

## Assignment 3 Report

In Project 3, students were asked to code a batch scheduler called Aubatch, employing three different scheduling policies: shortest job first (SJF), first come first serve (FCFS), and priority. Various statistics were to be taken based on scheduler performance.

## Compilation Instructions

To compile, in the terminal in the directory where the project resides, type 'make.' The program 'job1.c' is compiled separately because it exists outside of the rest of the system. To compile 'job1.c,' type 'gcc -o job1 job1.c'

## Design and Implementation

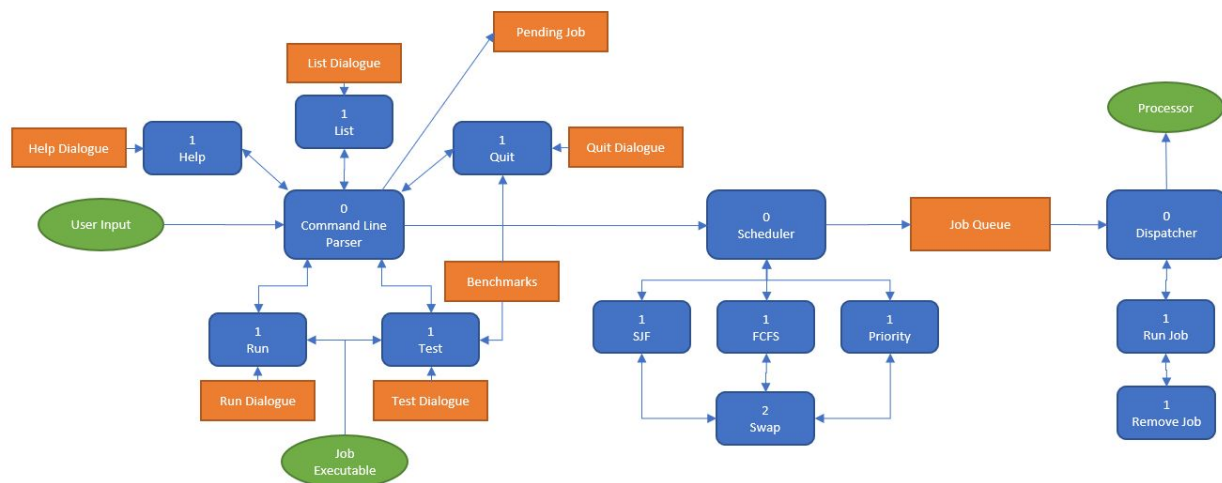


Figure 1: Data Flow Diagram

Figure 1 displays the data flow diagram for the Aubatch system, which was used as a design principle for the entire project. Three threads are run simultaneously, the command line parser accepting user input, providing a UI, and running benchmarks, the scheduler actually scheduling jobs, and the dispatcher running queued jobs.

The five available user commands are 'help,' 'quit,' 'list,' 'run,' and 'test.' Each works according to the specifications inside the project guidelines. When a job is submitted, the scheduler is signaled via conditional variables and told to schedule a job if there is room in the queue. Once scheduled, the dispatcher is signaled to run the job as soon as it can. Statistics are logged for each job and are available on any 'test' or 'quit' input.

The program was written in three .c files and three .h files, found inside the tarball containing the project. Separate compilation was achieved via Makefile.

What follows are specific implementation details, unique to my own project.

### **Quit Implementation**

The 'quit' command was implemented as an immediate quit, interrupting still executing jobs. This was done for convenience and, if given more time, would be implemented with an option to immediately quit or to allow queued jobs to finish running.

### **Throughput Implementation**

Throughput in 'test' commands works based off of actual CPU time taken by queued jobs, but throughput as measured upon a 'quit' call is calculated based on total jobs complete divided by total program runtime, including idle time when there are no jobs queued. I was unsure whether it would be more prudent to calculate throughput based only on CPU time or total time, but the latter was an easier implementation, and since it is possible to get the CPU time throughput via the 'test' command, I figured that my bases were covered.

### **Queue Implementation**

The queue was implemented as a non-circular array. This means that each time a job is submitted, the queue is sorted per the chosen scheduling policy. This method was chosen because it was convenient to code, though in a more taxing system, it could provide slowdown.

### **Input Validation**

The program requires precise input from the user. Undefined behavior results from incorrect input to the program because input validation was a stretch goal that was mostly unreachable.

### **Executable Jobs**

One executable job is provided called 'job1.' This job takes an integer input from the command line if executed on its own. Otherwise it uses input from Aubatch when run by the scheduler. It functions using the sleep() function. Although the specifications asked us to design tasks that did dummy calculations, I was unable to figure out how to approximate the execution time selected via input without using sleep(). For performance benchmarks, sleep() is used in 'job1.c,' but if provided with other job executables, Aubatch can execute jobs with actual calculations.

### **Input/Output**

To demonstrate usage of the program, a script file is contained in the project tarball. This illustrates correct input and output for Aubatch.

### **Performance Metrics**

For testing purposes, several performance metrics were implemented, including average turnaround time, average CPU time, average wait time, and throughput. Average turnaround time was calculated per test by averaging the sum of the finish times minus the arrival times of

each task in the test. Average CPU time is computed by averaging the sum of execution times of each task in the test. Average wait time (since the policies are all non-preemptive) is computed by averaging the sum of the start of execution times minus the arrival times of each task in the test. Throughput is computed by measuring the time the test takes divided by the amount of tasks accomplished.

## Performance Evaluation

For comparison, one test was run for each of the policies. The parameters were held steady. They are shown in Table 1.

**Table 1.** Test conditions

Test Conditions	
Number of Jobs	15
Priority Range	15
Arrival Rate	0.5
Minimum CPU Time	1
Maximum CPU Time	10

Results of the test are shown in Table 2.

**Table 2.** Test results

Test 1 Results (15 tasks per policy)			
	FCFS	SJF	Priority
Ave. Turnaround Time	37.63 sec	30.29 sec	43.03 sec
Ave. CPU Time	4.54 sec	4.94 sec	5.14 sec
Ave. Wait Time	33.09 sec	25.35 sec	37.89 sec
Throughput	0.2203 proc/sec	0.2025 proc/sec	0.1946 sec

To me, it seemed that the small amount of jobs leaves too much random chance inside the job execution time to provide reliable statistics. To remedy this, I elected to test fifty jobs per policy to see a truer comparison of these policies. The results are shown in Table 3.

**Table 3.** Test results

Test 2 Results (50 tasks per policy)
--------------------------------------

	FCFS	SJF	Priority
Ave. Turnaround Time	124.66 sec	94.94 sec	123.29 sec
Ave. CPU Time	4.99 sec	4.99 sec	4.93 sec
Ave. Wait Time	119.67 sec	89.95 sec	118.36 sec
Throughput	0.2006 proc/sec	0.2006 proc/sec	0.2030 proc/sec

These results are more informative. One can see that SJF results in the shortest turnaround and wait times by far. FCFS and SJF policies provide the same throughput while Priority scheduling gives the best throughput. However, this could just be because of the job length distribution, since the average CPU time for this priority test is smaller than FCFS and SJF. This difference could probably be alleviated by tests with more jobs.

These results are still, unfortunately, rather unhelpful. To really understand, one must look at how policies perform on different types of tests. On examining the workload test results as a whole (shown in Appendices A, B, and C), one can see that each of these policies have an area they excel in. When processes arrive in quick succession, SJF performs better. FCFS excels at tasks with small burst times. Priority scheduling is more useful when tasks really have different priorities (as opposed to this random distribution of priorities). It helps to ensure that tasks that need to get done quickly actually do so [1]. As a note, the advantages of priority scheduling were not apparent upon examining test results and had to be researched.

## Lessons Learned

In this project, I learned a lot about C coding. I have never done separate compilation, nor worked with C outside of my first software course at Auburn and COMP 3500. I learned how to use Makefiles and header files, how to use the Pthread library and the 'execv' command. All these lessons are things I look forward to adding to my coding repertoire permanently.

## **Works Cited**

- [1] "Comparison of Scheduling Algorithms." *Study Tonight*. Accessed March 13, 2021.  
<<https://www.studytonight.com/operating-system/comparison-scheduling-algorithms>>

## Appendix A: FCFS Workload Conditions Test Results

Workload Conditions for test:

Priority Range:	0-5
Minimum CPU time:	0.100000
Maximum CPU time:	1.000000
Arrival rates:	0.100000 per second
The total number of jobs submitted:	5
Average turnaround time:	0.01 seconds
Average CPU time:	0.01 seconds
Average waiting time:	0.00 seconds
Throughput:	93.2158 No./second

Workload Conditions for test:

Priority Range:	0-5
Minimum CPU time:	0.500000
Maximum CPU time:	1.000000
Arrival rates:	0.100000 per second
The total number of jobs submitted:	5
Average turnaround time:	0.01 seconds
Average CPU time:	0.01 seconds
Average waiting time:	0.00 seconds
Throughput:	94.8605 No./second

Workload Conditions for test:

Priority Range:	0-5
Minimum CPU time:	1.000000
Maximum CPU time:	10.000000
Arrival rates:	0.100000 per second
The total number of jobs submitted:	5
Average turnaround time:	16.00 seconds
Average CPU time:	5.01 seconds
Average waiting time:	10.99 seconds
Throughput:	0.1998 No./second

Workload Conditions for test:

Priority Range:	0-5
Minimum CPU time:	0.100000
Maximum CPU time:	0.500000
Arrival rates:	0.200000 per second
The total number of jobs submitted:	5
Average turnaround time:	0.01 seconds
Average CPU time:	0.01 seconds
Average waiting time:	0.00 seconds
Throughput:	48.3863 No./second

Workload Conditions for test:

Priority Range:	0-5
Minimum CPU time:	0.100000
Maximum CPU time:	1.000000
Arrival rates:	0.200000 per second
The total number of jobs submitted:	5
Average turnaround time:	0.01 seconds
Average CPU time:	0.01 seconds
Average waiting time:	0.00 seconds
Throughput:	49.3476 No./second

Workload Conditions for test:

Priority Range:	0-5
Minimum CPU time:	0.500000
Maximum CPU time:	1.000000
Arrival rates:	0.200000 per second

The total number of jobs submitted: 5  
Average turnaround time: 0.00 seconds  
Average CPU time: 0.00 seconds  
Average waiting time: 0.00 seconds  
Throughput: 48.9012 No./second

Workload Conditions for test:  
Priority Range: 0-5  
Minimum CPU time: 1.000000  
Maximum CPU time: 10.000000  
Arrival rates: 0.200000 per second  
The total number of jobs submitted: 5  
Average turnaround time: 15.98 seconds  
Average CPU time: 5.41 seconds  
Average waiting time: 10.57 seconds  
Throughput: 0.1850 No./second

Workload Conditions for test:  
Priority Range: 0-5  
Minimum CPU time: 0.100000  
Maximum CPU time: 0.500000  
Arrival rates: 0.500000 per second  
The total number of jobs submitted: 5  
Average turnaround time: 0.01 seconds  
Average CPU time: 0.01 seconds  
Average waiting time: 0.00 seconds  
Throughput: 19.8354 No./second

