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COIS 2020H ASSIGNMENT 2 TESTS

CPU Simulation Tests

Constant inter-arrival time and processing time; increasing number of processors

10min inter-arrival time; 10min processing time; 1 processors [INTERRUPT PRE-EMPTS JOB 3]

10min inter-arrival time; 10min processing time; 2 processors [INTERRUPT PRE-EMPTS JOB 3]

```
C:\Users\user\source\repos\assign2\assign2\bin\Debug\assign2.exe                    —    □    ×

queue to be processed and the average wait-time for all jobs.

Number of processors for the simulation? 2
Mean inter-arrival time (in seconds)? 600
Mean processing time for jobs (in seconds)? 600
Job 1 arrives and begins execution on processor 1 at 9:12 AM
Job 2 arrives and begins execution on processor 2 at 9:13 AM
Job 2 arrives and is placed in the waiting queue
Job 2 completes execution and Job 2 begins execution on processor 2 at 9:13 AM
Job 2 completes execution on processor 2 at 9:14 AM
Job 3 arrives and begins execution on processor 2 at 9:15 AM
Job 3 arrives and is placed in the waiting queue
Job 0 arrives and begins execution on processor 2 at 9:15 AM, pre-empting Job 3
Job 0 completes execution and Job 3 begins execution on processor 2 at 9:15 AM
Job 3 completes execution and Job 3 begins execution on processor 2 at 9:16 AM
Job 3 completes execution on processor 2 at 9:17 AM
Job 4 arrives and begins execution on processor 2 at 9:23 AM
Job 1 completes execution on processor 1 at 9:24 AM
Job 4 completes execution on processor 2 at 9:32 AM
Job 5 arrives and begins execution on processor 1 at 9:47 AM
Job 6 arrives and begins execution on processor 2 at 10:04 AM
Job 5 completes execution on processor 1 at 10:11 AM
Job 7 arrives and begins execution on processor 1 at 10:14 AM
Job 8 arrives and is placed in the waiting queue
Job 8 arrives and is placed in the waiting queue
Job 0 arrives and begins execution on processor 2 at 10:20 AM, pre-empting Job 6
Job 0 completes execution and Job 8 begins execution on processor 2 at 10:20 AM
Job 8 completes execution and Job 8 begins execution on processor 2 at 10:23 AM
Job 7 completes execution and Job 6 begins execution on processor 1 at 10:24 AM
Job 6 completes execution on processor 1 at 10:25 AM
Job 8 completes execution on processor 2 at 10:26 AM
Job 9 arrives and begins execution on processor 1 at 10:50 AM
Job 10 arrives and begins execution on processor 2 at 10:51 AM
Job 10 arrives and is placed in the waiting queue
Job 10 completes execution and Job 10 begins execution on processor 2 at 10:52 AM
Job 11 arrives and is placed in the waiting queue
Job 11 arrives and is placed in the waiting queue
Job 10 completes execution and Job 11 begins execution on processor 2 at 10:53 AM
Job 11 completes execution and Job 11 begins execution on processor 2 at 10:53 AM
Job 12 arrives and is placed in the waiting queue
Job 12 arrives and is placed in the waiting queue
Job 11 completes execution and Job 12 begins execution on processor 2 at 10:54 AM
Job 12 completes execution and Job 12 begins execution on processor 2 at 10:55 AM
Job 12 completes execution on processor 2 at 10:55 AM
Job 9 completes execution on processor 1 at 11:19 AM

Average wait-time in the waiting queue: 00:01:07.560

Average wait-time for all jobs: 00:00:35.388


Press any key ...
```

10min inter-arrival time; 10min processing time; 4 processors

```
C:\Users\user\source\repos\assign2\assign2\bin\Debug\assign2.exe                          —      □      ✕

PURPOSE:
This program implements a discrete simulation of processes in a CPU over
a two hour period and returns the average wait-time for jobs that were in
queue to be processed and the average wait-time for all jobs.

Number of processors for the simulation? 4
Mean inter-arrival time (in seconds)? 600
Mean processing time for jobs (in seconds)? 600
Job 1 arrives and begins execution on processor 1 at 9:02 AM
Job 1 arrives and begins execution on processor 2 at 9:02 AM
Job 1 arrives and begins execution on processor 3 at 9:02 AM
Job 1 arrives and begins execution on processor 4 at 9:02 AM
Job 1 completes execution on processor 3 at 9:02 AM
Job 1 completes execution on processor 4 at 9:02 AM
Job 1 completes execution on processor 1 at 9:02 AM
Job 1 completes execution on processor 2 at 9:02 AM
Job 2 arrives and begins execution on processor 1 at 9:04 AM
Job 2 arrives and begins execution on processor 2 at 9:04 AM
Job 2 arrives and begins execution on processor 3 at 9:04 AM
Job 2 arrives and begins execution on processor 4 at 9:04 AM
Job 2 completes execution on processor 3 at 9:04 AM
Job 2 completes execution on processor 4 at 9:04 AM
Job 2 completes execution on processor 1 at 9:04 AM
Job 2 completes execution on processor 2 at 9:04 AM
Job 3 arrives and begins execution on processor 1 at 9:21 AM
Job 4 arrives and begins execution on processor 2 at 9:31 AM
Job 4 arrives and begins execution on processor 3 at 9:31 AM
Job 5 arrives and begins execution on processor 4 at 9:34 AM
Job 5 arrives and is placed in the waiting queue
Job 5 arrives and is placed in the waiting queue
Job 4 completes execution and Job 5 begins execution on processor 3 at 9:35 AM
Job 4 completes execution and Job 5 begins execution on processor 2 at 9:35 AM
Job 5 completes execution on processor 4 at 9:35 AM
Job 5 completes execution on processor 2 at 9:37 AM
Job 5 completes execution on processor 3 at 9:37 AM
Job 3 completes execution on processor 1 at 9:38 AM
Job 6 arrives and begins execution on processor 1 at 9:51 AM
Job 7 arrives and begins execution on processor 2 at 10:06 AM
Job 6 completes execution on processor 1 at 10:07 AM
Job 7 completes execution on processor 2 at 10:21 AM
Job 8 arrives and begins execution on processor 1 at 10:21 AM
Job 0 arrives and begins execution on processor 4 at 10:21 AM
Job 0 completes execution on processor 4 at 10:21 AM
Job 9 arrives and begins execution on processor 2 at 10:31 AM
Job 9 arrives and begins execution on processor 3 at 10:31 AM
Job 9 completes execution on processor 2 at 10:36 AM
Job 9 completes execution on processor 3 at 10:36 AM
Job 8 completes execution on processor 1 at 10:36 AM

Average wait-time in the waiting queue: 00:01:09.955

Average wait-time for all jobs: 00:00:06.662


Press any key ...
```

