

Here, you can see a sample output of the code execution across all tests. In the first three tests, when a thread starts working, we print '+ threadID'. At the beginning and end of each thread's iteration, we print '. threadID' and ', threadID', respectively.

===== KPL PROGRAM STARTING =====

Initializing Thread Scheduler...  
Initializing Process Manager...  
Initializing Thread Manager...  
Initializing Frame Manager...

\*\*\*\*\* THREAD-MANAGER TEST \*\*\*\*\*

+1.1+2.2+3.3,1+4.4,2+5.5+6.6,3+7.7+8.8.1+9.9.2+10.10,4+11.11.3,6,5+12.12+13.13,7,8+14.14.4,10,2,11  
+15.15,69,1,3,7.8+16.16,12.10,2,14+17.17,13.11,4,5+18.18.9+19.19,15+20.20.1,6,3.12,7.14,16,8,17,10.  
13,2,4,11.15,5,20.6.7.16,14,3,8.17.2.10,18.11,13,5,9.20,4,15,19.14.3,1,6.18,8,17.13,11,9,5,4,12.15.19.6.1,  
14,3,8.17,2,16.11,10,20,9.12.5,13.14,4,3,2,15.16,8,17.10.9,11.20,7.13,12,4,19,5,6.15.8,3,17,16.11.7,10.12  
,20,9,18.5.19.6,4,14,1,3,2.10,17.16.20.9.18,11,4,12.14.1,19,2,5,15,8,6.17.11,13.12,3,16.19.5,4.15.8,14.6,2  
,7.13,3,17.16,20,10,4,9,2,1,18.14.7,8,17,6,11,12.10.20,19,9,16.1,4,5.18.8,2,6.11,14.12,17.19.16,3,4,5,20,1  
0,9,15,7.2.14,18.3.17,6.10.20,19,12.9.15.7,4,13.18,5,6,8,2,14.19,11.12.4,16.5.13.8,9,2,15.14,18,1,11,6,3,1  
7.16,19.9.15,12,20.1.18.6.3.17,8,14.19.12.20,10,11,16,7,4,9.8.14,5.10,1,11.16.4.7,19.9,15,5,18.1,2,8,6,14.  
19,10.15,3,17.2.18.6.8.14.10.3,9.17,5,11,19,15,12,16,13.9.5,4,2.11.15.16.12.19.4.13,3,2,20,18,9,5,3,7,6,2  
0,8,5,14,11.9.18.7.6,8,2.14,15,11,3,16,1,2,20,12,5,19.3.15,9.16.1.12.5.20,4,19,11,9,18,2,4,3,10.11,15,17,7  
.2.18,3,6.10.15.17,7,19,9,6,16,4,11,1,19,8,14.9.16.4,2,5.11.1.8,18.14,6,2,19,3,5,12,10,9,16.6.18.19,3,15.1  
2.10.9.16,11,14,13.15,4,5,20,18,1,11,6.14.4.13.5,8.20.18.1,6,15,17,8,19,14,15,7,3,11,12.17,4.19.14,9,7,3.  
11.12.4,13,8,9,15,10,17,8,20,5.13,2.15,19.10.17,18.20.5.2.19.18,7,14,9,13,8,3,15,16,1.14.9.7.13.8,3,6,15.  
16.1,6,20.20,17.17,11.11,9,14,7,5,9,13,12.14.7.5.13.12,2,20,3.2.20,11,3,4,16.4.11,7,9.16,15,14.7.9.15,10.  
14,20,2,17,8.10.20,4,2.17,16,5,13,8,11,4,6.16,5,10.13,20,11,3.6.10,19,2.20,7,18,3,8.19,9,2,12.7.18,15,8,9,  
11.12,6.15,20,16.11,5,13,3,1,6,2.16.20.5,8.13,12,3,14.1,2,7,8,18,11.12.14.7,10,17,6,16.18,4,11,1,3.10,20.  
6.17.16,4,12.1,3,13.20,9,18.12,19,13,15,9.18,10.19,2,11,17,1,15.10,8,2.17,12,1,5,8,13.12,16,4,9,5,7.13.16  
.4,3,15,20,7,1,19.15.20.1,12.19,13,5,6.12,2.13.5,18,6,7,18,10,7,15,8,10,19.15,8,13.19,12,16,20.13,14.12.1  
6,20,7,4,14,10,7,6,1,4.10,19,6.1,19,5,13,12.13.12,15,17,14.17,16,14,7.16,4,20.7.20,18,10.18.10,12,1,1,17.  
17,19.19,6,8,7,7,13.13,18.18,16,14,1,1,17.17,19,10.10,20,7,13.13,17.17,1,1,18.18,10,13,17,1,18.18,18