Workload Conditions for test:  
Priority Range: 0-5  
Minimum CPU time: 0.100000  
Maximum CPU time: 1.000000  
Arrival rates: 0.500000 per second  
The total number of jobs submitted: 5  
Average turnaround time: 0.01 seconds  
Average CPU time: 0.01 seconds  
Average waiting time: 0.00 seconds  
Throughput: 19.8302 No./second

Workload Conditions for test:  
Priority Range: 0-5  
Minimum CPU time: 0.500000  
Maximum CPU time: 1.000000  
Arrival rates: 0.500000 per second  
The total number of jobs submitted: 5  
Average turnaround time: 0.01 seconds  
Average CPU time: 0.01 seconds  
Average waiting time: 0.00 seconds  
Throughput: 19.8220 No./second

Workload Conditions for test:  
Priority Range: 0-5  
Minimum CPU time: 1.000000  
Maximum CPU time: 10.000000  
Arrival rates: 0.500000 per second  
The total number of jobs submitted: 5  
Average turnaround time: 15.92 seconds  
Average CPU time: 4.61 seconds  
Average waiting time: 11.31 seconds  
Throughput: 0.2171 No./second

Workload Conditions for test:  
Priority Range: 0-5

Minimum CPU time: 0.100000  
Maximum CPU time: 0.500000  
Arrival rates: 1.000000 per second  
The total number of jobs submitted: 5  
Average turnaround time: 0.01 seconds  
Average CPU time: 0.01 seconds  
Average waiting time: 0.00 seconds  
Throughput: 9.9738 No./second

Workload Conditions for test:

Priority Range: 0-5  
Minimum CPU time: 0.100000  
Maximum CPU time: 1.000000  
Arrival rates: 1.000000 per second  
The total number of jobs submitted: 5  
Average turnaround time: 0.01 seconds  
Average CPU time: 0.01 seconds  
Average waiting time: 0.00 seconds  
Throughput: 9.9548 No./second

Workload Conditions for test:

Priority Range: 0-5  
Minimum CPU time: 0.500000  
Maximum CPU time: 1.000000  
Arrival rates: 1.000000 per second  
The total number of jobs submitted: 5  
Average turnaround time: 0.01 seconds  
Average CPU time: 0.01 seconds  
Average waiting time: 0.00 seconds  
Throughput: 9.9477 No./second

Workload Conditions for test:

Priority Range: 0-5  
Minimum CPU time: 1.000000  
Maximum CPU time: 10.000000  
Arrival rates: 1.000000 per second  
The total number of jobs submitted: 5  
Average turnaround time: 11.02 seconds  
Average CPU time: 3.61 seconds  
Average waiting time: 7.41 seconds  
Throughput: 0.2773 No./second

Workload Conditions for test:

Priority Range: 0-10  
Minimum CPU time: 0.100000  
Maximum CPU time: 0.500000  
Arrival rates: 0.100000 per second  
The total number of jobs submitted: 10  
Average turnaround time: 0.01 seconds  
Average CPU time: 0.01 seconds  
Average waiting time: 0.00 seconds  
Throughput: 94.0982 No./second

Workload Conditions for test:

Priority Range: 0-10  
Minimum CPU time: 0.100000  
Maximum CPU time: 1.000000  
Arrival rates: 0.100000 per second  
The total number of jobs submitted: 10  
Average turnaround time: 0.01 seconds  
Average CPU time: 0.01 seconds  
Average waiting time: 0.00 seconds  
Throughput: 80.1224 No./second



Workload Conditions for test:  
Priority Range: 0-10  
Minimum CPU time: 0.500000  
Maximum CPU time: 1.000000  
Arrival rates: 0.100000 per second  
The total number of jobs submitted: 10  
Average turnaround time: 0.01 seconds  
Average CPU time: 0.01 seconds  
Average waiting time: 0.00 seconds  
Throughput: 93.0536 No./second

Workload Conditions for test:  
Priority Range: 0-10  
Minimum CPU time: 1.000000  
Maximum CPU time: 10.000000  
Arrival rates: 0.100000 per second  
The total number of jobs submitted: 10  
Average turnaround time: 26.72 seconds  
Average CPU time: 5.21 seconds  
Average waiting time: 21.51 seconds  
Throughput: 0.1920 No./second

Workload Conditions for test:  
Priority Range: 0-10  
Minimum CPU time: 0.100000  
Maximum CPU time: 0.500000  
Arrival rates: 0.200000 per second  
The total number of jobs submitted: 10  
Average turnaround time: 0.01 seconds  
Average CPU time: 0.01 seconds  
Average waiting time: 0.00 seconds  
Throughput: 48.6530 No./second

Workload Conditions for test:  
Priority Range: 0-10  
Minimum CPU time: 0.100000  
Maximum CPU time: 1.000000  
Arrival rates: 0.200000 per second  
The total number of jobs submitted: 10  
Average turnaround time: 0.01 seconds  
Average CPU time: 0.01 seconds  
Average waiting time: 0.00 seconds  
Throughput: 48.9005 No./second

Workload Conditions for test:  
Priority Range: 0-10  
Minimum CPU time: 0.500000  
Maximum CPU time: 1.000000  
Arrival rates: 0.200000 per second  
The total number of jobs submitted: 10  
Average turnaround time: 0.01 seconds  
Average CPU time: 0.01 seconds  
Average waiting time: 0.00 seconds  
Throughput: 48.8119 No./second

Workload Conditions for test:  
Priority Range: 0-10  
Minimum CPU time: 1.000000  
Maximum CPU time: 10.000000  
Arrival rates: 0.200000 per second  
The total number of jobs submitted: 10  
Average turnaround time: 28.34 seconds

Average CPU time: 5.21 seconds  
Average waiting time: 23.14 seconds  
Throughput: 0.1921 No./second

Workload Conditions for test:

Priority Range: 0-10  
Minimum CPU time: 0.100000  
Maximum CPU time: 0.500000  
Arrival rates: 0.500000 per second  
The total number of jobs submitted: 10  
Average turnaround time: 0.01 seconds  
Average CPU time: 0.01 seconds  
Average waiting time: 0.00 seconds  
Throughput: 19.8682 No./second

Workload Conditions for test:

Priority Range: 0-10  
Minimum CPU time: 0.100000  
Maximum CPU time: 1.000000  
Arrival rates: 0.500000 per second  
The total number of jobs submitted: 10  
Average turnaround time: 0.01 seconds  
Average CPU time: 0.01 seconds  
Average waiting time: 0.00 seconds  
Throughput: 19.8634 No./second

Workload Conditions for test:

Priority Range: 0-10  
Minimum CPU time: 0.500000  
Maximum CPU time: 1.000000  
Arrival rates: 0.500000 per second  
The total number of jobs submitted: 10  
Average turnaround time: 0.01 seconds  
Average CPU time: 0.01 seconds  
Average waiting time: 0.00 seconds  
Throughput: 19.8721 No./second

Workload Conditions for test:

Priority Range: 0-10  
Minimum CPU time: 1.000000  
Maximum CPU time: 10.000000  
Arrival rates: 0.500000 per second  
The total number of jobs submitted: 10  
Average turnaround time: 23.41 seconds  
Average CPU time: 4.51 seconds  
Average waiting time: 18.90 seconds  
Throughput: 0.2219 No./second

Workload Conditions for test:

Priority Range: 0-10  
Minimum CPU time: 0.100000  
Maximum CPU time: 0.500000  
Arrival rates: 1.000000 per second  
The total number of jobs submitted: 10  
Average turnaround time: 0.01 seconds  
Average CPU time: 0.01 seconds  
Average waiting time: 0.00 seconds  
Throughput: 9.9508 No./second

Workload Conditions for test:

Priority Range: 0-10  
Minimum CPU time: 0.100000  
Maximum CPU time: 1.000000

Arrival rates: 1.000000 per second  
The total number of jobs submitted: 10  
Average turnaround time: 0.01 seconds  
Average CPU time: 0.01 seconds  
Average waiting time: 0.00 seconds  
Throughput: 9.9582 No./second

Workload Conditions for test:  
Priority Range: 0-10  
Minimum CPU time: 0.500000  
Maximum CPU time: 1.000000  
Arrival rates: 1.000000 per second  
The total number of jobs submitted: 10  
Average turnaround time: 0.01 seconds  
Average CPU time: 0.01 seconds  
Average waiting time: 0.00 seconds  
Throughput: 9.9468 No./second

Workload Conditions for test:  
Priority Range: 0-10  
Minimum CPU time: 1.000000  
Maximum CPU time: 10.000000  
Arrival rates: 1.000000 per second  
The total number of jobs submitted: 10  
Average turnaround time: 31.78 seconds  
Average CPU time: 5.11 seconds  
Average waiting time: 26.68 seconds  
Throughput: 0.1958 No./second

Workload Conditions for test:  
Priority Range: 0-15  
Minimum CPU time: 0.100000  
Maximum CPU time: 0.500000  
Arrival rates: 0.100000 per second  
The total number of jobs submitted: 15  
Average turnaround time: 0.01 seconds  
Average CPU time: 0.01 seconds  
Average waiting time: 0.00 seconds  
Throughput: 94.0203 No./second

Workload Conditions for test:  
Priority Range: 0-15  
Minimum CPU time: 0.100000  
Maximum CPU time: 1.000000  
Arrival rates: 0.100000 per second  
The total number of jobs submitted: 15  
Average turnaround time: 0.01 seconds  
Average CPU time: 0.01 seconds  
Average waiting time: 0.00 seconds  
Throughput: 94.4495 No./second

Workload Conditions for test:  
Priority Range: 0-15  
Minimum CPU time: 0.500000  
Maximum CPU time: 1.000000  
Arrival rates: 0.100000 per second  
The total number of jobs submitted: 15  
Average turnaround time: 0.01 seconds  
Average CPU time: 0.01 seconds  
Average waiting time: 0.00 seconds  
Throughput: 93.4341 No./second

Workload Conditions for test:

Priority Range: 0-15  
Minimum CPU time: 1.000000  
Maximum CPU time: 10.000000  
Arrival rates: 0.100000 per second  
The total number of jobs submitted: 15  
Average turnaround time: 41.84 seconds  
Average CPU time: 5.81 seconds  
Average waiting time: 36.04 seconds  
Throughput: 0.1722 No./second

Workload Conditions for test:

Priority Range: 0-15  
Minimum CPU time: 0.100000  
Maximum CPU time: 0.500000  
Arrival rates: 0.200000 per second  
The total number of jobs submitted: 15  
Average turnaround time: 0.01 seconds  
Average CPU time: 0.01 seconds  
Average waiting time: 0.00 seconds  
Throughput: 48.9443 No./second

Workload Conditions for test:

Priority Range: 0-15  
Minimum CPU time: 0.100000  
Maximum CPU time: 1.000000  
Arrival rates: 0.200000 per second  
The total number of jobs submitted: 15  
Average turnaround time: 0.01 seconds  
Average CPU time: 0.01 seconds  
Average waiting time: 0.00 seconds  
Throughput: 48.7965 No./second