10min inter-arrival time; 10min processing time; 6 processors [INTERRUPT AT 10:12 AM ARRIVES AND IS PROCESSED ON AN AVAILABLE PROCESSOR]

C:\Users\user\source\repos\assign2\assign2\bin\Debug\assign2.exe — □ ✕

```
Job 3 arrives and begins execution on processor 1 at 9:20 AM
Job 3 arrives and begins execution on processor 2 at 9:20 AM
Job 4 arrives and begins execution on processor 3 at 9:22 AM
Job 4 arrives and begins execution on processor 4 at 9:22 AM
Job 4 arrives and begins execution on processor 5 at 9:22 AM
Job 4 arrives and begins execution on processor 6 at 9:22 AM
Job 4 arrives and is placed in the waiting queue
Job 4 completes execution and Job 4 begins execution on processor 6 at 9:22 AM
Job 4 completes execution on processor 4 at 9:22 AM
Job 4 completes execution on processor 5 at 9:22 AM
Job 4 completes execution on processor 3 at 9:22 AM
Job 4 completes execution on processor 6 at 9:23 AM
Job 3 completes execution on processor 1 at 9:27 AM
Job 3 completes execution on processor 2 at 9:27 AM
Job 5 arrives and begins execution on processor 1 at 9:47 AM
Job 6 arrives and begins execution on processor 2 at 10:01 AM
Job 6 arrives and begins execution on processor 3 at 10:01 AM
Job 6 completes execution on processor 2 at 10:09 AM
Job 6 completes execution on processor 3 at 10:09 AM
Job 5 completes execution on processor 1 at 10:11 AM
Job 7 arrives and begins execution on processor 1 at 10:11 AM
Job 7 arrives and begins execution on processor 2 at 10:11 AM
Job 7 arrives and begins execution on processor 3 at 10:11 AM
Job 0 arrives and begins execution on processor 6 at 10:12 AM
Job 0 completes execution on processor 6 at 10:13 AM
Job 7 completes execution on processor 3 at 10:15 AM
Job 7 completes execution on processor 2 at 10:15 AM
Job 7 completes execution on processor 1 at 10:15 AM
Job 8 arrives and begins execution on processor 1 at 10:15 AM
Job 8 arrives and begins execution on processor 2 at 10:15 AM
Job 8 arrives and begins execution on processor 3 at 10:15 AM
Job 8 arrives and begins execution on processor 4 at 10:15 AM
Job 8 arrives and begins execution on processor 5 at 10:15 AM
Job 8 completes execution on processor 4 at 10:16 AM
Job 8 completes execution on processor 5 at 10:16 AM
Job 8 completes execution on processor 2 at 10:16 AM
Job 8 completes execution on processor 3 at 10:16 AM
Job 8 completes execution on processor 1 at 10:16 AM
Job 9 arrives and begins execution on processor 1 at 10:22 AM
Job 9 arrives and begins execution on processor 2 at 10:22 AM
Job 9 arrives and begins execution on processor 3 at 10:22 AM
Job 9 arrives and begins execution on processor 4 at 10:22 AM
Job 9 completes execution on processor 3 at 10:23 AM
Job 9 completes execution on processor 4 at 10:23 AM
Job 9 completes execution on processor 1 at 10:23 AM
Job 9 completes execution on processor 2 at 10:23 AM
Job 10 arrives and begins execution on processor 1 at 10:37 AM
Job 10 arrives and begins execution on processor 2 at 10:37 AM
Job 10 completes execution on processor 1 at 10:44 AM
Job 10 completes execution on processor 2 at 10:44 AM

Average wait-time in the waiting queue: 00:00:13.731

Average wait-time for all jobs: 00:00:00.742


Press any key ...
```

