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Project #1

Results and Interpretations

M / Mode	Normal Mode	Tapped Mode (N = 1)	Tapped Mode (N = 16)	Tapped Mode (N = 256)	Tapped Mode (N = 4096)
1000	2005µs	12213µs	1977µs	2027µs	2632µs
10000	9029µs	14596µs	9749µs	9095µs	7662µs
100000	50512µs	118528µs	51205µs	61378µs	57531µs
1000000	464687µs	1112105µs	486280µs	490770µs	487506µs

Table 1 M, mode, N and the execution time in microseconds

N / M	1000	10000	100000	1000000
1	12213µs	14596µs	118528µs	1112105µs
16	1977µs	9749µs	51205µs	486280µs
256	2027µs	9095µs	61378µs	490770µs
512	2711µs	10928µs	51998µs	478572µs
1024	1910µs	8135µs	75691µs	537685µs
2048	2786µs	9697µs	60522µs	499989µs
4096	2632µs	7662µs	57531µs	487506µs

Table 2 M, N and the execution time in microseconds for tapped mode

N (M = 100000)	read-call-count	write-call-count
1	100001	100000
16	41560	41559
256	44138	44137
512	42508	42507
1024	43382	43381
2048	45569	45568
4096	47140	47139

Table 3 N and call counts for fixed M for tapped mode

For fixed N, as M increases, the total execution time increases because producer writes and consumer reads more bytes. It can be seen from the data related to tapped mode that, for any fixed M, there is a decrease in execution time after N=1. After this decrease, the execution times tend to be close to each other besides being close to the relevant normal mode execution time having the same M value. On the tapped mode, there is a clear overhead for N=1 because the parent process reads from a pipe and writes to the other pipe bit by bit. Suppose that somebody is washing 5 dishes in t time and you are carrying those dishes to another room. Carrying 3 dishes per t time would be less time taking than carrying 1 dish per t time. However, if you carry more than 5 dishes per t time, it will not make a difference because there will not be dishes ready to be carried since you depend on the person who washes the dishes. There is an analogous situation in this data as well. N, which is analogous to dish carriage rate, it matters up to a point, after that point, read and write call counts and execution times do not change a lot because read gets less bytes than N which is the requested number of bytes. The reason why the execution times in tapped mode after a certain N value, for a fixed M, is close to the normal mode execution time is because in normal mode, children processes already read whatever data is available.

Conclusion

In conclusion, as the number of bytes that need to be transferred increases, the execution time increases. The number of bytes transferred to or from pipes, N, does not have a simple relation with execution time. However, it can be said that for small N values respectively more read and write calls are made and this results in longer execution times.