Workload Conditions for test:

Priority Range: 0-15  
Minimum CPU time: 0.500000  
Maximum CPU time: 1.000000  
Arrival rates: 0.200000 per second  
The total number of jobs submitted: 15  
Average turnaround time: 0.01 seconds  
Average CPU time: 0.01 seconds  
Average waiting time: 0.00 seconds  
Throughput: 48.5555 No./second

Workload Conditions for test:

Priority Range: 0-15  
Minimum CPU time: 1.000000  
Maximum CPU time: 10.000000  
Arrival rates: 0.200000 per second  
The total number of jobs submitted: 15  
Average turnaround time: 52.04 seconds  
Average CPU time: 5.94 seconds  
Average waiting time: 46.10 seconds  
Throughput: 0.1684 No./second

Workload Conditions for test:

Priority Range: 0-15  
Minimum CPU time: 0.100000  
Maximum CPU time: 0.500000  
Arrival rates: 0.500000 per second  
The total number of jobs submitted: 15  
Average turnaround time: 0.01 seconds  
Average CPU time: 0.01 seconds  
Average waiting time: 0.00 seconds

Throughput:	19.8234 No./second
Workload Conditions for test:	
Priority Range:	0-15
Minimum CPU time:	0.100000
Maximum CPU time:	1.000000
Arrival rates:	0.500000 per second
The total number of jobs submitted:	15
Average turnaround time:	0.01 seconds
Average CPU time:	0.01 seconds
Average waiting time:	0.00 seconds
Throughput:	19.8313 No./second
Workload Conditions for test:	
Priority Range:	0-15
Minimum CPU time:	0.500000
Maximum CPU time:	1.000000
Arrival rates:	0.500000 per second
The total number of jobs submitted:	15
Average turnaround time:	0.01 seconds
Average CPU time:	0.01 seconds
Average waiting time:	0.00 seconds
Throughput:	19.8205 No./second
Workload Conditions for test:	
Priority Range:	0-15
Minimum CPU time:	1.000000
Maximum CPU time:	10.000000
Arrival rates:	0.500000 per second
The total number of jobs submitted:	15
Average turnaround time:	38.23 seconds
Average CPU time:	4.54 seconds
Average waiting time:	33.69 seconds
Throughput:	0.2203 No./second
Workload Conditions for test:	
Priority Range:	0-15
Minimum CPU time:	0.100000
Maximum CPU time:	0.500000
Arrival rates:	1.000000 per second
The total number of jobs submitted:	15
Average turnaround time:	0.01 seconds
Average CPU time:	0.01 seconds
Average waiting time:	0.00 seconds
Throughput:	9.9524 No./second
Workload Conditions for test:	
Priority Range:	0-15
Minimum CPU time:	0.100000
Maximum CPU time:	1.000000
Arrival rates:	1.000000 per second
The total number of jobs submitted:	15
Average turnaround time:	0.01 seconds
Average CPU time:	0.01 seconds
Average waiting time:	0.00 seconds
Throughput:	9.9642 No./second
Workload Conditions for test:	
Priority Range:	0-15
Minimum CPU time:	0.500000
Maximum CPU time:	1.000000
Arrival rates:	1.000000 per second
The total number of jobs submitted:	15

Average turnaround time: 0.01 seconds  
Average CPU time: 0.01 seconds  
Average waiting time: 0.00 seconds  
Throughput: 9.9629 No./second

Workload Conditions for test:

Priority Range: 0-15  
Minimum CPU time: 1.000000  
Maximum CPU time: 10.000000  
Arrival rates: 1.000000 per second  
The total number of jobs submitted: 15  
Average turnaround time: 39.35 seconds  
Average CPU time: 5.27 seconds  
Average waiting time: 34.07 seconds  
Throughput: 0.1897 No./second

Workload Conditions for test:

Priority Range: 0-20  
Minimum CPU time: 0.100000  
Maximum CPU time: 0.500000  
Arrival rates: 0.100000 per second  
The total number of jobs submitted: 20  
Average turnaround time: 0.01 seconds  
Average CPU time: 0.01 seconds  
Average waiting time: 0.00 seconds  
Throughput: 95.5694 No./second

Workload Conditions for test:

Priority Range: 0-20  
Minimum CPU time: 0.100000  
Maximum CPU time: 1.000000  
Arrival rates: 0.100000 per second  
The total number of jobs submitted: 20  
Average turnaround time: 0.01 seconds  
Average CPU time: 0.01 seconds  
Average waiting time: 0.00 seconds  
Throughput: 95.5749 No./second

Workload Conditions for test:

Priority Range: 0-20  
Minimum CPU time: 0.500000  
Maximum CPU time: 1.000000  
Arrival rates: 0.100000 per second  
The total number of jobs submitted: 20  
Average turnaround time: 0.01 seconds  
Average CPU time: 0.01 seconds  
Average waiting time: 0.00 seconds  
Throughput: 95.2354 No./second

Workload Conditions for test:

Priority Range: 0-20  
Minimum CPU time: 1.000000  
Maximum CPU time: 10.000000  
Arrival rates: 0.100000 per second  
The total number of jobs submitted: 20  
Average turnaround time: 61.22 seconds  
Average CPU time: 5.11 seconds  
Average waiting time: 56.11 seconds  
Throughput: 0.1958 No./second

Workload Conditions for test:

Priority Range: 0-20  
Minimum CPU time: 0.100000

Maximum CPU time: 0.500000  
Arrival rates: 0.200000 per second  
The total number of jobs submitted: 20  
Average turnaround time: 0.01 seconds  
Average CPU time: 0.00 seconds  
Average waiting time: 0.00 seconds  
Throughput: 48.9885 No./second

Workload Conditions for test:

Priority Range: 0-20  
Minimum CPU time: 0.100000  
Maximum CPU time: 1.000000  
Arrival rates: 0.200000 per second  
The total number of jobs submitted: 20  
Average turnaround time: 0.00 seconds  
Average CPU time: 0.00 seconds  
Average waiting time: 0.00 seconds  
Throughput: 48.8704 No./second

Workload Conditions for test:

Priority Range: 0-20  
Minimum CPU time: 0.500000  
Maximum CPU time: 1.000000  
Arrival rates: 0.200000 per second  
The total number of jobs submitted: 20  
Average turnaround time: 0.01 seconds  
Average CPU time: 0.00 seconds  
Average waiting time: 0.00 seconds  
Throughput: 49.0432 No./second

Workload Conditions for test:

Priority Range: 0-20  
Minimum CPU time: 1.000000  
Maximum CPU time: 10.000000  
Arrival rates: 0.200000 per second  
The total number of jobs submitted: 20  
Average turnaround time: 52.37 seconds  
Average CPU time: 5.26 seconds  
Average waiting time: 47.11 seconds  
Throughput: 0.1903 No./second

Workload Conditions for test:

Priority Range: 0-20  
Minimum CPU time: 0.100000  
Maximum CPU time: 0.500000  
Arrival rates: 0.500000 per second  
The total number of jobs submitted: 20  
Average turnaround time: 0.01 seconds  
Average CPU time: 0.01 seconds  
Average waiting time: 0.00 seconds  
Throughput: 19.8711 No./second

Workload Conditions for test:

Priority Range: 0-20  
Minimum CPU time: 0.100000  
Maximum CPU time: 1.000000  
Arrival rates: 0.500000 per second  
The total number of jobs submitted: 20  
Average turnaround time: 0.01 seconds  
Average CPU time: 0.01 seconds  
Average waiting time: 0.00 seconds  
Throughput: 19.8153 No./second

Workload Conditions for test:  
Priority Range: 0-20  
Minimum CPU time: 0.500000  
Maximum CPU time: 1.000000  
Arrival rates: 0.500000 per second  
The total number of jobs submitted: 20  
Average turnaround time: 0.01 seconds  
Average CPU time: 0.01 seconds  
Average waiting time: 0.00 seconds  
Throughput: 19.8469 No./second

Workload Conditions for test:  
Priority Range: 0-20  
Minimum CPU time: 1.000000  
Maximum CPU time: 10.000000  
Arrival rates: 0.500000 per second  
The total number of jobs submitted: 20  
Average turnaround time: 49.08 seconds  
Average CPU time: 4.86 seconds  
Average waiting time: 44.23 seconds  
Throughput: 0.2059 No./second

Workload Conditions for test:  
Priority Range: 0-20  
Minimum CPU time: 0.100000  
Maximum CPU time: 0.500000  
Arrival rates: 1.000000 per second  
The total number of jobs submitted: 20  
Average turnaround time: 0.01 seconds  
Average CPU time: 0.01 seconds  
Average waiting time: 0.00 seconds  
Throughput: 9.9648 No./second

Workload Conditions for test:  
Priority Range: 0-20  
Minimum CPU time: 0.100000  
Maximum CPU time: 1.000000  
Arrival rates: 1.000000 per second  
The total number of jobs submitted: 20  
Average turnaround time: 0.01 seconds  
Average CPU time: 0.01 seconds  
Average waiting time: 0.00 seconds  
Throughput: 9.9529 No./second

Workload Conditions for test:  
Priority Range: 0-20  
Minimum CPU time: 0.500000  
Maximum CPU time: 1.000000  
Arrival rates: 1.000000 per second  
The total number of jobs submitted: 20  
Average turnaround time: 0.01 seconds  
Average CPU time: 0.01 seconds  
Average waiting time: 0.00 seconds  
Throughput: 9.9773 No./second

Workload Conditions for test:  
Priority Range: 0-20  
Minimum CPU time: 1.000000  
Maximum CPU time: 10.000000  
Arrival rates: 1.000000 per second  
The total number of jobs submitted: 20  
Average turnaround time: 47.91 seconds  
Average CPU time: 4.51 seconds



Average waiting time: 43.41 seconds  
Throughput: 0.2219 No./second

Workload Conditions for test:

Priority Range: 0-25  
Minimum CPU time: 0.100000  
Maximum CPU time: 0.500000  
Arrival rates: 0.100000 per second  
The total number of jobs submitted: 25  
Average turnaround time: 0.01 seconds  
Average CPU time: 0.01 seconds  
Average waiting time: 0.00 seconds  
Throughput: 94.7095 No./second

Workload Conditions for test:

Priority Range: 0-25  
Minimum CPU time: 0.100000  
Maximum CPU time: 1.000000  
Arrival rates: 0.100000 per second  
The total number of jobs submitted: 25  
Average turnaround time: 0.01 seconds  
Average CPU time: 0.01 seconds  
Average waiting time: 0.00 seconds  
Throughput: 94.9120 No./second

Workload Conditions for test:

Priority Range: 0-25  
Minimum CPU time: 0.500000  
Maximum CPU time: 1.000000  
Arrival rates: 0.100000 per second  
The total number of jobs submitted: 25  
Average turnaround time: 0.01 seconds  
Average CPU time: 0.01 seconds  
Average waiting time: 0.00 seconds  
Throughput: 94.8792 No./second

Workload Conditions for test:

Priority Range: 0-25  
Minimum CPU time: 1.000000  
Maximum CPU time: 10.000000  
Arrival rates: 0.100000 per second  
The total number of jobs submitted: 25  
Average turnaround time: 66.48 seconds  
Average CPU time: 4.73 seconds  
Average waiting time: 61.75 seconds  
Throughput: 0.2116 No./second

Workload Conditions for test:

Priority Range: 0-25  
Minimum CPU time: 0.100000  
Maximum CPU time: 0.500000  
Arrival rates: 0.200000 per second  
The total number of jobs submitted: 25  
Average turnaround time: 0.01 seconds  
Average CPU time: 0.01 seconds  
Average waiting time: 0.00 seconds  
Throughput: 49.0811 No./second

Workload Conditions for test:

Priority Range: 0-25  
Minimum CPU time: 0.100000  
Maximum CPU time: 1.000000  
Arrival rates: 0.200000 per second

The total number of jobs submitted: 25  
Average turnaround time: 0.00 seconds  
Average CPU time: 0.00 seconds  
Average waiting time: 0.00 seconds  
Throughput: 48.8140 No./second

Workload Conditions for test:  
Priority Range: 0-25  
Minimum CPU time: 0.500000  
Maximum CPU time: 1.000000  
Arrival rates: 0.200000 per second  
The total number of jobs submitted: 25  
Average turnaround time: 0.00 seconds  
Average CPU time: 0.00 seconds  
Average waiting time: 0.00 seconds  
Throughput: 49.0383 No./second

Workload Conditions for test:  
Priority Range: 0-25  
Minimum CPU time: 1.000000  
Maximum CPU time: 10.000000  
Arrival rates: 0.200000 per second  
The total number of jobs submitted: 25  
Average turnaround time: 61.87 seconds  
Average CPU time: 5.05 seconds  
Average waiting time: 56.83 seconds  
Throughput: 0.1982 No./second

Workload Conditions for test:  
Priority Range: 0-25  
Minimum CPU time: 0.100000  
Maximum CPU time: 0.500000  
Arrival rates: 0.500000 per second  
The total number of jobs submitted: 25  
Average turnaround time: 0.01 seconds  
Average CPU time: 0.01 seconds  
Average waiting time: 0.00 seconds  
Throughput: 19.8713 No./second

Workload Conditions for test:  
Priority Range: 0-25  
Minimum CPU time: 0.100000  
Maximum CPU time: 1.000000  
Arrival rates: 0.500000 per second  
The total number of jobs submitted: 25  
Average turnaround time: 0.01 seconds  
Average CPU time: 0.01 seconds  
Average waiting time: 0.00 seconds  
Throughput: 19.8378 No./second

Workload Conditions for test:  
Priority Range: 0-25  
Minimum CPU time: 0.500000  
Maximum CPU time: 1.000000  
Arrival rates: 0.500000 per second  
The total number of jobs submitted: 25  
Average turnaround time: 0.01 seconds  
Average CPU time: 0.01 seconds  
Average waiting time: 0.00 seconds  
Throughput: 19.8760 No./second

Workload Conditions for test:  
Priority Range: 0-25

Minimum CPU time: 1.000000  
Maximum CPU time: 10.000000  
Arrival rates: 0.500000 per second  
The total number of jobs submitted: 25  
Average turnaround time: 58.59 seconds  
Average CPU time: 4.61 seconds  
Average waiting time: 53.99 seconds  
Throughput: 0.2171 No./second

Workload Conditions for test:

Priority Range: 0-25  
Minimum CPU time: 0.100000  
Maximum CPU time: 0.500000  
Arrival rates: 1.000000 per second  
The total number of jobs submitted: 25  
Average turnaround time: 0.01 seconds  
Average CPU time: 0.01 seconds  
Average waiting time: 0.00 seconds  
Throughput: 9.9680 No./second

Workload Conditions for test:

Priority Range: 0-25  
Minimum CPU time: 0.100000  
Maximum CPU time: 1.000000  
Arrival rates: 1.000000 per second  
The total number of jobs submitted: 25  
Average turnaround time: 0.01 seconds  
Average CPU time: 0.01 seconds  
Average waiting time: 0.00 seconds  
Throughput: 9.9573 No./second

Workload Conditions for test:

Priority Range: 0-25  
Minimum CPU time: 0.500000  
Maximum CPU time: 1.000000  
Arrival rates: 1.000000 per second  
The total number of jobs submitted: 25  
Average turnaround time: 0.01 seconds  
Average CPU time: 0.01 seconds  
Average waiting time: 0.00 seconds  
Throughput: 9.9556 No./second

Workload Conditions for test:

Priority Range: 0-25  
Minimum CPU time: 1.000000  
Maximum CPU time: 10.000000  
Arrival rates: 1.000000 per second  
The total number of jobs submitted: 25  
Average turnaround time: 68.28 seconds  
Average CPU time: 5.41 seconds  
Average waiting time: 62.87 seconds  
Throughput: 0.1850 No./second

Workload Conditions for test:

Priority Range: 0-5  
Minimum CPU time: 0.100000  
Maximum CPU time: 0.500000  
Arrival rates: 0.100000 per second  
The total number of jobs submitted: 5  
Average turnaround time: 0.01 seconds  
Average CPU time: 0.01 seconds  
Average waiting time: 0.00 seconds  
Throughput: 94.1389 No./second

Workload Conditions for test:

Priority Range:	0-5
Minimum CPU time:	0.100000
Maximum CPU time:	1.000000
Arrival rates:	0.100000 per second
The total number of jobs submitted:	5
Average turnaround time:	0.01 seconds
Average CPU time:	0.01 seconds
Average waiting time:	0.00 seconds
Throughput:	93.3829 No./second

Workload Conditions for test:

Priority Range:	0-5
Minimum CPU time:	0.500000
Maximum CPU time:	1.000000
Arrival rates:	0.100000 per second
The total number of jobs submitted:	5
Average turnaround time:	0.01 seconds
Average CPU time:	0.01 seconds
Average waiting time:	0.00 seconds
Throughput:	94.6038 No./second

## Appendix B: SJF Workload Conditions Test Results

### Workload Conditions for test:

Priority Range:	0-5
Minimum CPU time:	0.100000
Maximum CPU time:	0.500000
Arrival rates:	0.100000 per second
The total number of jobs submitted:	5
Average turnaround time:	0.01 seconds
Average CPU time:	0.01 seconds
Average waiting time:	0.00 seconds
Throughput:	92.8453 No./second

### Workload Conditions for test:

Priority Range:	0-5
Minimum CPU time:	0.100000
Maximum CPU time:	1.000000
Arrival rates:	0.100000 per second
The total number of jobs submitted:	5
Average turnaround time:	0.01 seconds
Average CPU time:	0.01 seconds
Average waiting time:	0.00 seconds
Throughput:	93.5576 No./second

### Workload Conditions for test:

Priority Range:	0-5
Minimum CPU time:	0.500000
Maximum CPU time:	1.000000
Arrival rates:	0.100000 per second
The total number of jobs submitted:	5
Average turnaround time:	0.01 seconds
Average CPU time:	0.01 seconds
Average waiting time:	0.00 seconds
Throughput:	94.5358 No./second

### Workload Conditions for test:

Priority Range:	0-5
Minimum CPU time:	1.000000
Maximum CPU time:	10.000000
Arrival rates:	0.100000 per second
The total number of jobs submitted:	5
Average turnaround time:	14.00 seconds
Average CPU time:	5.01 seconds
Average waiting time:	9.00 seconds
Throughput:	0.1997 No./second

### Workload Conditions for test:

Priority Range:	0-5
Minimum CPU time:	0.100000
Maximum CPU time:	0.500000
Arrival rates:	0.200000 per second
The total number of jobs submitted:	5
Average turnaround time:	0.01 seconds
Average CPU time:	0.01 seconds
Average waiting time:	0.00 seconds
Throughput:	49.0451 No./second

### Workload Conditions for test:

Priority Range:	0-5
Minimum CPU time:	0.100000
Maximum CPU time:	1.000000
Arrival rates:	0.200000 per second

The total number of jobs submitted: 5  
Average turnaround time: 0.01 seconds  
Average CPU time: 0.01 seconds  
Average waiting time: 0.00 seconds  
Throughput: 48.6145 No./second

Workload Conditions for test:

Priority Range: 0-5  
Minimum CPU time: 0.500000  
Maximum CPU time: 1.000000  
Arrival rates: 0.200000 per second  
The total number of jobs submitted: 5  
Average turnaround time: 0.01 seconds  
Average CPU time: 0.01 seconds  
Average waiting time: 0.00 seconds  
Throughput: 48.7420 No./second

Workload Conditions for test:

Priority Range: 0-5  
Minimum CPU time: 1.000000  
Maximum CPU time: 10.000000  
Arrival rates: 0.200000 per second  
The total number of jobs submitted: 5  
Average turnaround time: 13.98 seconds  
Average CPU time: 5.41 seconds  
Average waiting time: 8.57 seconds  
Throughput: 0.1849 No./second

Workload Conditions for test:

Priority Range: 0-5  
Minimum CPU time: 0.100000  
Maximum CPU time: 0.500000  
Arrival rates: 0.500000 per second  
The total number of jobs submitted: 5  
Average turnaround time: 0.01 seconds  
Average CPU time: 0.01 seconds  
Average waiting time: 0.00 seconds  
Throughput: 19.7650 No./second

Workload Conditions for test:

Priority Range: 0-5  
Minimum CPU time: 0.100000  
Maximum CPU time: 1.000000  
Arrival rates: 0.500000 per second  
The total number of jobs submitted: 5  
Average turnaround time: 0.01 seconds  
Average CPU time: 0.01 seconds  
Average waiting time: 0.00 seconds  
Throughput: 19.6785 No./second

Workload Conditions for test:

Priority Range: 0-5  
Minimum CPU time: 0.500000  
Maximum CPU time: 1.000000  
Arrival rates: 0.500000 per second  
The total number of jobs submitted: 5  
Average turnaround time: 0.01 seconds  
Average CPU time: 0.01 seconds  
Average waiting time: 0.00 seconds  
Throughput: 19.8833 No./second

Workload Conditions for test:

Priority Range: 0-5

Minimum CPU time: 1.000000  
Maximum CPU time: 10.000000  
Arrival rates: 0.500000 per second  
The total number of jobs submitted: 5  
Average turnaround time: 13.92 seconds  
Average CPU time: 4.61 seconds  
Average waiting time: 9.32 seconds  
Throughput: 0.2170 No./second

Workload Conditions for test:

Priority Range: 0-5  
Minimum CPU time: 0.100000  
Maximum CPU time: 0.500000  
Arrival rates: 1.000000 per second  
The total number of jobs submitted: 5  
Average turnaround time: 0.01 seconds  
Average CPU time: 0.01 seconds  
Average waiting time: 0.00 seconds  
Throughput: 9.9561 No./second

Workload Conditions for test:

Priority Range: 0-5  
Minimum CPU time: 0.100000  
Maximum CPU time: 1.000000  
Arrival rates: 1.000000 per second  
The total number of jobs submitted: 5  
Average turnaround time: 0.01 seconds  
Average CPU time: 0.01 seconds  
Average waiting time: 0.00 seconds  
Throughput: 9.9793 No./second

Workload Conditions for test:

Priority Range: 0-5  
Minimum CPU time: 0.500000  
Maximum CPU time: 1.000000  
Arrival rates: 1.000000 per second  
The total number of jobs submitted: 5  
Average turnaround time: 0.01 seconds  
Average CPU time: 0.01 seconds  
Average waiting time: 0.00 seconds  
Throughput: 9.9723 No./second

Workload Conditions for test:

Priority Range: 0-5  
Minimum CPU time: 1.000000  
Maximum CPU time: 10.000000  
Arrival rates: 1.000000 per second  
The total number of jobs submitted: 5  
Average turnaround time: 10.22 seconds  
Average CPU time: 3.61 seconds  
Average waiting time: 6.61 seconds  
Throughput: 0.2772 No./second

Workload Conditions for test:

Priority Range: 0-10  
Minimum CPU time: 0.100000  
Maximum CPU time: 0.500000  
Arrival rates: 0.100000 per second  
The total number of jobs submitted: 10  
Average turnaround time: 0.01 seconds  
Average CPU time: 0.01 seconds  
Average waiting time: 0.00 seconds  
Throughput: 93.0224 No./second

Workload Conditions for test:  
Priority Range: 0-10  
Minimum CPU time: 0.100000  
Maximum CPU time: 1.000000  
Arrival rates: 0.100000 per second  
The total number of jobs submitted: 10  
Average turnaround time: 0.01 seconds  
Average CPU time: 0.01 seconds  
Average waiting time: 0.00 seconds  
Throughput: 92.3284 No./second

Workload Conditions for test:  
Priority Range: 0-10  
Minimum CPU time: 0.500000  
Maximum CPU time: 1.000000  
Arrival rates: 0.100000 per second  
The total number of jobs submitted: 10  
Average turnaround time: 0.01 seconds  
Average CPU time: 0.01 seconds  
Average waiting time: 0.00 seconds  
Throughput: 91.3534 No./second

Workload Conditions for test:  
Priority Range: 0-10  
Minimum CPU time: 1.000000  
Maximum CPU time: 10.000000  
Arrival rates: 0.100000 per second  
The total number of jobs submitted: 10  
Average turnaround time: 23.20 seconds  
Average CPU time: 5.21 seconds  
Average waiting time: 17.99 seconds  
Throughput: 0.1920 No./second

Workload Conditions for test:  
Priority Range: 0-10  
Minimum CPU time: 0.100000  
Maximum CPU time: 0.500000  
Arrival rates: 0.200000 per second  
The total number of jobs submitted: 10  
Average turnaround time: 0.01 seconds  
Average CPU time: 0.01 seconds  
Average waiting time: 0.00 seconds  
Throughput: 47.9437 No./second

Workload Conditions for test:  
Priority Range: 0-10  
Minimum CPU time: 0.100000  
Maximum CPU time: 1.000000  
Arrival rates: 0.200000 per second  
The total number of jobs submitted: 10  
Average turnaround time: 0.01 seconds  
Average CPU time: 0.01 seconds  
Average waiting time: 0.00 seconds  
Throughput: 47.8572 No./second

Workload Conditions for test:  
Priority Range: 0-10  
Minimum CPU time: 0.500000  
Maximum CPU time: 1.000000  
Arrival rates: 0.200000 per second  
The total number of jobs submitted: 10  
Average turnaround time: 0.01 seconds



Average CPU time: 0.01 seconds  
Average waiting time: 0.00 seconds  
Throughput: 47.9704 No./second

Workload Conditions for test:

Priority Range: 0-10  
Minimum CPU time: 1.000000  
Maximum CPU time: 10.000000  
Arrival rates: 0.200000 per second  
The total number of jobs submitted: 10  
Average turnaround time: 22.35 seconds  
Average CPU time: 5.21 seconds  
Average waiting time: 17.15 seconds  
Throughput: 0.1920 No./second

Workload Conditions for test:

Priority Range: 0-10  
Minimum CPU time: 0.100000  
Maximum CPU time: 0.500000  
Arrival rates: 0.500000 per second  
The total number of jobs submitted: 10  
Average turnaround time: 0.01 seconds  
Average CPU time: 0.01 seconds  
Average waiting time: 0.00 seconds  
Throughput: 19.8176 No./second

Workload Conditions for test:

Priority Range: 0-10  
Minimum CPU time: 0.100000  
Maximum CPU time: 1.000000  
Arrival rates: 0.500000 per second  
The total number of jobs submitted: 10  
Average turnaround time: 0.01 seconds  
Average CPU time: 0.01 seconds  
Average waiting time: 0.00 seconds  
Throughput: 19.8139 No./second

Workload Conditions for test:

Priority Range: 0-10  
Minimum CPU time: 0.500000  
Maximum CPU time: 1.000000  
Arrival rates: 0.500000 per second  
The total number of jobs submitted: 10  
Average turnaround time: 0.01 seconds  
Average CPU time: 0.01 seconds  
Average waiting time: 0.00 seconds  
Throughput: 19.8450 No./second

Workload Conditions for test:

Priority Range: 0-10  
Minimum CPU time: 1.000000  
Maximum CPU time: 10.000000  
Arrival rates: 0.500000 per second  
The total number of jobs submitted: 10  
Average turnaround time: 15.92 seconds  
Average CPU time: 4.51 seconds  
Average waiting time: 11.41 seconds  
Throughput: 0.2218 No./second

Workload Conditions for test:

Priority Range: 0-10  
Minimum CPU time: 0.100000  
Maximum CPU time: 0.500000

Arrival rates: 1.000000 per second  
The total number of jobs submitted: 10  
Average turnaround time: 0.01 seconds  
Average CPU time: 0.01 seconds  
Average waiting time: 0.00 seconds  
Throughput: 9.9613 No./second

Workload Conditions for test:  
Priority Range: 0-10  
Minimum CPU time: 0.100000  
Maximum CPU time: 1.000000  
Arrival rates: 1.000000 per second  
The total number of jobs submitted: 10  
Average turnaround time: 0.01 seconds  
Average CPU time: 0.01 seconds  
Average waiting time: 0.00 seconds  
Throughput: 9.9627 No./second

Workload Conditions for test:  
Priority Range: 0-10  
Minimum CPU time: 0.500000  
Maximum CPU time: 1.000000  
Arrival rates: 1.000000 per second  
The total number of jobs submitted: 10  
Average turnaround time: 0.01 seconds  
Average CPU time: 0.01 seconds  
Average waiting time: 0.00 seconds  
Throughput: 9.9623 No./second

Workload Conditions for test:  
Priority Range: 0-10  
Minimum CPU time: 1.000000  
Maximum CPU time: 10.000000  
Arrival rates: 1.000000 per second  
The total number of jobs submitted: 10  
Average turnaround time: 23.79 seconds  
Average CPU time: 5.11 seconds  
Average waiting time: 18.69 seconds  
Throughput: 0.1958 No./second

Workload Conditions for test:  
Priority Range: 0-15  
Minimum CPU time: 0.100000  
Maximum CPU time: 0.500000  
Arrival rates: 0.100000 per second  
The total number of jobs submitted: 15  
Average turnaround time: 0.01 seconds  
Average CPU time: 0.01 seconds  
Average waiting time: 0.00 seconds  
Throughput: 91.7588 No./second

Workload Conditions for test:  
Priority Range: 0-15  
Minimum CPU time: 0.100000  
Maximum CPU time: 1.000000  
Arrival rates: 0.100000 per second  
The total number of jobs submitted: 15  
Average turnaround time: 0.01 seconds  
Average CPU time: 0.01 seconds  
Average waiting time: 0.00 seconds  
Throughput: 94.3835 No./second

Workload Conditions for test:

Priority Range: 0-15  
Minimum CPU time: 0.500000  
Maximum CPU time: 1.000000  
Arrival rates: 0.100000 per second  
The total number of jobs submitted: 15  
Average turnaround time: 0.01 seconds  
Average CPU time: 0.01 seconds  
Average waiting time: 0.00 seconds  
Throughput: 93.4003 No./second

Workload Conditions for test:

Priority Range: 0-15  
Minimum CPU time: 1.000000  
Maximum CPU time: 10.000000  
Arrival rates: 0.100000 per second  
The total number of jobs submitted: 15  
Average turnaround time: 34.53 seconds  
Average CPU time: 5.81 seconds  
Average waiting time: 28.72 seconds  
Throughput: 0.1722 No./second

Workload Conditions for test:

Priority Range: 0-15  
Minimum CPU time: 0.100000  
Maximum CPU time: 0.500000  
Arrival rates: 0.200000 per second  
The total number of jobs submitted: 15  
Average turnaround time: 0.01 seconds  
Average CPU time: 0.01 seconds  
Average waiting time: 0.00 seconds  
Throughput: 47.9239 No./second

Workload Conditions for test:

Priority Range: 0-15  
Minimum CPU time: 0.100000  
Maximum CPU time: 1.000000  
Arrival rates: 0.200000 per second  
The total number of jobs submitted: 15  
Average turnaround time: 0.01 seconds  
Average CPU time: 0.01 seconds  
Average waiting time: 0.00 seconds  
Throughput: 47.8229 No./second

Workload Conditions for test:

Priority Range: 0-15  
Minimum CPU time: 0.500000  
Maximum CPU time: 1.000000  
Arrival rates: 0.200000 per second  
The total number of jobs submitted: 15  
Average turnaround time: 0.01 seconds  
Average CPU time: 0.01 seconds  
Average waiting time: 0.00 seconds  
Throughput: 47.7406 No./second

Workload Conditions for test:

Priority Range: 0-15  
Minimum CPU time: 1.000000  
Maximum CPU time: 10.000000  
Arrival rates: 0.200000 per second  
The total number of jobs submitted: 15  
Average turnaround time: 38.32 seconds  
Average CPU time: 5.94 seconds  
Average waiting time: 32.38 seconds

Throughput: 0.1683 No./second

Workload Conditions for test:

Priority Range:	0-15
Minimum CPU time:	0.100000
Maximum CPU time:	0.500000
Arrival rates:	0.500000 per second
The total number of jobs submitted:	15
Average turnaround time:	0.01 seconds
Average CPU time:	0.01 seconds
Average waiting time:	0.00 seconds
Throughput:	19.6639 No./second

Workload Conditions for test:

Priority Range:	0-15
Minimum CPU time:	0.100000
Maximum CPU time:	1.000000
Arrival rates:	0.500000 per second
The total number of jobs submitted:	15
Average turnaround time:	0.01 seconds
Average CPU time:	0.01 seconds
Average waiting time:	0.00 seconds
Throughput:	19.6782 No./second

Workload Conditions for test:

Priority Range:	0-15
Minimum CPU time:	0.500000
Maximum CPU time:	1.000000
Arrival rates:	0.500000 per second
The total number of jobs submitted:	15
Average turnaround time:	0.01 seconds
Average CPU time:	0.01 seconds
Average waiting time:	0.00 seconds
Throughput:	19.6785 No./second

