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Section 1

Operating Systems

CS342 Project 4 Report

Fall 2018-2019

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Purpose of report:

This report tries to give statistical examinations to the fourth project in Operating Systems course given in Bilkent University Fall 2018. The project deals with simualting six disk scheduling algorithms being: a) FCFS; b) SSTF; c) SCAN; d) C-SCAN; e) LOOK; f) C-LOOK, respectively. The simulation is done on an array of size 5000 with the array representing the disk and with 1000 requests for the disk with each index 0-4999 being a possible request. The results below include only interpretations based on the total head movement in accessing the given files. Also there were 100 runs with different random request arrays generated to populate the tables. Whenever needed the head direction was always right in the computation of these results.

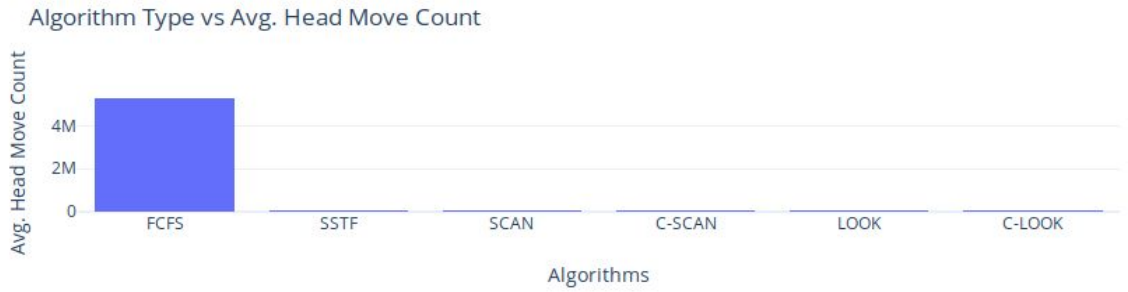
Seeing the total head Movement

In here the report gives the results of the head movement for each algorithm of this assignment. In the tables below each run represent a distinct run with 1000 requests that were randomly generated. The table in the appendix gives the plain results for each run whereas the second table encapsulates the statistical interpretations of the results.

Table 1.0 Average total Head Movement and Standard Deviation

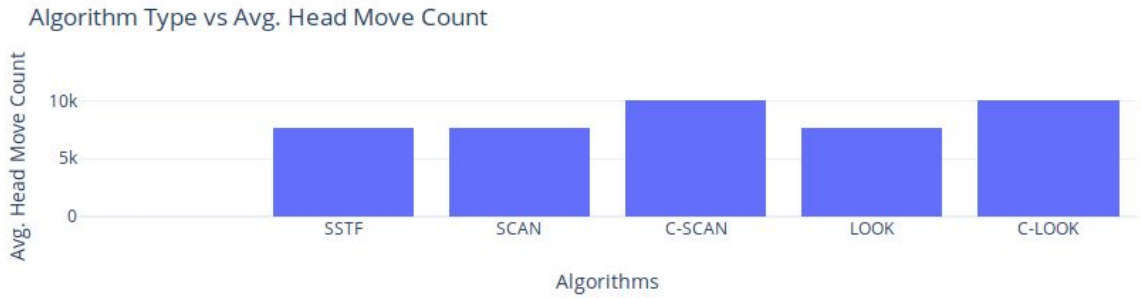
	FCFS	SSTF	SCAN	C-SCAN	LOOK	C-LOOK
Avg. Standard Deviation	73867.864925811	1432.036	1438.807	0.9079648	1438.667	2.5737908
Avg.Movement	5271078.89	7667.61	7599.46	9996.34	7598.48	9994.34

Algorithm type vs head move count.

