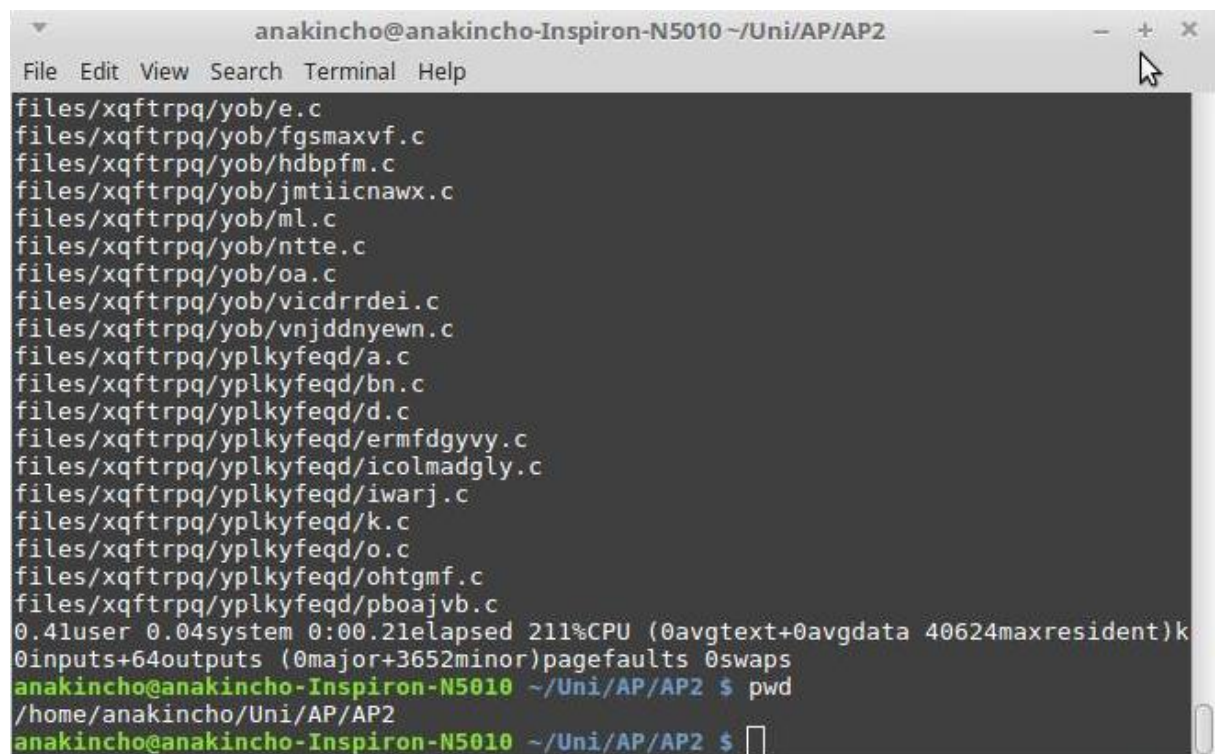
1) Status report:

The solution provided is with multiple workers (multithreading), and is working correctly. For compiling I am using: `javac *.java`

And for execution I use: `java fileCrawler "*.c(or whatever pattern)" "directory"`

Based on that everything works as intended. With 1 thread starts out slowly then with incrementing the thread number it starts getting faster, and after I start writing more threads than the CPU supports it starts decreasing in performance. Everything is shown in screenshots below.

2) Sequential and 1 Thread runtime:



```
anakincho@anakincho-Inspiron-N5010 ~/Uni/AP/AP2
File Edit View Search Terminal Help
files/xqftrpq/yob/e.c
files/xqftrpq/yob/fgsmavf.c
files/xqftrpq/yob/hdbpfm.c
files/xqftrpq/yob/jmtiicnawx.c
files/xqftrpq/yob/ml.c
files/xqftrpq/yob/ntte.c
files/xqftrpq/yob/oa.c
files/xqftrpq/yob/vicdrrdei.c
files/xqftrpq/yob/vnjddnyewn.c
files/xqftrpq/yplkyfeqd/a.c
files/xqftrpq/yplkyfeqd/bn.c
files/xqftrpq/yplkyfeqd/d.c
files/xqftrpq/yplkyfeqd/ermfdgyvy.c
files/xqftrpq/yplkyfeqd/icolmadgly.c
files/xqftrpq/yplkyfeqd/iwarj.c
files/xqftrpq/yplkyfeqd/k.c
files/xqftrpq/yplkyfeqd/o.c
files/xqftrpq/yplkyfeqd/ohtgmf.c
files/xqftrpq/yplkyfeqd/pboajvb.c
0.41user 0.04system 0:00.21elapsed 211%CPU (0avgtext+0avgdata 40624maxresident)k
0inputs+64outputs (0major+3652minor)pagefaults 0swaps
anakincho@anakincho-Inspiron-N5010 ~/Uni/AP/AP2 $ pwd
/home/anakincho/Uni/AP/AP2
anakincho@anakincho-Inspiron-N5010 ~/Uni/AP/AP2 $
```