\*\*\*\*\* THREAD-MANAGER TEST COMPLETED SUCCESSFULLY \*\*\*\*\*

\*\*\*\*\* PROCESS-MANAGER TEST \*\*\*\*\*

+1.1+2.2+3.3,1,2+4.4+5.5+6.6,3+7.7.1+8.8.2+9.9.3,4,6+10.10+11.11+12.12,5+13.13,7+14.14.4,8,6,9,2,3  
+15.15,10.5,7,13,11,14+16.16.3,9,2+17.17,8,4,6+18.18,1,12+19.19.10,15.13+20.20,7,5.14,16,4,17.11,3,6.  
1.12,18,9,15,19,7,10,5,13.16,2,14,3.17,11,4.18,20,9,6.19.10,15,8.13,2,5.14,16,12.11,3,4,18.20,6,7,9,15,8.  
5,19,16,13,3,2,17,12,1,18,11,7,4,20,9,19,15,13,14,2.17,16,3,1,10.11,4,18,12,20,7,8,15,9,14,13,3.16,10,18,  
1,6.12,7,4,8,11,20,9,5,19,15,13,14.1,6,3,4.11.20,5,12.19,15,7,14,17,8,9,3,13,2,10,16,4.12,7,17,19,8,14,9,1

3.2.16,3.4.10,6,1.19,11.14,12,20,7,5,3,8,18.6.1.11.7.12,4.20,15.5,19,14.8,9.18,3,13,2,6.4,16.15.19.14.9,20  
.3,5.13.2.6,8,18.16,1,10,17,4.20.5,15,19,12.8.18.1.4.10.17,13.15,11.19,16.12,20,7,5,14,9,8.13,3.11.16.7.2  
0,15.14.5,19,12.9.8.3,18.15,2,13,11,6,1.19.12,16,14.18.2.13.11,9,8.6.1,15.16.14,19,20.8.9,7,10,12.15,17,1  
8.19,4,6.20,16.7.12.10,5.17.18.4.6,8.16,3,15,19,13,11,20,1.5.8,7.3.15.19.13.11,17.20.1,16.7,14,2,8,5.17,1  
0.16.14,3,12.2.8,15.5,6.10,7.3,17,9.12.15.6,19.7,4,16,18,2.9.17,5,20.19,3.4.16,14,12.2.18,7.5,10.20,1,9.3,  
17.14.12.7.10,8,19.9.1.17,11,6,13,5,20.8,15.19,3.6.11,14.13.5.20.15,1,9.3,8,4.14,16,19,2,6,12.1.9.8.4.16.1  
9,7.2.6.12,3,11.7,14,13.3,18,9,1.11,20,8.14.13,15.18.9.1.20,10,7.8,4,3.15,5,11,16.7.10,19,14.4.3.5.11.16,1  
7.19.14,8,15,13,2,18,10.17,9,7.8.15,4.13.2.18.10.9,19.7.4,17,1.19,3,6,8.17,15,13,5.1,11.3.8.6.15.13,7,2.5.  
11,19,18,17.7.2,20.19,12.18,10,1.17,3.12.20,14,5.10,11.1,16.3,7.14,6,18.5,17.11,15.16,12.7,4.6.18,8,1.17.  
15,3.12.4,19.8.1,11,13,5.3,16.19,2,6,20,17.11,10.13.5.16.2.6.20.17,8.10,18,19,15,3,8,12.18.19,11,4,13.15.  
3,5.12.11.4,10.13.5,8,7.10,16,19,18.8.7,1,2.16,15.19,3,20.18.1.2,10.15,6,12.20,11,8.10,16,9,6,4.,13,12,18.  
11.8.16.9,15.4.13.18,20,7.15,17,10.20,1.7,6.17,12.10,2.1,11.6,4.12.2,14.11,15,20.4.8.14,7,16.15.20,9,13,1  
8.7.16,12.9.13.18,11,10,4.12,1.11,6,15,2.10.4,19,7.1,14.6.2,16,12,17,11.19.14.16.12.17,9.11,20,10.9,1,18.  
20.10,5.1.18.5,14,19,16,4.14.16.4.11,9,6,12,20,13.9.6.12.20.13,1,14,17,16.1.14.17,5,9,10.5,6,18.9.10,4.6.  
18,1,20.20,14.14,12,2.2,5,5,17.17,13.13,9,9,20,18.18,14,10.10,6,2,2,5,17.17,9,13,18,10,2,2,17.17,2,17