10min inter-arrival time; 10min processing time; 8 processors

C:\Users\user\source\repos\assign2\assign2\bin\Debug\assign2.exe   —   □   ✕

```
PURPOSE:
This program implements a discrete simulation of processes in a CPU over
a two hour period and returns the average wait-time for jobs that were in
queue to be processed and the average wait-time for all jobs.

Number of processors for the simulation? 8
Mean inter-arrival time (in seconds)? 600
Mean processing time for jobs (in seconds)? 600
Job 1 arrives and begins execution on processor 1 at 9:23 AM
Job 2 arrives and begins execution on processor 2 at 9:39 AM
Job 2 arrives and begins execution on processor 3 at 9:39 AM
Job 2 completes execution on processor 2 at 9:47 AM
Job 2 completes execution on processor 3 at 9:47 AM
Job 1 completes execution on processor 1 at 9:47 AM
Job 3 arrives and begins execution on processor 1 at 10:06 AM
Job 4 arrives and begins execution on processor 2 at 10:26 AM
Job 4 arrives and begins execution on processor 3 at 10:26 AM
Job 5 arrives and begins execution on processor 4 at 10:29 AM
Job 5 arrives and begins execution on processor 5 at 10:29 AM
Job 5 arrives and begins execution on processor 6 at 10:29 AM
Job 5 arrives and begins execution on processor 7 at 10:29 AM
Job 5 arrives and begins execution on processor 8 at 10:29 AM
Job 5 arrives and is placed in the waiting queue
Job 5 completes execution and Job 5 begins execution on processor 8 at 10:30 AM
Job 5 completes execution on processor 4 at 10:30 AM
Job 5 completes execution on processor 5 at 10:30 AM
Job 5 completes execution on processor 7 at 10:30 AM
Job 5 completes execution on processor 6 at 10:30 AM
Job 5 completes execution on processor 8 at 10:30 AM
Job 3 completes execution on processor 1 at 10:34 AM
Job 4 completes execution on processor 2 at 10:36 AM
Job 4 completes execution on processor 3 at 10:36 AM
Job 6 arrives and begins execution on processor 1 at 10:43 AM
Job 6 arrives and begins execution on processor 2 at 10:43 AM
Job 6 completes execution on processor 1 at 10:51 AM
Job 6 completes execution on processor 2 at 10:51 AM
Job 7 arrives and begins execution on processor 1 at 10:58 AM
Job 7 arrives and begins execution on processor 2 at 10:58 AM
Job 7 completes execution on processor 1 at 11:05 AM
Job 7 completes execution on processor 2 at 11:05 AM

Average wait-time in the waiting queue: 00:00:29.080

Average wait-time for all jobs: 00:00:01.531


Press any key ...
```

10min inter-arrival time; 10min processing time; 10 processors [INTERRUPT PRE-EMPTS JOB 7]

```
C:\Users\user\source\repos\assign2\assign2\bin\Debug\assign2.exe                    —     □    ✕

Job 7 arrives and is placed in the waiting queue
Job 7 arrives and is placed in the waiting queue
Job 0 arrives and begins execution on processor 10 at 10:32 AM, pre-empting Job 7
Job 7 completes execution and Job 7 begins execution on processor 5 at 10:32 AM
Job 7 completes execution and Job 7 begins execution on processor 4 at 10:32 AM
Job 7 completes execution and Job 7 begins execution on processor 7 at 10:32 AM
Job 7 completes execution on processor 6 at 10:32 AM
Job 7 completes execution on processor 8 at 10:32 AM
Job 7 completes execution on processor 9 at 10:32 AM
Job 0 completes execution on processor 10 at 10:32 AM
Job 7 completes execution on processor 7 at 10:33 AM
Job 7 completes execution on processor 5 at 10:33 AM
Job 7 completes execution on processor 4 at 10:33 AM
Job 4 completes execution on processor 1 at 10:33 AM
Job 8 arrives and begins execution on processor 1 at 10:40 AM
Job 8 arrives and begins execution on processor 4 at 10:40 AM
Job 8 arrives and begins execution on processor 5 at 10:40 AM
Job 8 arrives and begins execution on processor 6 at 10:40 AM
Job 8 arrives and begins execution on processor 7 at 10:40 AM
Job 6 completes execution on processor 2 at 10:41 AM
Job 6 completes execution on processor 3 at 10:41 AM
Job 8 completes execution on processor 7 at 10:41 AM
Job 8 completes execution on processor 6 at 10:41 AM
Job 8 completes execution on processor 5 at 10:41 AM
Job 8 completes execution on processor 4 at 10:41 AM
Job 8 completes execution on processor 1 at 10:41 AM
Job 9 arrives and begins execution on processor 1 at 10:47 AM
Job 9 arrives and begins execution on processor 2 at 10:47 AM
Job 9 arrives and begins execution on processor 3 at 10:47 AM
Job 9 arrives and begins execution on processor 4 at 10:47 AM
Job 9 arrives and begins execution on processor 5 at 10:47 AM
Job 0 arrives and begins execution on processor 10 at 10:48 AM
Job 0 completes execution on processor 10 at 10:49 AM
Job 9 completes execution on processor 4 at 10:49 AM
Job 9 completes execution on processor 2 at 10:49 AM
Job 9 completes execution on processor 1 at 10:49 AM
Job 9 completes execution on processor 5 at 10:49 AM
Job 9 completes execution on processor 3 at 10:49 AM
Job 10 arrives and begins execution on processor 1 at 10:55 AM
Job 10 arrives and begins execution on processor 2 at 10:55 AM
Job 10 arrives and begins execution on processor 3 at 10:55 AM
Job 10 arrives and begins execution on processor 4 at 10:55 AM
Job 10 arrives and begins execution on processor 5 at 10:55 AM
Job 10 arrives and begins execution on processor 6 at 10:55 AM
Job 10 completes execution on processor 5 at 10:56 AM
Job 10 completes execution on processor 6 at 10:56 AM
Job 10 completes execution on processor 3 at 10:56 AM
Job 10 completes execution on processor 2 at 10:56 AM
Job 10 completes execution on processor 4 at 10:56 AM
Job 10 completes execution on processor 1 at 10:56 AM

Average wait-time in the waiting queue: 00:00:05.842

Average wait-time for all jobs: 00:00:00.302


Press any key ...
```
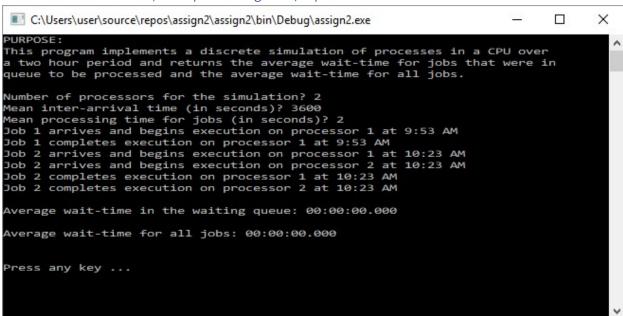
Increasing inter-arrival time; constant processing time and number of processors