This is the sequential running times and cpu utilization (was made on my laptop since the requirements didn't specify for 2) to be on a uni lab machine. The screenshots from 3) are on the lab machine.)

```
anakincho@anakincho-Inspiron-N5010 ~/Uni/AP/AP2
File Edit View Search Terminal Help
files/xqftrpq/yob/e.c
files/xqftrpq/yob/fgsmaxvf.c
files/xqftrpq/yob/hdbpfm.c
files/xqftrpq/yob/jmtiicnawx.c
files/xqftrpq/yob/ml.c
files/xqftrpq/yob/ntte.c
files/xqftrpq/yob/oa.c
files/xqftrpq/yob/vicdrdei.c
files/xqftrpq/yob/vnjddnyewn.c
files/xqftrpq/yplkyfeqd/a.c
files/xqftrpq/yplkyfeqd/bn.c
files/xqftrpq/yplkyfeqd/d.c
files/xqftrpq/yplkyfeqd/ermfdgyvy.c
files/xqftrpq/yplkyfeqd/icolmadgly.c
files/xqftrpq/yplkyfeqd/iwarj.c
files/xqftrpq/yplkyfeqd/k.c
files/xqftrpq/yplkyfeqd/o.c
files/xqftrpq/yplkyfeqd/ohtgmf.c
files/xqftrpq/yplkyfeqd/pboajvb.c
0.48user 0.04system 0:00.24elapsed 219%CPU (0avgtext+0avgdata 42036maxresident)k
0inputs+64outputs (0major+3679minor)pagefaults 0swaps
anakincho@anakincho-Inspiron-N5010 ~/Uni/AP/AP2 $ pwd
/home/anakincho/Uni/AP/AP2
anakincho@anakincho-Inspiron-N5010 ~/Uni/AP/AP2 $
```

This is the fileCrawler running with 1 Thread.

3) Experiment:

```
Terminal
File Edit View Search Terminal Help
files/xqftrpq/yob/e.c
files/xqftrpq/yob/fgsmaxvf.c
files/xqftrpq/yob/hdbpfm.c
files/xqftrpq/yob/jmtiicnawx.c
files/xqftrpq/yob/ml.c
files/xqftrpq/yob/ntte.c
files/xqftrpq/yob/oa.c
files/xqftrpq/yob/vicdrdei.c
files/xqftrpq/yob/vnjddnyewn.c
files/xqftrpq/yplkyfeqd/a.c
files/xqftrpq/yplkyfeqd/bn.c
files/xqftrpq/yplkyfeqd/d.c
files/xqftrpq/yplkyfeqd/ermfdgyvy.c
files/xqftrpq/yplkyfeqd/icolmadgly.c
files/xqftrpq/yplkyfeqd/iwarj.c
files/xqftrpq/yplkyfeqd/k.c
files/xqftrpq/yplkyfeqd/o.c
files/xqftrpq/yplkyfeqd/ohtgmf.c
files/xqftrpq/yplkyfeqd/pboajvb.c
0.44user 0.05system 0:00.41elapsed 118%CPU (0avgtext+0avgdata 46772maxresident)k
0inputs+72outputs (0major+7235minor)pagefaults 0swaps
bash-4.2$ pwd
/users/level3/2115451i/AP/ap2/AP2
bash-4.2$
```