\*\*\*\*\* PROCESS-MANAGER TEST COMPLETED SUCCESSFULLY \*\*\*\*\*

\*\*\*\*\* FRAME-MANAGER TEST \*\*\*\*\*

+1.1+2.2+3.3+4.4+5.5,1+7.7,2+6.6+8.8,3+9.9,1,5+10.10,2,4,3,7,8,6,9,5,1,10,4,7,3,2,6,9,8,1,5,10,2,3,7,4,  
6,5,8,9,1,7,10,4,6,2,3,9,8,1,5,10,7,4,2,3,6,9,5,1,8,7,4,10,2,6,9,3,5,1,8,7,2,10,4,6,3,9,1,5,8,4,7,6,3,2,9,1,10,  
8,5,3,4,2,9,10,1,5,7,4,3,9,6,1,8,7,5,3,10,6,8,9,5,2,10,3,9,6,2,4,3,8,6,9,4,7,8,3,10,9,7,4,3,10,9,4,8,9,3,8,4,10  
.3,4,8,1,10,8,3,5,1,10,3,5,1,4,10,1,5,4,8,5,10,1,8,10,5,1,8,2,5,8,1,2,6,5,1,6,2,7,5,2,1,9,7,1,8,9,6,8,7,6,9,2,7.  
9,2,7,6,7,5,6,7,5,6,7,5,6,7,5,6,7,5,6,7,5,6,7,5,6,7,3,6,7,3,4,7,3,4,7,3,4,7,3,4,6,3,4,6,3,4,10,3,10,4,1,4,  
3,1,8,3,1,8,4,1,8,4,1,8,9,1,8,9,2,8,9,2,8,9,2,8,9,2,9,10,10,2,1,2,1,10,10,2,9,2,9,10,10,2,2,8,8,4,4,3,3,6,6,7,7  
,5,5,1,1,9,9,10,10,2,2,8,8,4,4,3,3,6,6,7,7,5,5,1,1,9,9,10,10,2,2,8,8,4,4,3,3,6,6,7,7,5,5,1,1,9,9,10,10,2,2,8,8,  
4,8,4,8,3,8,3,8,6,3,6,8,3,8,7,3,8,7,3,8,5,7,3,8,7,5,3,8,1,7,3,1,7,5,3,1,8,5,3,7,8,1,5,3,7,5,9,8,1,8,9,10,1,5,3,5.  
10,8,7,3,1,5,7,8,1,3,5,7,8,3,1,7,5,8,1,3,5,7,3,8,7,5,1,8,5,7,1,3,7,8,1,3,8,5,1,3,5,7,1,3,7,5,1,5,8,3,8,3,7,7,8,1.  
8,10,1,5,10,1,5,7,1,5,7,1,5,7,1,5,7,5,1,7,1,8,7,1,8,7,1,7,3,8,3,8,5,5,3,3,1,1,7,7,5,5,3,3,5,5,1,1,10,10,9,10,9,  
2,10,9,2,10,9,10,4,9,10,4,9,10,6,4,9,10,4,6,10,9,8,4,6,8,4,6,10,7,10,9,4,6,7,9,10,4,6,3,10,9,4,6,3,10,9,4,6,1  