1sec inter-arrival time; 2sec processing time; 2 processors

C:\Users\user\source\repos\assign2\assign2\bin\Debug\assign2.exe   —   □   ✕

```
Job 0 arrives and begins execution on processor 2 at 10:59 AM, pre-empting Job 6
416
Job 0 completes execution and Job 6420 begins execution on processor 2 at 10:59
AM
Job 6427 arrives and is placed in the waiting queue
Job 6427 arrives and is placed in the waiting queue
Job 6428 arrives and is placed in the waiting queue
Job 6428 arrives and is placed in the waiting queue
Job 6420 completes execution and Job 6420 begins execution on processor 2 at 10:
59 AM
Job 6420 completes execution and Job 6421 begins execution on processor 2 at 10:
59 AM
Job 6421 completes execution and Job 6421 begins execution on processor 2 at 10:
59 AM
Job 6421 completes execution and Job 6422 begins execution on processor 2 at 10:
59 AM
Job 6429 arrives and is placed in the waiting queue
Job 6410 completes execution and Job 6423 begins execution on processor 1 at 10:
59 AM
Job 6430 arrives and is placed in the waiting queue
Job 6422 completes execution and Job 6424 begins execution on processor 2 at 10:
59 AM
Job 6431 arrives and is placed in the waiting queue
Job 6431 arrives and is placed in the waiting queue
Job 6423 completes execution and Job 6425 begins execution on processor 1 at 10:
59 AM
Job 6425 completes execution and Job 6426 begins execution on processor 1 at 11:
00 AM
Job 6426 completes execution and Job 6426 begins execution on processor 1 at 11:
00 AM
Job 6426 completes execution and Job 6416 begins execution on processor 1 at 11:
00 AM
Job 6416 completes execution and Job 6427 begins execution on processor 1 at 11:
00 AM
Job 6427 completes execution and Job 6427 begins execution on processor 1 at 11:
00 AM
Job 6427 completes execution and Job 6428 begins execution on processor 1 at 11:
00 AM
Job 6424 completes execution and Job 6428 begins execution on processor 2 at 11:
00 AM
Job 6428 completes execution and Job 6429 begins execution on processor 1 at 11:
00 AM
Job 6428 completes execution and Job 6430 begins execution on processor 2 at 11:
00 AM
Job 6430 completes execution and Job 6431 begins execution on processor 2 at 11:
00 AM
Job 6431 completes execution and Job 6431 begins execution on processor 2 at 11:
00 AM
Job 6431 completes execution on processor 2 at 11:00 AM
Job 6429 completes execution on processor 1 at 11:00 AM

Average wait-time in the waiting queue: 00:00:06.330

Average wait-time for all jobs: 00:00:06.283


Press any key ...
```

1min inter-arrival time; 2sec processing time; 2 processors

C:\Users\user\source\repos\assign2\assign2\bin\Debug\assign2.exe   —   □   ✕

```
Job 0 arrives and begins execution on processor 2 at 10:45 AM
Job 0 completes execution on processor 2 at 10:45 AM
Job 89 arrives and begins execution on processor 1 at 10:46 AM
Job 89 arrives and begins execution on processor 2 at 10:46 AM
Job 89 completes execution on processor 1 at 10:46 AM
Job 89 completes execution on processor 2 at 10:46 AM
Job 90 arrives and begins execution on processor 1 at 10:46 AM
Job 90 arrives and begins execution on processor 2 at 10:46 AM
Job 90 completes execution on processor 1 at 10:46 AM
Job 90 completes execution on processor 2 at 10:46 AM
Job 91 arrives and begins execution on processor 1 at 10:47 AM
Job 91 arrives and begins execution on processor 2 at 10:47 AM
Job 91 completes execution on processor 1 at 10:47 AM
Job 91 completes execution on processor 2 at 10:47 AM
Job 92 arrives and begins execution on processor 1 at 10:49 AM
Job 92 completes execution on processor 1 at 10:49 AM
Job 93 arrives and begins execution on processor 1 at 10:51 AM
Job 93 completes execution on processor 1 at 10:51 AM
Job 94 arrives and begins execution on processor 1 at 10:52 AM
Job 94 completes execution on processor 1 at 10:52 AM
Job 95 arrives and begins execution on processor 1 at 10:53 AM
Job 95 arrives and begins execution on processor 2 at 10:53 AM
Job 95 completes execution on processor 1 at 10:53 AM
Job 95 completes execution on processor 2 at 10:53 AM
Job 96 arrives and begins execution on processor 1 at 10:53 AM
Job 96 arrives and begins execution on processor 2 at 10:53 AM
Job 96 completes execution on processor 1 at 10:53 AM
Job 96 completes execution on processor 2 at 10:53 AM
Job 0 arrives and begins execution on processor 2 at 10:53 AM
Job 0 completes execution on processor 2 at 10:53 AM
Job 0 arrives and begins execution on processor 2 at 10:53 AM
Job 0 completes execution on processor 2 at 10:53 AM
Job 0 arrives and begins execution on processor 2 at 10:53 AM
Job 0 completes execution on processor 2 at 10:53 AM
Job 97 arrives and begins execution on processor 1 at 10:54 AM
Job 97 arrives and begins execution on processor 2 at 10:54 AM
Job 97 completes execution on processor 1 at 10:54 AM
Job 97 completes execution on processor 2 at 10:54 AM
Job 0 arrives and begins execution on processor 2 at 10:54 AM
Job 0 completes execution on processor 2 at 10:54 AM
Job 98 arrives and begins execution on processor 1 at 10:54 AM
Job 98 arrives and begins execution on processor 2 at 10:54 AM
Job 98 completes execution on processor 1 at 10:54 AM
Job 98 completes execution on processor 2 at 10:54 AM
Job 99 arrives and begins execution on processor 1 at 10:54 AM
Job 99 arrives and begins execution on processor 2 at 10:54 AM
Job 99 completes execution on processor 1 at 10:54 AM
Job 99 completes execution on processor 2 at 10:54 AM
Job 100 arrives and begins execution on processor 1 at 10:58 AM
Job 100 completes execution on processor 1 at 10:58 AM

Average wait-time in the waiting queue: 00:00:00.000

Average wait-time for all jobs: 00:00:00.000


Press any key ...
```