This is the fileCrawler running on a Uni lab machine with 1 Thread with the "*.c" pattern and directory files(the one from the starting files supplied on moodle for APH Ex.2)

```
Terminal
File Edit View Search Terminal Help
files/xqftrpq/yob/e.c
files/xqftrpq/yob/fgsmaxvf.c
files/xqftrpq/yob/hdbpfm.c
files/xqftrpq/yob/jmtiicnawx.c
files/xqftrpq/yob/ml.c
files/xqftrpq/yob/ntte.c
files/xqftrpq/yob/oa.c
files/xqftrpq/yob/vicdrrdei.c
files/xqftrpq/yob/vnjddnyewn.c
files/xqftrpq/yplkyfeqd/a.c
files/xqftrpq/yplkyfeqd/bn.c
files/xqftrpq/yplkyfeqd/d.c
files/xqftrpq/yplkyfeqd/ermfdgyvy.c
files/xqftrpq/yplkyfeqd/icolmadgly.c
files/xqftrpq/yplkyfeqd/iwarj.c
files/xqftrpq/yplkyfeqd/k.c
files/xqftrpq/yplkyfeqd/o.c
files/xqftrpq/yplkyfeqd/ohtgmf.c
files/xqftrpq/yplkyfeqd/pboajvb.c
0.40user 0.05system 0:00.20elapsed 227%CPU (0avgtext+0avgdata 45100maxresident)k
0inputs+72outputs (0major+6370minor)pagefaults 0swaps
bash-4.2$ pwd
/users/level3/2115451i/AP/ap2/AP2
bash-4.2$
```

This is the fileCrawler with 2 Threads

```
Terminal
File Edit View Search Terminal Help
files/xqftrpq/yob/e.c
files/xqftrpq/yob/fgsmaxvf.c
files/xqftrpq/yob/hdbpfm.c
files/xqftrpq/yob/jmtiicnawx.c
files/xqftrpq/yob/ml.c
files/xqftrpq/yob/ntte.c
files/xqftrpq/yob/oa.c
files/xqftrpq/yob/vicdrrdei.c
files/xqftrpq/yob/vnjddnyewn.c
files/xqftrpq/yplkyfeqd/a.c
files/xqftrpq/yplkyfeqd/bn.c
files/xqftrpq/yplkyfeqd/d.c
files/xqftrpq/yplkyfeqd/ermfdgyvy.c
files/xqftrpq/yplkyfeqd/icolmadgly.c
files/xqftrpq/yplkyfeqd/iwarj.c
files/xqftrpq/yplkyfeqd/k.c
files/xqftrpq/yplkyfeqd/o.c
files/xqftrpq/yplkyfeqd/ohtgmf.c
files/xqftrpq/yplkyfeqd/pboajvb.c
0.34user 0.06system 0:00.17elapsed 232%CPU (0avgtext+0avgdata 44924maxresident)k
0inputs+72outputs (0major+6763minor)pagefaults 0swaps
bash-4.2$ pwd
/users/level3/2115451i/AP/ap2/AP2
bash-4.2$
```

This is the fileCrawler with 3 Threads


```
Terminal
File Edit View Search Terminal Help
files/xqftrpq/yob/e.c
files/xqftrpq/yob/fgsmaxvf.c
files/xqftrpq/yob/hdbpfm.c
files/xqftrpq/yob/jmtiicnawx.c
files/xqftrpq/yob/ml.c
files/xqftrpq/yob/ntte.c
files/xqftrpq/yob/oa.c
files/xqftrpq/yob/vicdrrdei.c
files/xqftrpq/yob/vnjddnyewn.c
files/xqftrpq/yplkyfeqd/a.c
files/xqftrpq/yplkyfeqd/bn.c
files/xqftrpq/yplkyfeqd/d.c
files/xqftrpq/yplkyfeqd/ermfdgyvy.c
files/xqftrpq/yplkyfeqd/icolmadgly.c
files/xqftrpq/yplkyfeqd/iwarj.c
files/xqftrpq/yplkyfeqd/k.c
files/xqftrpq/yplkyfeqd/o.c
files/xqftrpq/yplkyfeqd/ohgfmf.c
files/xqftrpq/yplkyfeqd/pboajvb.c
0.35user 0.04system 0:00.16elapsed 234%CPU (0avgtext+0avgdata 43988maxresident)k
0inputs+72outputs (0major+5907minor)pagefaults 0swaps
bash-4.2$ pwd
/users/level3/2115451i/AP/ap2/AP2
bash-4.2$
```

