Programming Assignment 6

CSCE 313-503

4/15/2018

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Raw data for FIFO:

test1 results with n=10k, b=50	
w	time(s)
5	22.35698
10	11.09
15	7.3737
20	5.504534
25	4.403469
30	3.790703
35	3.231393
40	2.798102
45	2.499317
50	2.278127
55	2.0927
60	1.944695
65	1.857902
70	1.699158
75	1.597411
80	1.512779
85	1.43268
90	1.394121
95	1.316433
100	1.283623
105	1.210263
110	1.165291
115	1.123334
120	1.10245
125	1.085334
130	1.067159
135	1.090014
140	1.039637
145	0.947392
150	0.939459
155	0.953246
160	0.905213
165	0.909927
170	0.88845
175	0.843838
180	0.827398
185	0.825066
190	0.797439
195	0.791124

200	0.761222
205	0.81448
210	0.780194
215	0.776044
220	0.77972
225	0.788753
230	0.686699
235	0.69843
240	0.700885
245	0.677965
250	0.677008

Raw data for Message Queue:

test1 results	with n=10k, b=50 for MSQ
w	time(s)
5	22.50347
10	11.17808
15	7.350964
20	5.47751
25	4.353654
30	3.58806
35	3.107659
40	2.717858
45	2.428585
50	2.17711
55	1.983854
60	1.817577
65	1.680864
70	1.561315
75	1.459935
80	1.370631
85	1.291864
90	1.225076
95	1.160696
100	1.10675
105	1.05965
110	1.02276
115	0.980976
120	0.932171

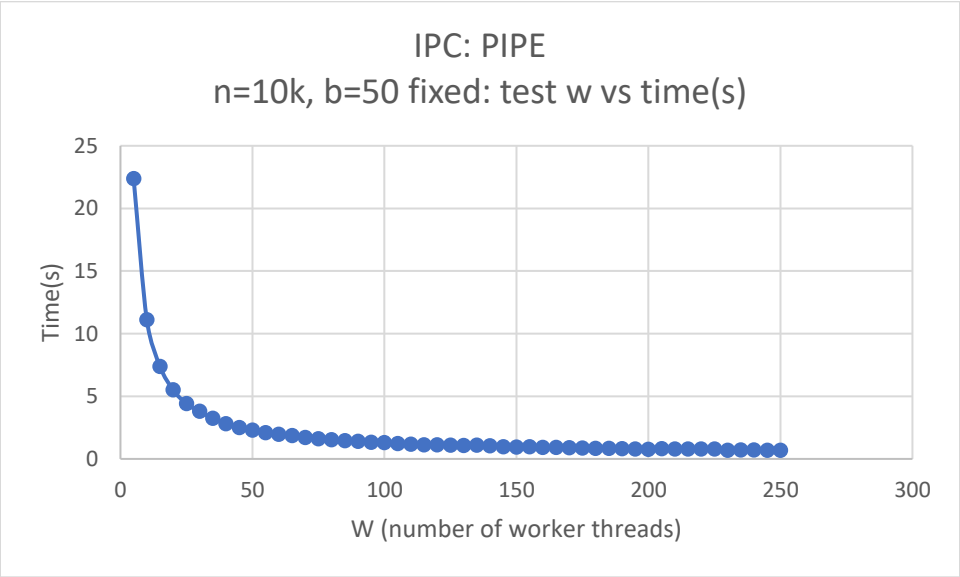
125	0.913709
130	0.874585
135	0.861858
140	0.838868
145	0.796538
150	0.732503
155	0.815592
160	0.750074
165	0.742437
170	0.73068
175	0.696096
180	0.67966
185	0.696555
190	0.651976
195	0.629056
200	0.643152
205	0.547049
210	0.559942
215	0.546034
220	0.551669
225	0.492242
230	0.552166
235	0.490397
240	0.566712
245	0.482213
250	0.471014

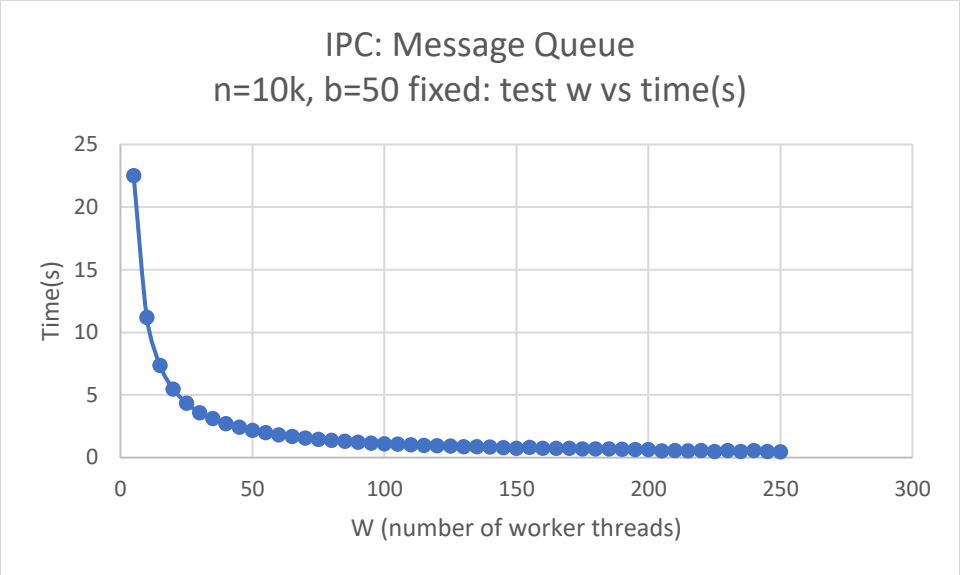
Raw data for Shared memory with kernel semaphore:

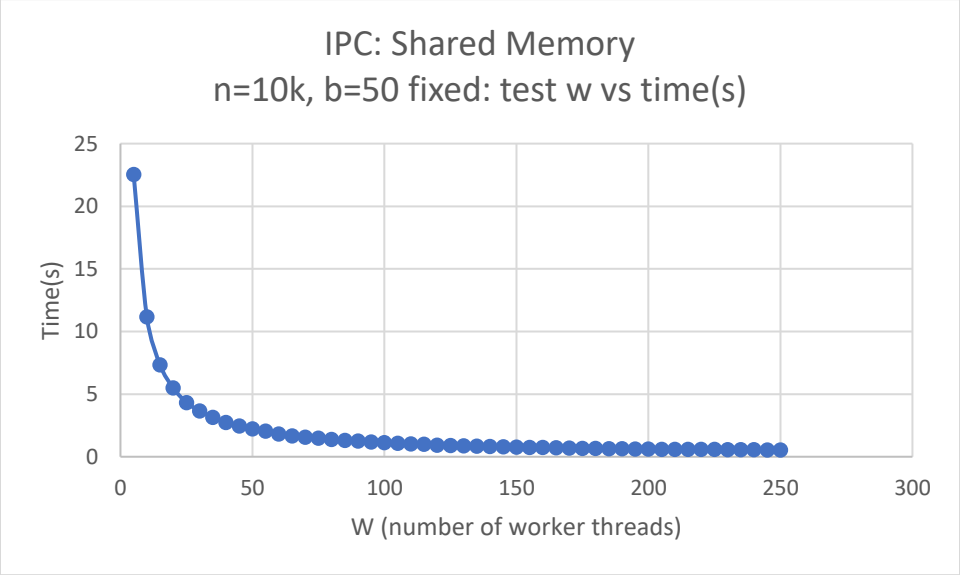
test1 results	with n=10k, b=50 for SHM
w	time(s)
5	22.54214
10	11.17524
15	7.344134
20	5.49342
25	4.328583
30	3.661301
35	3.144562
40	2.753719
45	2.473081
50	2.222681
55	2.044101
60	1.815996
65	1.65865
70	1.571671
75	1.4807
80	1.386465
85	1.29999
90	1.251756
95	1.174423
100	1.119311
105	1.082883
110	1.028836
115	0.992527
120	0.931815
125	0.913753
130	0.883533
135	0.84824
140	0.81932
145	0.805967
150	0.782975
155	0.753349
160	0.748067
165	0.727207
170	0.692551
175	0.680317
180	0.664644
185	0.658462

190	0.637832
195	0.631248
200	0.619953
205	0.60685
210	0.607649
215	0.600612
220	0.592817
225	0.58631
230	0.563492
235	0.57346
240	0.57346
245	0.552604
250	0.543969

GRAPHS:







For the comparison between that FIFO, Message Queue and Shared Memory IPCs, they have almost identical results, no significant difference obversed. I ran them on Ubuntu Linux system installed on my personal computer. The maximum w I ran was 250.

Differences between FIFO and Message queue and Shared Memory:

- FIFO is not limited in size, while queue and shared memory are.

- FIFO can be implemented with select() while the other two cant.
- FIFO and Message Queue are synchronized by kernel, while Shared Memory is not (must use Kernel Semaphore)

To clear up the IPCs:

In the Message Queue's destructor, I used:

```
msgctl(serverID, IPC_RMID, NULL);

msgctl(clientID, IPC_RMID, NULL);
```

These two lines will destroy the message queues IPC created.

In the Shared Memory, I used: shmctl() function to release the memory segment used and semctl to release the semaphore arrays.

Bonus part:

For the Message Queue, I used mtype variable which is a private member of struc buf to distinguish data for Server and Client. In cread, I set mtype=1 if side is server, and mtype=2 if side is Client. In cwrite, I flipped the mtype. In other words, whenever side is server, mtype is =2, and mtype=1 when side== client.

That way I only used one buffer for two direction data transfer.

For the Shared Memory, instead of using two memory segments, I appended the second segment to the first segment. That way only one segment was used for data transfer (they still have different keys).

```
client_data = (char*) shmat(clientID, (void*) 0, 0);

server_data = (char*) ((unsigned long)client_data + ((unsigned long) SHM_SIZE));
```