1hour inter-arrival time; 2sec processing time; 2 processors

C:\Users\user\source\repos\assign2\assign2\bin\Debug\assign2.exe   —   □   ✕

PURPOSE:
This program implements a discrete simulation of processes in a CPU over
a two hour period and returns the average wait-time for jobs that were in
queue to be processed and the average wait-time for all jobs.

Number of processors for the simulation? 2
Mean inter-arrival time (in seconds)? 3600
Mean processing time for jobs (in seconds)? 2
Job 1 arrives and begins execution on processor 1 at 9:53 AM
Job 1 completes execution on processor 1 at 9:53 AM
Job 2 arrives and begins execution on processor 1 at 10:23 AM
Job 2 arrives and begins execution on processor 2 at 10:23 AM
Job 2 completes execution on processor 1 at 10:23 AM
Job 2 completes execution on processor 2 at 10:23 AM

Average wait-time in the waiting queue: 00:00:00.000

Average wait-time for all jobs: 00:00:00.000

Press any key ...

Increasing processing time; constant inter-arrival time and number of processors

1min inter-arrival time; 1ms processing time; 2 processors

```
C:\Users\user\source\repos\assign2\assign2\bin\Debug\assign2.exe                    —    □    ✕

Job 90 arrives and begins execution on processor 1 at 10:40 AM
Job 90 arrives and begins execution on processor 2 at 10:40 AM
Job 90 completes execution on processor 1 at 10:40 AM
Job 90 completes execution on processor 2 at 10:40 AM
Job 91 arrives and begins execution on processor 1 at 10:43 AM
Job 91 completes execution on processor 1 at 10:43 AM
Job 0 arrives and begins execution on processor 2 at 10:43 AM
Job 0 completes execution on processor 2 at 10:43 AM
Job 92 arrives and begins execution on processor 1 at 10:43 AM
Job 92 arrives and begins execution on processor 2 at 10:43 AM
Job 92 completes execution on processor 1 at 10:43 AM
Job 92 completes execution on processor 2 at 10:43 AM
Job 93 arrives and begins execution on processor 1 at 10:43 AM
Job 93 arrives and begins execution on processor 2 at 10:43 AM
Job 93 completes execution on processor 1 at 10:43 AM
Job 93 completes execution on processor 2 at 10:43 AM
Job 94 arrives and begins execution on processor 1 at 10:46 AM
Job 94 completes execution on processor 1 at 10:46 AM
Job 95 arrives and begins execution on processor 1 at 10:48 AM
Job 95 completes execution on processor 1 at 10:48 AM
Job 96 arrives and begins execution on processor 1 at 10:50 AM
Job 96 completes execution on processor 1 at 10:50 AM
Job 0 arrives and begins execution on processor 2 at 10:50 AM
Job 0 completes execution on processor 2 at 10:50 AM
Job 97 arrives and begins execution on processor 1 at 10:51 AM
Job 97 completes execution on processor 1 at 10:51 AM
Job 98 arrives and begins execution on processor 1 at 10:54 AM
Job 98 completes execution on processor 1 at 10:54 AM
Job 0 arrives and begins execution on processor 2 at 10:54 AM
Job 0 completes execution on processor 2 at 10:54 AM
Job 99 arrives and begins execution on processor 1 at 10:55 AM
Job 99 completes execution on processor 1 at 10:55 AM
Job 100 arrives and begins execution on processor 1 at 10:58 AM
Job 100 completes execution on processor 1 at 10:58 AM
Job 101 arrives and begins execution on processor 1 at 10:58 AM
Job 101 arrives and begins execution on processor 2 at 10:58 AM
Job 101 completes execution on processor 1 at 10:58 AM
Job 101 completes execution on processor 2 at 10:58 AM
Job 102 arrives and begins execution on processor 1 at 10:59 AM
Job 102 arrives and begins execution on processor 2 at 10:59 AM
Job 102 completes execution on processor 1 at 10:59 AM
Job 102 completes execution on processor 2 at 10:59 AM
Job 103 arrives and begins execution on processor 1 at 10:59 AM
Job 103 arrives and begins execution on processor 2 at 10:59 AM
Job 103 completes execution on processor 1 at 10:59 AM
Job 103 completes execution on processor 2 at 10:59 AM
Job 104 arrives and begins execution on processor 1 at 10:59 AM
Job 104 arrives and begins execution on processor 2 at 10:59 AM
Job 104 completes execution on processor 1 at 10:59 AM
Job 104 completes execution on processor 2 at 10:59 AM

Average wait-time in the waiting queue: 00:00:00.000

Average wait-time for all jobs: 00:00:00.000


Press any key ...
```

