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Total Threads	Create File	Fill File	Searching	Runtime
2	1	1	2	2.502 sec
4	1	2	4	2.317 sec
6	1	2	6	2. 241 sec
8	1	3	8	2.148 sec
10	1	4	10	2.104 sec
12	1	4	12	1.945 sec
14	1	5	14	1.851 sec
16	1	6	16	1.921 sec
18	1	6	18	2.202 sec
20	1	7	20	2.302 sec

According to the results above, it looks like optimal number of threads are 2 threads per core, in my case 16 threads because my computer has 8 cores. It looks like that the runtime is longer at 16 threads but the runtime changes every time you run the program in the same number of threads. The optimal value is 2 threads per core because it needs less switching operation done by operating system. After 2 threads per core it takes more time to switch the threads than doing the actual calculations.

It’s unnecessary to use threads to fill the file or search the file for substrings because threads run sequentially because of the way we design this program now. There would be problems like that slow thread changes the count of x so the result would be wrong so the threads has to run sequentially which does not make much of a difference than running on 1 thread except that operating system has to switch threads at the end of each operation which costs extra time.