Workload Conditions for test:

Priority Range:	0-15
Minimum CPU time:	1.000000
Maximum CPU time:	10.000000
Arrival rates:	0.500000 per second
The total number of jobs submitted:	15
Average turnaround time:	25.65 seconds
Average CPU time:	4.54 seconds
Average waiting time:	21.10 seconds
Throughput:	0.2202 No./second

Workload Conditions for test:

Priority Range:	0-15
Minimum CPU time:	0.100000
Maximum CPU time:	0.500000
Arrival rates:	1.000000 per second
The total number of jobs submitted:	15
Average turnaround time:	0.01 seconds
Average CPU time:	0.01 seconds
Average waiting time:	0.00 seconds
Throughput:	9.9385 No./second

Workload Conditions for test:

Priority Range:	0-15
Minimum CPU time:	0.100000
Maximum CPU time:	1.000000
Arrival rates:	1.000000 per second
The total number of jobs submitted:	15

Average turnaround time: 0.01 seconds  
Average CPU time: 0.01 seconds  
Average waiting time: 0.00 seconds  
Throughput: 9.9320 No./second

Workload Conditions for test:

Priority Range: 0-15  
Minimum CPU time: 0.500000  
Maximum CPU time: 1.000000  
Arrival rates: 1.000000 per second  
The total number of jobs submitted: 15  
Average turnaround time: 0.01 seconds  
Average CPU time: 0.01 seconds  
Average waiting time: 0.00 seconds  
Throughput: 9.9311 No./second

Workload Conditions for test:

Priority Range: 0-15  
Minimum CPU time: 1.000000  
Maximum CPU time: 10.000000  
Arrival rates: 1.000000 per second  
The total number of jobs submitted: 15  
Average turnaround time: 32.50 seconds  
Average CPU time: 5.28 seconds  
Average waiting time: 27.22 seconds  
Throughput: 0.1896 No./second

Workload Conditions for test:

Priority Range: 0-20  
Minimum CPU time: 0.100000  
Maximum CPU time: 0.500000  
Arrival rates: 0.100000 per second  
The total number of jobs submitted: 20  
Average turnaround time: 0.01 seconds  
Average CPU time: 0.01 seconds  
Average waiting time: 0.00 seconds  
Throughput: 93.3567 No./second

Workload Conditions for test:

Priority Range: 0-20  
Minimum CPU time: 0.100000  
Maximum CPU time: 1.000000  
Arrival rates: 0.100000 per second  
The total number of jobs submitted: 20  
Average turnaround time: 0.01 seconds  
Average CPU time: 0.01 seconds  
Average waiting time: 0.00 seconds  
Throughput: 92.1184 No./second

Workload Conditions for test:

Priority Range: 0-20  
Minimum CPU time: 0.500000  
Maximum CPU time: 1.000000  
Arrival rates: 0.100000 per second  
The total number of jobs submitted: 20  
Average turnaround time: 0.01 seconds  
Average CPU time: 0.01 seconds  
Average waiting time: 0.00 seconds  
Throughput: 93.4287 No./second

Workload Conditions for test:

Priority Range: 0-20  
Minimum CPU time: 1.000000

Maximum CPU time: 10.000000  
Arrival rates: 0.100000 per second  
The total number of jobs submitted: 20  
Average turnaround time: 41.89 seconds  
Average CPU time: 5.11 seconds  
Average waiting time: 36.78 seconds  
Throughput: 0.1958 No./second

Workload Conditions for test:

Priority Range: 0-20  
Minimum CPU time: 0.100000  
Maximum CPU time: 0.500000  
Arrival rates: 0.200000 per second  
The total number of jobs submitted: 20  
Average turnaround time: 0.01 seconds  
Average CPU time: 0.01 seconds  
Average waiting time: 0.00 seconds  
Throughput: 48.6401 No./second

Workload Conditions for test:

Priority Range: 0-20  
Minimum CPU time: 0.100000  
Maximum CPU time: 1.000000  
Arrival rates: 0.200000 per second  
The total number of jobs submitted: 20  
Average turnaround time: 0.01 seconds  
Average CPU time: 0.01 seconds  
Average waiting time: 0.00 seconds  
Throughput: 48.6946 No./second

Workload Conditions for test:

Priority Range: 0-20  
Minimum CPU time: 0.500000  
Maximum CPU time: 1.000000  
Arrival rates: 0.200000 per second  
The total number of jobs submitted: 20  
Average turnaround time: 0.01 seconds  
Average CPU time: 0.01 seconds  
Average waiting time: 0.00 seconds  
Throughput: 48.3189 No./second

Workload Conditions for test:

Priority Range: 0-20  
Minimum CPU time: 1.000000  
Maximum CPU time: 10.000000  
Arrival rates: 0.200000 per second  
The total number of jobs submitted: 20  
Average turnaround time: 39.54 seconds  
Average CPU time: 5.26 seconds  
Average waiting time: 34.28 seconds  
Throughput: 0.1902 No./second

Workload Conditions for test:

Priority Range: 0-20  
Minimum CPU time: 0.100000  
Maximum CPU time: 0.500000  
Arrival rates: 0.500000 per second  
The total number of jobs submitted: 20  
Average turnaround time: 0.01 seconds  
Average CPU time: 0.01 seconds  
Average waiting time: 0.00 seconds  
Throughput: 19.8480 No./second

Workload Conditions for test:  
Priority Range: 0-20  
Minimum CPU time: 0.100000  
Maximum CPU time: 1.000000  
Arrival rates: 0.500000 per second  
The total number of jobs submitted: 20  
Average turnaround time: 0.01 seconds  
Average CPU time: 0.01 seconds  
Average waiting time: 0.00 seconds  
Throughput: 19.8617 No./second

Workload Conditions for test:  
Priority Range: 0-20  
Minimum CPU time: 0.500000  
Maximum CPU time: 1.000000  
Arrival rates: 0.500000 per second  
The total number of jobs submitted: 20  
Average turnaround time: 0.01 seconds  
Average CPU time: 0.01 seconds  
Average waiting time: 0.00 seconds  
Throughput: 19.8351 No./second

Workload Conditions for test:  
Priority Range: 0-20  
Minimum CPU time: 1.000000  
Maximum CPU time: 10.000000  
Arrival rates: 0.500000 per second  
The total number of jobs submitted: 20  
Average turnaround time: 35.56 seconds  
Average CPU time: 4.86 seconds  
Average waiting time: 30.70 seconds  
Throughput: 0.2058 No./second

Workload Conditions for test:  
Priority Range: 0-20  
Minimum CPU time: 0.100000  
Maximum CPU time: 0.500000  
Arrival rates: 1.000000 per second  
The total number of jobs submitted: 20  
Average turnaround time: 0.01 seconds  
Average CPU time: 0.01 seconds  
Average waiting time: 0.00 seconds  
Throughput: 9.9660 No./second

Workload Conditions for test:  
Priority Range: 0-20  
Minimum CPU time: 0.100000  
Maximum CPU time: 1.000000  
Arrival rates: 1.000000 per second  
The total number of jobs submitted: 20  
Average turnaround time: 0.01 seconds  
Average CPU time: 0.01 seconds  
Average waiting time: 0.00 seconds  
Throughput: 9.9666 No./second

Workload Conditions for test:  
Priority Range: 0-20  
Minimum CPU time: 0.500000  
Maximum CPU time: 1.000000  
Arrival rates: 1.000000 per second  
The total number of jobs submitted: 20  
Average turnaround time: 0.01 seconds  
Average CPU time: 0.01 seconds

Average waiting time: 0.00 seconds  
Throughput: 9.9646 No./second

Workload Conditions for test:

Priority Range: 0-20  
Minimum CPU time: 1.000000  
Maximum CPU time: 10.000000  
Arrival rates: 1.000000 per second  
The total number of jobs submitted: 20  
Average turnaround time: 34.98 seconds  
Average CPU time: 4.51 seconds  
Average waiting time: 30.48 seconds  
Throughput: 0.2218 No./second

Workload Conditions for test:

Priority Range: 0-25  
Minimum CPU time: 0.100000  
Maximum CPU time: 0.500000  
Arrival rates: 0.100000 per second  
The total number of jobs submitted: 25  
Average turnaround time: 0.01 seconds  
Average CPU time: 0.01 seconds  
Average waiting time: 0.00 seconds  
Throughput: 93.8826 No./second

Workload Conditions for test:

Priority Range: 0-25  
Minimum CPU time: 0.100000  
Maximum CPU time: 1.000000  
Arrival rates: 0.100000 per second  
The total number of jobs submitted: 25  
Average turnaround time: 0.01 seconds  
Average CPU time: 0.01 seconds  
Average waiting time: 0.00 seconds  
Throughput: 95.3318 No./second

Workload Conditions for test:

Priority Range: 0-25  
Minimum CPU time: 0.500000  
Maximum CPU time: 1.000000  
Arrival rates: 0.100000 per second  
The total number of jobs submitted: 25  
Average turnaround time: 0.01 seconds  
Average CPU time: 0.01 seconds  
Average waiting time: 0.00 seconds  
Throughput: 94.8551 No./second

Workload Conditions for test:

Priority Range: 0-25  
Minimum CPU time: 1.000000  
Maximum CPU time: 10.000000  
Arrival rates: 0.100000 per second  
The total number of jobs submitted: 25  
Average turnaround time: 43.18 seconds  
Average CPU time: 4.73 seconds  
Average waiting time: 38.45 seconds  
Throughput: 0.2115 No./second

Workload Conditions for test:

Priority Range: 0-25  
Minimum CPU time: 0.100000  
Maximum CPU time: 0.500000  
Arrival rates: 0.200000 per second



The total number of jobs submitted: 25  
Average turnaround time: 0.01 seconds  
Average CPU time: 0.01 seconds  
Average waiting time: 0.00 seconds  
Throughput: 48.4298 No./second

Workload Conditions for test:

Priority Range: 0-25  
Minimum CPU time: 0.100000  
Maximum CPU time: 1.000000  
Arrival rates: 0.200000 per second  
The total number of jobs submitted: 25  
Average turnaround time: 0.01 seconds  
Average CPU time: 0.01 seconds  
Average waiting time: 0.00 seconds  
Throughput: 48.4181 No./second

Workload Conditions for test:

Priority Range: 0-25  
Minimum CPU time: 0.500000  
Maximum CPU time: 1.000000  
Arrival rates: 0.200000 per second  
The total number of jobs submitted: 25  
Average turnaround time: 0.01 seconds  
Average CPU time: 0.01 seconds  
Average waiting time: 0.00 seconds  
Throughput: 48.7974 No./second

Workload Conditions for test:

Priority Range: 0-25  
Minimum CPU time: 1.000000  
Maximum CPU time: 10.000000  
Arrival rates: 0.200000 per second  
The total number of jobs submitted: 25  
Average turnaround time: 47.38 seconds  
Average CPU time: 5.05 seconds  
Average waiting time: 42.34 seconds  
Throughput: 0.1981 No./second