This is the fileCrawler with 4 Threads

```
Terminal
File Edit View Search Terminal Help
files/xqftrpq/yob/e.c
files/xqftrpq/yob/fgsmaxvf.c
files/xqftrpq/yob/hdbpfm.c
files/xqftrpq/yob/jmtiicnawx.c
files/xqftrpq/yob/ml.c
files/xqftrpq/yob/ntte.c
files/xqftrpq/yob/oa.c
files/xqftrpq/yob/vicdrrdei.c
files/xqftrpq/yob/vnjddnyewn.c
files/xqftrpq/yplkyfeqd/a.c
files/xqftrpq/yplkyfeqd/bn.c
files/xqftrpq/yplkyfeqd/d.c
files/xqftrpq/yplkyfeqd/ermfdgyvy.c
files/xqftrpq/yplkyfeqd/icolmadgly.c
files/xqftrpq/yplkyfeqd/iwarj.c
files/xqftrpq/yplkyfeqd/k.c
files/xqftrpq/yplkyfeqd/o.c
files/xqftrpq/yplkyfeqd/ohgfmf.c
files/xqftrpq/yplkyfeqd/pboajvb.c
0.37user 0.06system 0:00.18elapsed 241%CPU (0avgtext+0avgdata 47476maxresident)k
0inputs+72outputs (0major+6812minor)pagefaults 0swaps
bash-4.2$ pwd
/users/level3/2115451i/AP/ap2/AP2
bash-4.2$
```

This is the fileCrawler with 6 Threads

```
Terminal
File Edit View Search Terminal Help
files/xqftrpq/yob/e.c
files/xqftrpq/yob/fgsmaxvf.c
files/xqftrpq/yob/hdbpfm.c
files/xqftrpq/yob/jmtiicnawx.c
files/xqftrpq/yob/ml.c
files/xqftrpq/yob/ntte.c
files/xqftrpq/yob/oa.c
files/xqftrpq/yob/vicdrdei.c
files/xqftrpq/yob/vnjddnyewn.c
files/xqftrpq/yplkyfeqd/a.c
files/xqftrpq/yplkyfeqd/bn.c
files/xqftrpq/yplkyfeqd/d.c
files/xqftrpq/yplkyfeqd/ermfdgyvy.c
files/xqftrpq/yplkyfeqd/icolmadgly.c
files/xqftrpq/yplkyfeqd/iwarj.c
files/xqftrpq/yplkyfeqd/k.c
files/xqftrpq/yplkyfeqd/o.c
files/xqftrpq/yplkyfeqd/ohtgmf.c
files/xqftrpq/yplkyfeqd/pboajvb.c
0.40user 0.09system 0:00.20elapsed 247%CPU (0avgtext+0avgdata 46432maxresident)k
0inputs+72outputs (0major+6139minor)pagefaults 0swaps
bash-4.2$ pwd
/users/level3/2115451i/AP/ap2/AP2
bash-4.2$
```

This is the fileCrawler with 8 Threads

CRAWLER_THREADS	1		2		3		4		6		8	
	E1. Time	Core Util.	E1. Time	Core Util.	E1. Time	Core Util.	E1. Time	Core Util.	E1. Time	Core Util.	E1. Time	Core Util.
Execution 1	0:00.27	177%	0:00.21	221%	0:00.20	236%	0:00.16	248%	0:00.18	252%	0:00.24	218%
Execution 2	0:00.27	195%	0:00.20	230%	0:00.21	213%	0:00.17	235%	0:00.18	251%	0:00.20	242%
Execution 3	0:00.22	176%	0:00.18	228%	0:00.17	236%	0:00.19	249%	0:00.18	244%	0:00.20	238%
Median	0:00.22	176%	0:00.20	228%	0:00.20	236%	0:00.17	248%	0:00.18	251%	0:00.20	238%

From the experiment from a) I can conclude that at the beginning the execution time is slower, then as the Threads grow it improves performance, and after the max supported threads for the given CPU (4 in this case) the performance starts to decrease.

From the experiment from b) I can conclude that depending on how loaded the CPU is the performance might vary by some small amount. But as you can see the results from the 3 executions are close to identical.