Rüzgar Ayan 21801984

2020-2021 SPRING CS342 PROJECT 1 Report

I have collected data by running the command "./producer M | ./consumer M" with different values of M using both normal mode and tapped mode of different N. The time it takes to execute each of these are given in the following table in microseconds.

| M	Normal Mode	Tapped Mode N=1	Tapped Mode N=4	Tapped Mode N=16	Tapped Mode N=64	Tapped Mode N=256	Tapped Mode N=1024	Tapped Mode N=4096
10^1	659	668	682	731	703	639	704	632
10^2	566	749	717	782	659	668	761	665
10^3	668	1212	997	720	667	762	784	641
10^4	771	14590	1976	1131	748	727	785	827
10^5	1847	69234	14905	3529	1784	2207	1809	1844
10^6	16157	512281	144033	47131	13296	13504	13476	12842
10^7	125442	5177051	1632643	335207	123198	136595	128029	129732
10^8	1250165	52390637	13089089	3996917	1235733	1259996	1268768	1263493

For small M ($10^1, 10^2, 10^3$), different options have almost the same execution time probably because they don't take enough time to be measurable.

Now considering the higher values of M, it is obvious that Tapped Mode with N=1 to N=16 starts to take a lot more time compared to the Normal Mode. This is probably caused by the overhead of calling the system call for reads and writes so much more often than necessary. Consequently, N=1 is the slowest, N=4 is the second slowest and N=16 is the third slowest as it is obvious from the table. However, for larger values of N (from 64 up to 4096), the difference is very small with the normal mode. The execution times when N=64 seems slightly better compared to any other option, this might be because of architecture supports the system calls of reads and writes the fastest at 64 bytes.

Now we are eliminating the options with N=1,4,16 since they obviously run slower and it would be hard to use them for larger M values. For the remaining options, we run the command "./producer M | ./consumer M" for even higher values of M and also plot the results. This time, the time unit is seconds.

M	Normal Mode	Tapped Mode N=64	Tapped Mode N=256	Tapped Mode N=1024	Tapped Mode N=4096
100000000	1.2574	1.2175	1.3037	1.3175	1.3029
250000000	3.2064	3.1589	3.2738	3.5542	3.2736
500000000	6.3528	6.1980	6.4608	6.4230	6.5293
750000000	9.6504	9.2608	9.7418	9.7634	9.7814
1000000000	12.6819	12.3588	12.9705	12.8639	12.7662

Plotting the table above, we obtain the following:
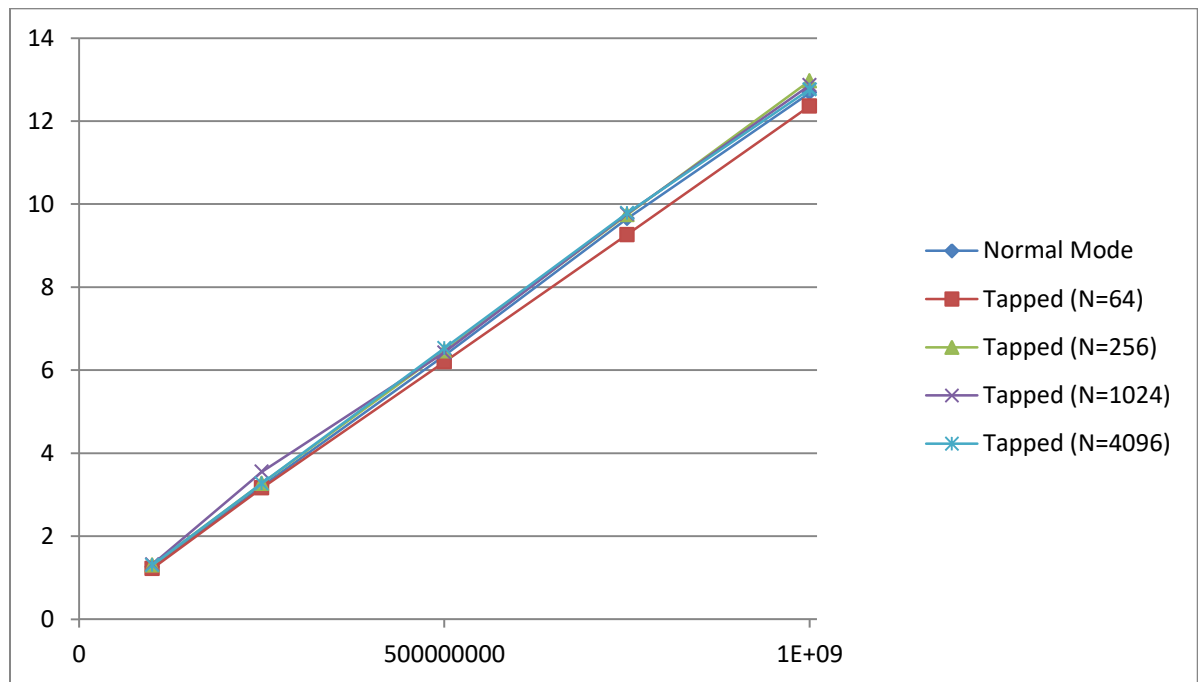
The lines in the above plot are very close to each other. Actually, all four lines except the red one (Tapped mode with N=64) almost overlap.

We conclude

- The fastest option is the **Tapped Mode with N = 64**.
- The options **Tapped Mode with N=1 up to 16** are very slow and they shouldn't be used unless the amount of data to redirected is very small.
- All the other options (**Normal Mode or Tapped Mode with N= 256 up to 4096**) are almost at the same speed. But tapped mode can be preferred since it allows the direct control of the redirection.