0,3,9,4,3,6,9,4,10,6,5,10,9,5,4,9,10,6,4,10,6,9,3,9,4,3,9,10,4,9,6,10,4,6,9,4,6,9,4,10,6,4,10,6,9,6,1,9,6,1,9.  
6,9,5,5,6,1,6,1,4,6,4,7,6,4,7,6,4,6,10,10,4,4,9,9,6,6,10,10,4,4,9,9,7,7,3,3,2,2,8,2,8,5,2,5,2,8,2,8,2,1,2,1,2,6.  
2,6,2,2,10,2,10,4,2,4,2,2,10,10,2,2,9,9,2,2,7,7,3,3,5,2,5,2,3,6,3,6,2,2,4,4,3,5,3,5,3,3,8,8,3,3,1,8,1,3,8,10,3,  
8,10,3,3,8,9,9,8,3,8,6,3,6,8,3,8,2,3,2,8,8,7,7,8,8,7,4,7,3,4,3,10,10,8,7,4,8,7,3,4,8,7,3,8,7,2,3,2,3,8,7,8,2,7,2  
,3,8,3,7,8,7,3,8,3,8,2,2,7,7,3,3,8,8,7,4,7,4,7,7,5,5,1,5,1,9,5,1,7,9,5,1,7,5,3,1,3,7,1,8,7,5,8,1,5,7,1,5,7,1,5,1,  
3,3,5,1,5,6,1,6,5,1,5,8,1,8,5,10,5,10,1,5,1,7,5,1,7,1,5,7,5,7,1,1,2,2,5,5,3,3,1,8,1,8,5,1,5,1,7,5,7,5,1,1,7,7,4.  
4,9,4,9,6,4,6,4,4,9,4,9,10,4,9,10,4,4,9,2,10,10,2,4,9,9,3,4,10,9,3,10,4,9,4,8,10,8,9,10,5,9,4,10,5,4,9,10,1,9,  
4,1,10,4,9,10,5,9,5,4,4,9,10,9,10,1,1,4,7,4,7,9,6,9,10,6,9,10,4,6,9,4,5,6,10,5,6,10,9,6,9,1,1,4,4,6,10,6,10,9,  
5,9,5,6,9,6,10,9,6,10,9,6,10,9,6,10,9,6,10,6,9,6,9,2,6,2,6,6,9,9,6,6,8,8,3,3,7,3,7,3,1,1,6,6,4,3,4,3,6,6  
,10,10,4,4,3,3,7,7,3,3,5,5,3,3,2,2,3,3,9,2,2,9,3,3,8,2,8,2,1,3,1,3,2,6,2,6,3,3,1,1,2,2,10,10,3,3,4,4,2,2,7,7,2,5  
.2,7,5,7,2,2,7,9,7,9,8,2,8,2,6,7,8,7,6,2,8,10,2,3,10,2,3,8,7,8,7,2,10,8,10,7,8,7,1,1,8,8,4,7,7,1,4,1,5,8,1,5,8,1