1min inter-arrival time; 1min processing time; 2 processors

C:\Users\user\source\repos\assign2\assign2\bin\Debug\assign2.exe

```
Job 92 arrives and begins execution on processor 1 at 10:36 AM
Job 93 arrives and begins execution on processor 2 at 10:36 AM
Job 93 arrives and is placed in the waiting queue
Job 93 completes execution and Job 93 begins execution on processor 2 at 10:36 AM
Job 93 completes execution on processor 2 at 10:36 AM
Job 94 arrives and begins execution on processor 2 at 10:37 AM
Job 95 arrives and is placed in the waiting queue
Job 95 arrives and is placed in the waiting queue
Job 92 completes execution and Job 95 begins execution on processor 1 at 10:37 AM
Job 95 completes execution and Job 95 begins execution on processor 1 at 10:37 AM
Job 95 completes execution on processor 1 at 10:37 AM
Job 94 completes execution on processor 2 at 10:38 AM
Job 96 arrives and begins execution on processor 1 at 10:38 AM
Job 97 arrives and begins execution on processor 2 at 10:38 AM
Job 97 arrives and is placed in the waiting queue
Job 0 arrives and begins execution on processor 2 at 10:39 AM, pre-empting Job 97
Job 0 completes execution and Job 97 begins execution on processor 2 at 10:39 AM
Job 97 completes execution and Job 97 begins execution on processor 2 at 10:39 AM
Job 97 completes execution on processor 2 at 10:39 AM
Job 96 completes execution on processor 1 at 10:40 AM
Job 98 arrives and begins execution on processor 1 at 10:41 AM
Job 99 arrives and begins execution on processor 2 at 10:42 AM
Job 98 completes execution on processor 1 at 10:43 AM
Job 99 completes execution on processor 2 at 10:43 AM
Job 100 arrives and begins execution on processor 1 at 10:44 AM
Job 100 completes execution on processor 1 at 10:46 AM
Job 101 arrives and begins execution on processor 1 at 10:46 AM
Job 102 arrives and begins execution on processor 2 at 10:47 AM
Job 102 arrives and is placed in the waiting queue
Job 102 completes execution and Job 102 begins execution on processor 2 at 10:47 AM
Job 102 completes execution on processor 2 at 10:48 AM
Job 103 arrives and begins execution on processor 2 at 10:49 AM
Job 101 completes execution on processor 1 at 10:49 AM
Job 104 arrives and begins execution on processor 1 at 10:50 AM
Job 104 completes execution on processor 1 at 10:51 AM
Job 103 completes execution on processor 2 at 10:51 AM
Job 105 arrives and begins execution on processor 1 at 10:52 AM
Job 106 arrives and begins execution on processor 2 at 10:52 AM
Job 106 arrives and is placed in the waiting queue
Job 106 completes execution and Job 106 begins execution on processor 2 at 10:52 AM
Job 107 arrives and is placed in the waiting queue
Job 107 arrives and is placed in the waiting queue
Job 106 completes execution and Job 107 begins execution on processor 2 at 10:53 AM
Job 107 completes execution and Job 107 begins execution on processor 2 at 10:53 AM
Job 107 completes execution on processor 2 at 10:53 AM
Job 105 completes execution on processor 1 at 10:53 AM
Job 108 arrives and begins execution on processor 1 at 10:57 AM
Job 0 arrives and begins execution on processor 2 at 10:57 AM
Job 0 completes execution on processor 2 at 10:57 AM
Job 108 completes execution on processor 1 at 11:02 AM

Average wait-time in the waiting queue: 00:00:17.766

Average wait-time for all jobs: 00:00:07.792


Press any key ...
```

1min inter-arrival time; 15min processing time; 2 processors [HIGH WAIT-TIME]

```
C:\Users\user\source\repos\assign2\assign2\bin\Debug\assign2.exe                      —    □    ✕

Job 76 completes execution and Job 76 begins execution on processor 2 at 7:34 PM
Job 76 completes execution and Job 77 begins execution on processor 2 at 7:35 PM
Job 75 completes execution and Job 78 begins execution on processor 1 at 7:48 PM
Job 77 completes execution and Job 79 begins execution on processor 2 at 8:00 PM
Job 79 completes execution and Job 79 begins execution on processor 2 at 8:02 PM
Job 79 completes execution and Job 80 begins execution on processor 2 at 8:04 PM
Job 78 completes execution and Job 80 begins execution on processor 1 at 8:05 PM
Job 80 completes execution and Job 81 begins execution on processor 2 at 8:06 PM
Job 80 completes execution and Job 82 begins execution on processor 1 at 8:08 PM
Job 81 completes execution and Job 83 begins execution on processor 2 at 8:24 PM
Job 82 completes execution and Job 84 begins execution on processor 1 at 8:32 PM
Job 84 completes execution and Job 84 begins execution on processor 1 at 8:33 PM
Job 84 completes execution and Job 85 begins execution on processor 1 at 8:34 PM
Job 85 completes execution and Job 86 begins execution on processor 1 at 8:46 PM
Job 86 completes execution and Job 86 begins execution on processor 1 at 8:47 PM
Job 86 completes execution and Job 87 begins execution on processor 1 at 8:48 PM
Job 87 completes execution and Job 87 begins execution on processor 1 at 8:50 PM
Job 87 completes execution and Job 88 begins execution on processor 1 at 8:52 PM
Job 88 completes execution and Job 88 begins execution on processor 1 at 8:56 PM
Job 88 completes execution and Job 89 begins execution on processor 1 at 8:59 PM
Job 89 completes execution and Job 89 begins execution on processor 1 at 9:02 PM
Job 89 completes execution and Job 90 begins execution on processor 1 at 9:05 PM
Job 90 completes execution and Job 90 begins execution on processor 1 at 9:07 PM
Job 90 completes execution and Job 22 begins execution on processor 1 at 9:09 PM
Job 22 completes execution and Job 91 begins execution on processor 1 at 9:24 PM
Job 91 completes execution and Job 91 begins execution on processor 1 at 9:26 PM
Job 91 completes execution and Job 92 begins execution on processor 1 at 9:27 PM
Job 83 completes execution and Job 93 begins execution on processor 2 at 9:31 PM
Job 92 completes execution and Job 94 begins execution on processor 1 at 9:38 PM
Job 94 completes execution and Job 94 begins execution on processor 1 at 9:39 PM
Job 94 completes execution and Job 95 begins execution on processor 1 at 9:40 PM
Job 95 completes execution and Job 95 begins execution on processor 1 at 9:42 PM
Job 95 completes execution and Job 96 begins execution on processor 1 at 9:44 PM
Job 96 completes execution and Job 96 begins execution on processor 1 at 9:49 PM
Job 96 completes execution and Job 97 begins execution on processor 1 at 9:53 PM
Job 97 completes execution and Job 98 begins execution on processor 1 at 10:34 PM
Job 93 completes execution and Job 99 begins execution on processor 2 at 11:10 PM
Job 99 completes execution and Job 99 begins execution on processor 2 at 11:14 PM
Job 99 completes execution and Job 23 begins execution on processor 2 at 11:17 PM
Job 23 completes execution and Job 100 begins execution on processor 2 at 11:21 PM
Job 98 completes execution and Job 100 begins execution on processor 1 at 11:23 PM
Job 100 completes execution and Job 101 begins execution on processor 2 at 11:24 PM
Job 101 completes execution and Job 101 begins execution on processor 2 at 11:25 PM
Job 100 completes execution and Job 102 begins execution on processor 1 at 11:26 PM
Job 101 completes execution and Job 102 begins execution on processor 2 at 11:27 PM
Job 102 completes execution and Job 103 begins execution on processor 1 at 11:28 PM
Job 102 completes execution and Job 103 begins execution on processor 2 at 11:28 PM
Job 103 completes execution and Job 104 begins execution on processor 1 at 11:30 PM
Job 103 completes execution on processor 2 at 11:31 PM
Job 104 completes execution on processor 1 at 12:02 AM

Average wait-time in the waiting queue: 06:15:46.103

Average wait-time for all jobs: 06:04:14.504


Press any key ...
```