Workload Conditions for test:

Priority Range: 0-25  
Minimum CPU time: 0.100000  
Maximum CPU time: 0.500000  
Arrival rates: 0.500000 per second  
The total number of jobs submitted: 25  
Average turnaround time: 0.01 seconds  
Average CPU time: 0.01 seconds  
Average waiting time: 0.00 seconds  
Throughput: 19.8059 No./second

Workload Conditions for test:

Priority Range: 0-25  
Minimum CPU time: 0.100000  
Maximum CPU time: 1.000000  
Arrival rates: 0.500000 per second  
The total number of jobs submitted: 25  
Average turnaround time: 0.01 seconds  
Average CPU time: 0.01 seconds  
Average waiting time: 0.00 seconds  
Throughput: 19.8318 No./second

Workload Conditions for test:

Priority Range: 0-25

Minimum CPU time: 0.500000  
Maximum CPU time: 1.000000  
Arrival rates: 0.500000 per second  
The total number of jobs submitted: 25  
Average turnaround time: 0.01 seconds  
Average CPU time: 0.01 seconds  
Average waiting time: 0.00 seconds  
Throughput: 19.8519 No./second

Workload Conditions for test:

Priority Range: 0-25  
Minimum CPU time: 1.000000  
Maximum CPU time: 10.000000  
Arrival rates: 0.500000 per second  
The total number of jobs submitted: 25  
Average turnaround time: 45.50 seconds  
Average CPU time: 4.61 seconds  
Average waiting time: 40.89 seconds  
Throughput: 0.2170 No./second

Workload Conditions for test:

Priority Range: 0-25  
Minimum CPU time: 0.100000  
Maximum CPU time: 0.500000  
Arrival rates: 1.000000 per second  
The total number of jobs submitted: 25  
Average turnaround time: 0.01 seconds  
Average CPU time: 0.01 seconds  
Average waiting time: 0.00 seconds  
Throughput: 9.9593 No./second

Workload Conditions for test:

Priority Range: 0-25  
Minimum CPU time: 0.100000  
Maximum CPU time: 1.000000  
Arrival rates: 1.000000 per second  
The total number of jobs submitted: 25  
Average turnaround time: 0.01 seconds  
Average CPU time: 0.01 seconds  
Average waiting time: 0.00 seconds  
Throughput: 9.9639 No./second

Workload Conditions for test:

Priority Range: 0-25  
Minimum CPU time: 0.500000  
Maximum CPU time: 1.000000  
Arrival rates: 1.000000 per second  
The total number of jobs submitted: 25  
Average turnaround time: 0.01 seconds  
Average CPU time: 0.01 seconds  
Average waiting time: 0.00 seconds  
Throughput: 9.9733 No./second

Workload Conditions for test:

Priority Range: 0-25  
Minimum CPU time: 1.000000  
Maximum CPU time: 10.000000  
Arrival rates: 1.000000 per second  
The total number of jobs submitted: 25  
Average turnaround time: 54.30 seconds  
Average CPU time: 5.41 seconds  
Average waiting time: 48.90 seconds  
Throughput: 0.1849 No./second

## Appendix C: Priority Workload Conditions Test Results

Workload Conditions for test:

Priority Range:	0-5
Minimum CPU time:	0.100000
Maximum CPU time:	0.500000
Arrival rates:	0.100000 per second
The total number of jobs submitted:	5
Average turnaround time:	0.01 seconds
Average CPU time:	0.01 seconds
Average waiting time:	0.00 seconds
Throughput:	87.5243 No./second

Workload Conditions for test:

Priority Range:	0-5
Minimum CPU time:	0.100000
Maximum CPU time:	1.000000
Arrival rates:	0.100000 per second
The total number of jobs submitted:	5
Average turnaround time:	0.01 seconds
Average CPU time:	0.01 seconds
Average waiting time:	0.00 seconds
Throughput:	84.8997 No./second

Workload Conditions for test:

Priority Range:	0-5
Minimum CPU time:	0.500000
Maximum CPU time:	1.000000
Arrival rates:	0.100000 per second
The total number of jobs submitted:	5
Average turnaround time:	0.01 seconds
Average CPU time:	0.01 seconds
Average waiting time:	0.00 seconds
Throughput:	85.5857 No./second

Workload Conditions for test:

Priority Range:	0-5
Minimum CPU time:	1.000000
Maximum CPU time:	10.000000
Arrival rates:	0.100000 per second
The total number of jobs submitted:	5
Average turnaround time:	16.00 seconds
Average CPU time:	5.01 seconds
Average waiting time:	10.99 seconds
Throughput:	0.1997 No./second

Workload Conditions for test:

Priority Range:	0-5
Minimum CPU time:	0.100000
Maximum CPU time:	0.500000
Arrival rates:	0.200000 per second
The total number of jobs submitted:	5
Average turnaround time:	0.01 seconds
Average CPU time:	0.01 seconds
Average waiting time:	0.00 seconds
Throughput:	47.2175 No./second

Workload Conditions for test:

Priority Range:	0-5
Minimum CPU time:	0.100000
Maximum CPU time:	1.000000
Arrival rates:	0.200000 per second

The total number of jobs submitted: 5  
Average turnaround time: 0.01 seconds  
Average CPU time: 0.01 seconds  
Average waiting time: 0.00 seconds  
Throughput: 46.3332 No./second

Workload Conditions for test:  
Priority Range: 0-5  
Minimum CPU time: 0.500000  
Maximum CPU time: 1.000000  
Arrival rates: 0.200000 per second  
The total number of jobs submitted: 5  
Average turnaround time: 0.01 seconds  
Average CPU time: 0.01 seconds  
Average waiting time: 0.00 seconds  
Throughput: 46.1565 No./second

Workload Conditions for test:  
Priority Range: 0-5  
Minimum CPU time: 1.000000  
Maximum CPU time: 10.000000  
Arrival rates: 0.200000 per second  
The total number of jobs submitted: 5  
Average turnaround time: 14.38 seconds  
Average CPU time: 5.41 seconds  
Average waiting time: 8.97 seconds  
Throughput: 0.1849 No./second

Workload Conditions for test:  
Priority Range: 0-5  
Minimum CPU time: 0.100000  
Maximum CPU time: 0.500000  
Arrival rates: 0.500000 per second  
The total number of jobs submitted: 5  
Average turnaround time: 0.01 seconds  
Average CPU time: 0.00 seconds  
Average waiting time: 0.00 seconds  
Throughput: 19.5984 No./second

Workload Conditions for test:  
Priority Range: 0-5  
Minimum CPU time: 0.100000  
Maximum CPU time: 1.000000  
Arrival rates: 0.500000 per second  
The total number of jobs submitted: 5  
Average turnaround time: 0.01 seconds  
Average CPU time: 0.01 seconds  
Average waiting time: 0.00 seconds  
Throughput: 19.6785 No./second

Workload Conditions for test:  
Priority Range: 0-5  
Minimum CPU time: 0.500000  
Maximum CPU time: 1.000000  
Arrival rates: 0.500000 per second  
The total number of jobs submitted: 5  
Average turnaround time: 0.01 seconds  
Average CPU time: 0.01 seconds  
Average waiting time: 0.00 seconds  
Throughput: 19.4973 No./second

Workload Conditions for test:  
Priority Range: 0-5

Minimum CPU time: 1.000000  
Maximum CPU time: 10.000000  
Arrival rates: 0.500000 per second  
The total number of jobs submitted: 5  
Average turnaround time: 15.32 seconds  
Average CPU time: 4.61 seconds  
Average waiting time: 10.71 seconds  
Throughput: 0.2171 No./second

Workload Conditions for test:

Priority Range: 0-5  
Minimum CPU time: 0.100000  
Maximum CPU time: 0.500000  
Arrival rates: 1.000000 per second  
The total number of jobs submitted: 5  
Average turnaround time: 0.01 seconds  
Average CPU time: 0.01 seconds  
Average waiting time: 0.00 seconds  
Throughput: 9.8669 No./second

Workload Conditions for test:

Priority Range: 0-5  
Minimum CPU time: 0.100000  
Maximum CPU time: 1.000000  
Arrival rates: 1.000000 per second  
The total number of jobs submitted: 5  
Average turnaround time: 0.01 seconds  
Average CPU time: 0.01 seconds  
Average waiting time: 0.00 seconds  
Throughput: 9.8770 No./second

Workload Conditions for test:

Priority Range: 0-5  
Minimum CPU time: 0.500000  
Maximum CPU time: 1.000000  
Arrival rates: 1.000000 per second  
The total number of jobs submitted: 5  
Average turnaround time: 0.01 seconds  
Average CPU time: 0.01 seconds  
Average waiting time: 0.00 seconds  
Throughput: 9.8459 No./second

Workload Conditions for test:

Priority Range: 0-5  
Minimum CPU time: 1.000000  
Maximum CPU time: 10.000000  
Arrival rates: 1.000000 per second  
The total number of jobs submitted: 5  
Average turnaround time: 11.82 seconds  
Average CPU time: 3.61 seconds  
Average waiting time: 8.21 seconds  
Throughput: 0.2773 No./second

Workload Conditions for test:

Priority Range: 0-10  
Minimum CPU time: 0.100000  
Maximum CPU time: 0.500000  
Arrival rates: 0.100000 per second  
The total number of jobs submitted: 10  
Average turnaround time: 0.01 seconds  
Average CPU time: 0.01 seconds  
Average waiting time: 0.00 seconds  
Throughput: 90.0666 No./second

Workload Conditions for test:  
Priority Range: 0-10  
Minimum CPU time: 0.100000  
Maximum CPU time: 1.000000  
Arrival rates: 0.100000 per second  
The total number of jobs submitted: 10  
Average turnaround time: 0.01 seconds  
Average CPU time: 0.01 seconds  
Average waiting time: 0.00 seconds  
Throughput: 87.3004 No./second

Workload Conditions for test:  
Priority Range: 0-10  
Minimum CPU time: 0.500000  
Maximum CPU time: 1.000000  
Arrival rates: 0.100000 per second  
The total number of jobs submitted: 10  
Average turnaround time: 0.01 seconds  
Average CPU time: 0.01 seconds  
Average waiting time: 0.00 seconds  
Throughput: 85.7537 No./second

Workload Conditions for test:  
Priority Range: 0-10  
Minimum CPU time: 1.000000  
Maximum CPU time: 10.000000  
Arrival rates: 0.100000 per second  
The total number of jobs submitted: 10  
Average turnaround time: 25.29 seconds  
Average CPU time: 5.21 seconds  
Average waiting time: 20.08 seconds  
Throughput: 0.1921 No./second

Workload Conditions for test:  
Priority Range: 0-10  
Minimum CPU time: 0.100000  
Maximum CPU time: 0.500000  
Arrival rates: 0.200000 per second  
The total number of jobs submitted: 10  
Average turnaround time: 0.01 seconds  
Average CPU time: 0.01 seconds  
Average waiting time: 0.00 seconds  
Throughput: 48.1939 No./second