,4,7,5.4,7.5,8,3,1.8,5.3,1.4,5,8,4,5,3,8.5,1.3,7,1,5,7,6,5,1.6,5,1,2,5,8,2,1.8,7,1,2,7,2,3,3,7,7,6,5,6,5,9,1,9,1,  
6,9,6,9,8,10,8,5,10,9,8,5,9,1,8,9,5,1,5,9,8,1,8,9,1,9,2,7,2,7,3,3,5,5,2,2,8,1,8,9,1,9,7,7,5,5,3,3,1,1,2,9,2,9,4,  
4,9,9,2,4,2,4,9,6,9,6,4,9,4,8,9,4,8,5,4,5,9,9,7,4,7,4,10,4,10,4,3,3,4,10,4,10,4,4,1,10,1,8,10,8,5,5,9,10,9,10,  
7,4,7,10,10,4,1,1,5,5,9,9,8,8,10,10,2,2,4,4,3,3,10,10,6,6,10,10,6,7,6,7,4,4,1,6,1,6,10,5,10,6,5,6,10,9,10,6,9  
,10,6,4,10,6,4,6,10,10,9,9,4,4,1,6,1,6,8,8,10,1,10,1,6,2,6,2,6,6,3,3,7,7,3,6,3,6,5,5,10,9,10,3,9,6,3,6,10,10,4  
.4,3,3,6,6,5,5,3,3,8,8,3,3,1,1,3,3,2,2,3,3,7,2,7,2,3,3,9,2,9,2,3,3,10,2,10,2,3,3,4,4,6,6,10,10,2,2,5,5,2,2,8,8,2  
.2,1,1,2,2,7,7,2,2,9,9,2,2,3,3,4,4,2,6,2,6,3,2,3,10,2,10,2,2,3,3,6,6,2,2,3,3,5,5,8,8,1,8,1,8,7,1,7,1,8,9,8,7,1,9.  
7,8,1,8,4,7,1,4,7,8,1,8,9,7,9,1,7,1,10,9,8,10,9,7,8,7,6,9,6,1,7,9,7,1,2,2,8,9,9,8,3,3,7,1,7,1,2,9,8,2,9,8,6,6,7.  
7,2,2,1,1,5,5,9,9,4,5,8,4,5,8,10,5,10,9,5,9,4,4,7,7,3,5,3,5,1,1,6,6,8,2,8,9,2,8,9,7,8,5,7,9,5,1,9,1,7,5,7,8,5,9.  
8,5,9,7,5,7,1,1,8,8,9,9,3,3,5,5,2,2,5,5,10,10,4,10,4,10,6,4,6,10,4,7,10,1,7,1,4,10,10,8,4,5,8,10,4,5,10,9,4,9,  
7,4,7,5,4,1,5,1,10,4,10,4,7,7,9,9,8,8,5,5,1,10,1,4,10,4,7,7,5,5,9,9,1,1,10,10,3,4,3,4,2,2,10,10,3,4,4,6,6,2,2,  
8,6,10,8,2,6,10,2,5,5,9,9,4,6,4,6,7,10,7,10,1,1,2,6,2,6,7,7,4,4,8,10,8,10,5,5,2,6,2,6,8,8,2,6,2,6,9,9,4,4,1,1,2  
.2,7,7,6,6,10,2,2,10,6,6,5,5,4,4,2,2,8,8,6,6,9,9,2,2,1,1,6,6,10,10,4,4,2,2,5,5,6,6,9,9,7,8,1,1,10,10,2,2,4,4,6.  
6,10,10,2,2,4,4,6,6,2,2,6,6,2,2,5,5,9,9,1,10,10,4,4,6,6,2,2,5,5,9,10,10,4,4,6,6,2,2,5,10,10,4,4,6,6,2,2,10,4,6  
.6,2,2,6,6,2,6

The following shows how many times each frame was used:

- 0: 425
- 1: 422
- 2: 420
- 3: 419
- 4: 418
- 5: 416
- 6: 416
- 7: 414
- 8: 413
- 9: 411
- 10: 411
- 11: 407
- 12: 406
- 13: 402
- 14: 396
- 15: 385
- 16: 366
- 17: 349
- 18: 325
- 19: 301
- 20: 285
- 21: 274
- 22: 260
- 23: 245
- 24: 217
- 25: 178
- 26: 119

\*\*\*\*\* FRAME-MANAGER TEST COMPLETED SUCCESSFULLY \*\*\*\*\*

===== KPL PROGRAM TERMINATION =====