C:\Users\user\source\repos\assign2\assign2\bin\Debug\assign2.exe

```
Job 67 arrives and is placed in the waiting queue
Job 68 arrives and is placed in the waiting queue
Job 69 arrives and is placed in the waiting queue
Job 69 arrives and is placed in the waiting queue
Job 0 arrives and begins execution on processor 2 at 10:16 AM, pre-empting Job 46
Job 0 completes execution and Job 48 begins execution on processor 2 at 10:16 AM
Job 70 arrives and is placed in the waiting queue
Job 0 arrives and begins execution on processor 2 at 10:18 AM, pre-empting Job 48
Interrupt for processor 2 is ignored at 10:18 AM
Job 0 completes execution and Job 49 begins execution on processor 2 at 10:18 AM
Job 71 arrives and is placed in the waiting queue
Job 71 arrives and is placed in the waiting queue
Job 49 completes execution and Job 49 begins execution on processor 2 at 10:18 AM
Job 49 completes execution and Job 50 begins execution on processor 2 at 10:19 AM
Job 47 completes execution and Job 50 begins execution on processor 1 at 10:19 AM
Job 50 completes execution and Job 51 begins execution on processor 2 at 10:19 AM
Job 50 completes execution and Job 51 begins execution on processor 1 at 10:19 AM
Job 72 arrives and is placed in the waiting queue
Job 51 completes execution and Job 52 begins execution on processor 2 at 10:20 AM
Job 51 completes execution and Job 52 begins execution on processor 1 at 10:20 AM
Job 52 completes execution and Job 53 begins execution on processor 2 at 10:20 AM
Job 52 completes execution and Job 54 begins execution on processor 1 at 10:20 AM
Job 54 completes execution and Job 55 begins execution on processor 1 at 10:24 AM
Job 53 completes execution and Job 55 begins execution on processor 2 at 10:25 AM
Job 55 completes execution and Job 56 begins execution on processor 1 at 10:25 AM
Job 73 arrives and is placed in the waiting queue
Job 74 arrives and is placed in the waiting queue
Job 74 arrives and is placed in the waiting queue
Job 0 arrives and begins execution on processor 2 at 10:25 AM, pre-empting Job 55
Job 0 completes execution and Job 57 begins execution on processor 2 at 10:25 AM
Job 57 completes execution and Job 57 begins execution on processor 2 at 10:26 AM
Job 57 completes execution and Job 40 begins execution on processor 2 at 10:26 AM
Job 75 arrives and is placed in the waiting queue
Job 76 arrives and is placed in the waiting queue
Job 76 arrives and is placed in the waiting queue
Job 40 completes execution and Job 58 begins execution on processor 2 at 10:28 AM
Job 58 completes execution and Job 58 begins execution on processor 2 at 10:28 AM
Job 58 completes execution and Job 59 begins execution on processor 2 at 10:28 AM
Job 77 arrives and is placed in the waiting queue
Job 78 arrives and is placed in the waiting queue
Job 56 completes execution and Job 60 begins execution on processor 1 at 10:30 AM
Job 59 completes execution and Job 61 begins execution on processor 2 at 10:30 AM
Job 79 arrives and is placed in the waiting queue
Job 79 arrives and is placed in the waiting queue
Job 80 arrives and is placed in the waiting queue
Job 61 completes execution and Job 61 begins execution on processor 2 at 10:31 AM
Job 81 arrives and is placed in the waiting queue
Job 81 arrives and is placed in the waiting queue
Job 61 completes execution and Job 62 begins execution on processor 2 at 10:32 AM
Job 82 arrives and is placed in the waiting queue
Job 83 arrives and is placed in the waiting queue
Job 62 completes execution and Job 63 begins execution on processor 2 at 10:35 AM
Job 84 arrives and is placed in the waiting queue
Job 60 completes execution and Job 64 begins execution on processor 1 at 10:37 AM
Job 63 completes execution and Job 65 begins execution on processor 2 at 10:38 AM
Job 85 arrives and is placed in the waiting queue
Job 64 completes execution and Job 66 begins execution on processor 1 at 10:42 AM
Job 86 arrives and is placed in the waiting queue
```