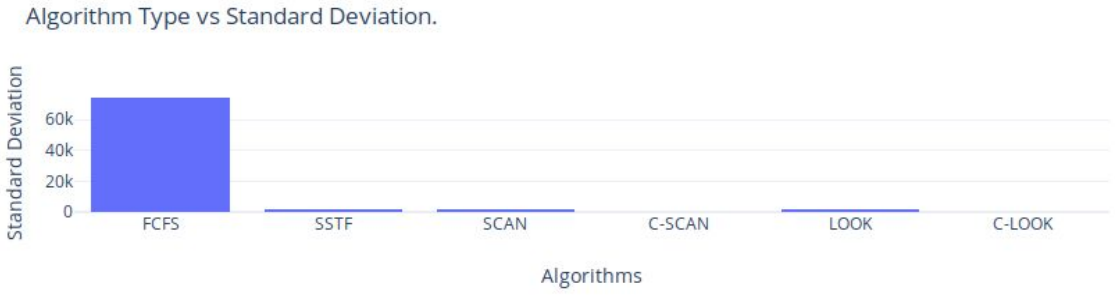


Algorithm type vs head move count(2).

The following is given to better see the results without FCFS (outlier).

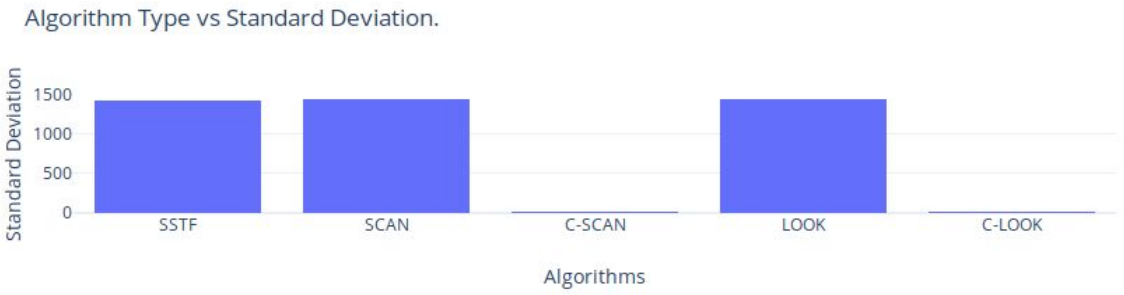


Algorithm type vs standard Deviation.



Algorithm type vs standard Deviation(2).

The following is given to better see the results without FCFS (outlier).



Insights:

As seen from the plots of the results for the average head movement count and the algorithm type as well as the standard deviation and algorithm type, FCFS algorithm is an outlier producing a large number of moves to address the requests. On average this is about 1000 times the maximum movement count of each request. Now this might seem counterintuitive at first but we also have to take into consideration that the head position is also chosen at random in the range [0:4999], so there are 5000 possible values for the head and 5000 movements to be done in maximum for each request with a maximal of 25M. So on average we get ⅕th of the maximum. The rest of the algorithms look more stable when it comes to the head movement count. The maximum difference is about 2000 in between them. Moreover SSTF, SCAN and LOOK are almost same in numbers meaning that it is hard to make interpretations on which is best

from these algorithms. This is the same case if we were to judge the standard deviation. Like these three C-SCAN and C-Look pair together in their numbers. Judging from the algorithms themselves we expected such two groupings to occur for the average case as the algorithms change only based on specific scenarios, and would make an impact only if we knew that our input requests follow in most cases a certain pattern. Making those random makes the algorithms indistinguishable as we got in the results.