High number of jobs: 200ms inter-arrival time; 100ms processing time; 4 processors

C:\Users\user\source\repos\assign2\assign2\bin\Debug\assign2.exe

```
Job 32497 arrives and is placed in the waiting queue
Job 32496 completes execution and Job 32497 begins execution on processor 3 at 10:59 AM
Job 32496 completes execution and Job 32497 begins execution on processor 2 at 10:59 AM
Job 32497 completes execution and Job 32497 begins execution on processor 4 at 10:59 AM
Job 32497 completes execution on processor 3 at 10:59 AM
Job 32497 completes execution on processor 2 at 10:59 AM
Job 32497 completes execution on processor 4 at 10:59 AM
Job 32498 arrives and begins execution on processor 2 at 10:59 AM
Job 32498 arrives and begins execution on processor 3 at 10:59 AM
Job 32498 arrives and begins execution on processor 4 at 10:59 AM
Job 32498 arrives and is placed in the waiting queue
Job 32494 completes execution and Job 32498 begins execution on processor 1 at 10:59 AM
Job 32498 completes execution on processor 2 at 10:59 AM
Job 32498 completes execution on processor 4 at 10:59 AM
Job 32498 completes execution on processor 3 at 10:59 AM
Job 32498 completes execution on processor 1 at 10:59 AM
Job 32499 arrives and begins execution on processor 1 at 10:59 AM
Job 32500 arrives and begins execution on processor 2 at 10:59 AM
Job 32500 arrives and begins execution on processor 3 at 10:59 AM
Job 32500 arrives and begins execution on processor 4 at 10:59 AM
Job 32500 completes execution on processor 2 at 10:59 AM
Job 32500 completes execution on processor 4 at 10:59 AM
Job 32500 completes execution on processor 3 at 10:59 AM
Job 32499 completes execution on processor 1 at 10:59 AM
Job 32501 arrives and begins execution on processor 1 at 10:59 AM
Job 32501 arrives and begins execution on processor 2 at 10:59 AM
Job 32501 arrives and begins execution on processor 3 at 10:59 AM
Job 32501 completes execution on processor 2 at 10:59 AM
Job 32501 completes execution on processor 3 at 10:59 AM
Job 32501 completes execution on processor 1 at 10:59 AM
Job 32502 arrives and begins execution on processor 1 at 10:59 AM
Job 32502 arrives and begins execution on processor 2 at 10:59 AM
Job 32502 arrives and begins execution on processor 3 at 10:59 AM
Job 32502 arrives and begins execution on processor 4 at 10:59 AM
Job 32502 completes execution on processor 3 at 10:59 AM
Job 32502 completes execution on processor 4 at 10:59 AM
Job 32502 completes execution on processor 1 at 10:59 AM
Job 32502 completes execution on processor 2 at 10:59 AM
Job 32503 arrives and begins execution on processor 1 at 10:59 AM
Job 32503 arrives and begins execution on processor 2 at 10:59 AM
Job 32504 arrives and begins execution on processor 3 at 10:59 AM
Job 32504 arrives and begins execution on processor 4 at 10:59 AM
Job 32504 arrives and is placed in the waiting queue
Job 32504 arrives and is placed in the waiting queue
Job 32504 completes execution and Job 32504 begins execution on processor 3 at 10:59 AM
Job 32504 completes execution and Job 32504 begins execution on processor 4 at 10:59 AM
Job 32504 completes execution on processor 3 at 10:59 AM
Job 32504 completes execution on processor 4 at 10:59 AM
Job 32503 completes execution on processor 1 at 10:59 AM
Job 32503 completes execution on processor 2 at 10:59 AM

Average wait-time in the waiting queue: 00:00:00.004

Average wait-time for all jobs: 00:00:00.000


Press any key ...
```

Input Validation

```
C:\Users\user\source\repos\assign2\assign2\bin\Debug\assign2.exe          —   □   ✕

PURPOSE:
This program implements a discrete simulation of processes in a CPU over
a two hour period and returns the average wait-time for jobs that were in
queue to be processed and the average wait-time for all jobs.

Number of processors for the simulation? 0
Error: The number of processors must be a positive integer.
Enter a positive integer.

Number of processors for the simulation? 0.1
ERROR: Input string was not in a correct format.
Enter a integer.

Number of processors for the simulation? ok
ERROR: Input string was not in a correct format.
Enter a integer.

Number of processors for the simulation? 1
Mean inter-arrival time (in seconds)? 0
Error: The inter-arrival time must be a positive number.

Mean inter-arrival time (in seconds)?
ERROR: Input string was not in a correct format.
Enter a number.

Mean inter-arrival time (in seconds)? -0.1
Error: The inter-arrival time must be a positive number.

Mean inter-arrival time (in seconds)? 0.1
Mean processing time for jobs (in seconds)? Hello
ERROR: Input string was not in a correct format.
Enter a number.

Mean processing time for jobs (in seconds)? 0
Error: The processing time must be a positive number.
Enter a positive number.

Mean processing time for jobs (in seconds)? Help me
ERROR: Input string was not in a correct format.
Enter a number.

Mean processing time for jobs (in seconds)? _
```