Appendix

Run	FCFS	SSTF	SCAN	C-SCAN	LOOK	C-LOOK
1	5227447	8397	8399	9997	8397	9995
2	5260588	6161	8830	9997	8830	9993
3	5100408	9665	9665	9996	9665	9990
4	5221517	9340	9340	9996	9340	9996
5	5169133	5291	5285	9997	5283	9993
6	5254332	6317	8680	9997	8680	9997
7	5237524	7711	7283	9997	7283	9995
8	5281602	9283	5711	9997	5711	9995
9	5374965	5550	9447	9996	9447	9996
10	5317297	7741	7252	9997	7250	9993
11	5207084	9314	5674	9996	5674	9990
12	5327041	6732	8265	9997	8265	9997
13	5183632	7141	7855	9997	7853	9995
14	5077796	8552	6442	9996	6442	9994
15	5340455	8820	8820	9997	8818	9995
16	5321317	5715	9282	9997	9282	9997
17	5398684	7283	7287	9995	7283	9991
18	5103198	5851	9148	9996	9144	9992
19	5104844	8253	8253	9993	8253	9993
20	5234832	9337	9339	9996	9337	9994
21	5139978	9205	9205	9994	9205	9992
22	5277764	9097	9097	9996	9097	9996
23	5421196	7575	7577	9995	7575	9993
24	5225406	7896	7900	9995	7896	9987
25	5324211	5224	9773	9997	9773	9997
26	5301613	7453	7542	9997	7538	9993
27	5286869	9950	9952	9996	9950	9994
28	5237731	6696	8301	9997	8301	9997
29	5214923	7610	7385	9996	7383	9992
30	5271596	5701	9300	9997	9300	9997
31	5253623	5801	5801	9996	5801	9996
32	5297136	7844	7846	9997	7844	9995
33	5129845	6684	8309	9997	8307	9993
34	5212868	7004	7004	9995	7004	9995
35	5311964	8151	8151	9996	8151	9992
36	5414293	6098	6098	9996	6098	9992
37	5346633	7355	7357	9997	7355	9995
38	5307527	7868	7126	9997	7120	9991
39	5317708	8820	6173	9997	6171	9993
40	5275206	6797	8200	9997	8200	9997
41	5423788	6574	6570	9997	6570	9997
42	5340436	6216	6216	9995	6216	9993
43	5294820	8655	6342	9997	6342	9997
44	5226821	6224	6224	9995	6224	9995
45	5274695	9209	9209	9997	9209	9997
46	5292994	6363	8634	9994	8634	9994
47	5409214	7250	7250	9996	7250	9996
48	5227149	8128	6869	9997	6869	9997
49	5326104	6560	8439	9997	8439	9997

Table Raw Results

50	5296458	9846	5152	9997	5150	9995
51	5276438	6446	8550	9995	8550	9993
52	5306882	5098	5098	9993	5098	9993
53	5313987	5688	5688	9997	5688	9997
54	5241981	8041	6953	9997	6953	9995
55	5308093	7436	7561	9996	7559	9992
56	5432106	9491	5508	9997	5508	9997
57	5169611	8241	8239	9997	8239	9997
58	5353477	8934	6062	9997	6060	9995
59	5241954	9084	5912	9996	5910	9994
60	5235946	9833	9835	9996	9833	9994
61	5254769	6917	6925	9996	6917	9988
62	5281706	8821	8825	9997	8821	9993
63	5193906	7478	7486	9997	7478	9989
64	5300994	5051	5051	9995	5051	9995
65	5346871	6503	8491	9997	8491	9995
66	5294466	8109	6888	9995	6888	9995
67	5189062	9330	5664	9997	5664	9995
68	5222393	6073	8926	9997	8926	9997
69	5227437	8145	6849	9997	6849	9995
70	5403836	8017	6968	9996	6968	9988
71	5293392	5800	5800	9997	5798	9995
72	5398941	9003	5994	9997	5994	9997
73	5257706	9961	9961	9997	9959	9995
74	5300885	5957	5961	9996	5957	9990
75	5119384	6307	6307	9995	6307	9989
76	5220137	5277	5277	9996	5277	9996
77	5280884	9578	9582	9996	9578	9990
78	5212121	7714	7283	9997	7283	9997
79	5300055	7833	7833	9997	7833	9997
80	5178572	9861	9863	9997	9861	9991
81	5285745	9995	9995	9996	9995	9996
82	5292131	9112	9110	9997	9110	9997
83	5407419	6660	6660	9995	6660	9993
84	5233702	9652	9650	9997	9650	9995
85	5269347	6220	6220	9997	6220	9993
86	5259793	9271	9269	9997	9269	9997
87	5212042	9282	5715	9997	5715	9997
88	5270148	9829	5170	9996	5170	9996
89	5280313	9172	9170	9997	9170	9997
90	5227876	8211	8211	9997	8211	9997
91	5379156	8495	8495	9996	8495	9996
92	5245845	8867	6124	9997	6124	9993
93	5288222	5219	9769	9996	9763	9986
94	5264861	5359	5359	9996	5359	9996
95	5289085	7763	7763	9995	7763	9995
96	5271657	8049	8047	9997	8047	9997
97	5271075	5927	9070	9997	9070	9997
98	5212953	8395	6602	9996	6602	9996
99	5264381	6143	6143	9997	6143	9993
100	5299881	8805	8805	9997	8805	9997