Workload Conditions for test:  
Priority Range: 0-10  
Minimum CPU time: 0.100000  
Maximum CPU time: 1.000000  
Arrival rates: 0.200000 per second  
The total number of jobs submitted: 10  
Average turnaround time: 0.01 seconds  
Average CPU time: 0.01 seconds  
Average waiting time: 0.00 seconds  
Throughput: 46.8498 No./second

Workload Conditions for test:  
Priority Range: 0-10  
Minimum CPU time: 0.500000  
Maximum CPU time: 1.000000  
Arrival rates: 0.200000 per second  
The total number of jobs submitted: 10  
Average turnaround time: 0.01 seconds

Average CPU time: 0.01 seconds  
Average waiting time: 0.00 seconds  
Throughput: 47.1462 No./second

Workload Conditions for test:

Priority Range: 0-10  
Minimum CPU time: 1.000000  
Maximum CPU time: 10.000000  
Arrival rates: 0.200000 per second  
The total number of jobs submitted: 10  
Average turnaround time: 29.84 seconds  
Average CPU time: 5.21 seconds  
Average waiting time: 24.64 seconds  
Throughput: 0.1921 No./second

Workload Conditions for test:

Priority Range: 0-10  
Minimum CPU time: 0.100000  
Maximum CPU time: 0.500000  
Arrival rates: 0.500000 per second  
The total number of jobs submitted: 10  
Average turnaround time: 0.01 seconds  
Average CPU time: 0.01 seconds  
Average waiting time: 0.00 seconds  
Throughput: 19.5300 No./second

Workload Conditions for test:

Priority Range: 0-10  
Minimum CPU time: 0.100000  
Maximum CPU time: 1.000000  
Arrival rates: 0.500000 per second  
The total number of jobs submitted: 10  
Average turnaround time: 0.01 seconds  
Average CPU time: 0.01 seconds  
Average waiting time: 0.00 seconds  
Throughput: 19.6307 No./second

Workload Conditions for test:

Priority Range: 0-10  
Minimum CPU time: 0.500000  
Maximum CPU time: 1.000000  
Arrival rates: 0.500000 per second  
The total number of jobs submitted: 10  
Average turnaround time: 0.01 seconds  
Average CPU time: 0.01 seconds  
Average waiting time: 0.00 seconds  
Throughput: 19.6898 No./second

Workload Conditions for test:

Priority Range: 0-10  
Minimum CPU time: 1.000000  
Maximum CPU time: 10.000000  
Arrival rates: 0.500000 per second  
The total number of jobs submitted: 10  
Average turnaround time: 21.71 seconds  
Average CPU time: 4.51 seconds  
Average waiting time: 17.20 seconds  
Throughput: 0.2219 No./second

Workload Conditions for test:

Priority Range: 0-10  
Minimum CPU time: 0.100000  
Maximum CPU time: 0.500000

Arrival rates: 1.000000 per second  
The total number of jobs submitted: 10  
Average turnaround time: 0.01 seconds  
Average CPU time: 0.01 seconds  
Average waiting time: 0.00 seconds  
Throughput: 9.9150 No./second

Workload Conditions for test:  
Priority Range: 0-10  
Minimum CPU time: 0.100000  
Maximum CPU time: 1.000000  
Arrival rates: 1.000000 per second  
The total number of jobs submitted: 10  
Average turnaround time: 0.01 seconds  
Average CPU time: 0.01 seconds  
Average waiting time: 0.00 seconds  
Throughput: 9.9116 No./second

Workload Conditions for test:  
Priority Range: 0-10  
Minimum CPU time: 0.500000  
Maximum CPU time: 1.000000  
Arrival rates: 1.000000 per second  
The total number of jobs submitted: 10  
Average turnaround time: 0.01 seconds  
Average CPU time: 0.01 seconds  
Average waiting time: 0.00 seconds  
Throughput: 9.9277 No./second

Workload Conditions for test:  
Priority Range: 0-10  
Minimum CPU time: 1.000000  
Maximum CPU time: 10.000000  
Arrival rates: 1.000000 per second  
The total number of jobs submitted: 10  
Average turnaround time: 31.58 seconds  
Average CPU time: 5.11 seconds  
Average waiting time: 26.48 seconds  
Throughput: 0.1958 No./second

Workload Conditions for test:  
Priority Range: 0-15  
Minimum CPU time: 0.100000  
Maximum CPU time: 0.500000  
Arrival rates: 0.100000 per second  
The total number of jobs submitted: 15  
Average turnaround time: 0.01 seconds  
Average CPU time: 0.00 seconds  
Average waiting time: 0.00 seconds  
Throughput: 92.1008 No./second

Workload Conditions for test:  
Priority Range: 0-15  
Minimum CPU time: 0.100000  
Maximum CPU time: 1.000000  
Arrival rates: 0.100000 per second  
The total number of jobs submitted: 15  
Average turnaround time: 0.00 seconds  
Average CPU time: 0.00 seconds  
Average waiting time: 0.00 seconds  
Throughput: 93.9220 No./second

Workload Conditions for test:



Priority Range: 0-15  
Minimum CPU time: 0.500000  
Maximum CPU time: 1.000000  
Arrival rates: 0.100000 per second  
The total number of jobs submitted: 15  
Average turnaround time: 0.01 seconds  
Average CPU time: 0.00 seconds  
Average waiting time: 0.00 seconds  
Throughput: 92.6435 No./second

Workload Conditions for test:

Priority Range: 0-15  
Minimum CPU time: 1.000000  
Maximum CPU time: 10.000000  
Arrival rates: 0.100000 per second  
The total number of jobs submitted: 15  
Average turnaround time: 40.78 seconds  
Average CPU time: 5.81 seconds  
Average waiting time: 34.97 seconds  
Throughput: 0.1722 No./second

Workload Conditions for test:

Priority Range: 0-15  
Minimum CPU time: 0.100000  
Maximum CPU time: 0.500000  
Arrival rates: 0.200000 per second  
The total number of jobs submitted: 15  
Average turnaround time: 0.01 seconds  
Average CPU time: 0.01 seconds  
Average waiting time: 0.00 seconds  
Throughput: 47.8385 No./second

Workload Conditions for test:

Priority Range: 0-15  
Minimum CPU time: 0.100000  
Maximum CPU time: 1.000000  
Arrival rates: 0.200000 per second  
The total number of jobs submitted: 15  
Average turnaround time: 0.01 seconds  
Average CPU time: 0.01 seconds  
Average waiting time: 0.00 seconds  
Throughput: 47.7838 No./second

Workload Conditions for test:

Priority Range: 0-15  
Minimum CPU time: 0.500000  
Maximum CPU time: 1.000000  
Arrival rates: 0.200000 per second  
The total number of jobs submitted: 15  
Average turnaround time: 0.01 seconds  
Average CPU time: 0.01 seconds  
Average waiting time: 0.00 seconds  
Throughput: 47.7607 No./second

Workload Conditions for test:

Priority Range: 0-15  
Minimum CPU time: 1.000000  
Maximum CPU time: 10.000000  
Arrival rates: 0.200000 per second  
The total number of jobs submitted: 15  
Average turnaround time: 47.24 seconds  
Average CPU time: 5.94 seconds  
Average waiting time: 41.30 seconds

Throughput: 0.1684 No./second

Workload Conditions for test:  
Priority Range: 0-15  
Minimum CPU time: 0.100000  
Maximum CPU time: 0.500000  
Arrival rates: 0.500000 per second  
The total number of jobs submitted: 15  
Average turnaround time: 0.01 seconds  
Average CPU time: 0.01 seconds  
Average waiting time: 0.00 seconds  
Throughput: 19.6399 No./second

Workload Conditions for test:  
Priority Range: 0-15  
Minimum CPU time: 0.100000  
Maximum CPU time: 1.000000  
Arrival rates: 0.500000 per second  
The total number of jobs submitted: 15  
Average turnaround time: 0.01 seconds  
Average CPU time: 0.01 seconds  
Average waiting time: 0.00 seconds  
Throughput: 19.6565 No./second

Workload Conditions for test:  
Priority Range: 0-15  
Minimum CPU time: 0.500000  
Maximum CPU time: 1.000000  
Arrival rates: 0.500000 per second  
The total number of jobs submitted: 15  
Average turnaround time: 0.01 seconds  
Average CPU time: 0.01 seconds  
Average waiting time: 0.00 seconds  
Throughput: 19.7044 No./second

Workload Conditions for test:  
Priority Range: 0-15  
Minimum CPU time: 1.000000  
Maximum CPU time: 10.000000  
Arrival rates: 0.500000 per second  
The total number of jobs submitted: 15  
Average turnaround time: 37.43 seconds  
Average CPU time: 4.54 seconds  
Average waiting time: 32.90 seconds  
Throughput: 0.2203 No./second

Workload Conditions for test:  
Priority Range: 0-15  
Minimum CPU time: 0.100000  
Maximum CPU time: 0.500000  
Arrival rates: 1.000000 per second  
The total number of jobs submitted: 15  
Average turnaround time: 0.01 seconds  
Average CPU time: 0.01 seconds  
Average waiting time: 0.00 seconds  
Throughput: 9.9055 No./second

Workload Conditions for test:  
Priority Range: 0-15  
Minimum CPU time: 0.100000  
Maximum CPU time: 1.000000  
Arrival rates: 1.000000 per second  
The total number of jobs submitted: 15

Average turnaround time: 0.01 seconds  
Average CPU time: 0.01 seconds  
Average waiting time: 0.00 seconds  
Throughput: 9.9241 No./second

Workload Conditions for test:

Priority Range: 0-15  
Minimum CPU time: 0.500000  
Maximum CPU time: 1.000000  
Arrival rates: 1.000000 per second  
The total number of jobs submitted: 15  
Average turnaround time: 0.01 seconds  
Average CPU time: 0.01 seconds  
Average waiting time: 0.00 seconds  
Throughput: 9.9278 No./second

Workload Conditions for test:

Priority Range: 0-15  
Minimum CPU time: 1.000000  
Maximum CPU time: 10.000000  
Arrival rates: 1.000000 per second  
The total number of jobs submitted: 15  
Average turnaround time: 39.35 seconds  
Average CPU time: 5.27 seconds  
Average waiting time: 34.07 seconds  
Throughput: 0.1896 No./second

Workload Conditions for test:

Priority Range: 0-20  
Minimum CPU time: 0.100000  
Maximum CPU time: 0.500000  
Arrival rates: 0.100000 per second  
The total number of jobs submitted: 20  
Average turnaround time: 0.01 seconds  
Average CPU time: 0.01 seconds  
Average waiting time: 0.00 seconds  
Throughput: 94.0079 No./second

Workload Conditions for test:

Priority Range: 0-20  
Minimum CPU time: 0.100000  
Maximum CPU time: 1.000000  
Arrival rates: 0.100000 per second  
The total number of jobs submitted: 20  
Average turnaround time: 0.01 seconds  
Average CPU time: 0.01 seconds  
Average waiting time: 0.00 seconds  
Throughput: 92.9969 No./second

Workload Conditions for test:

Priority Range: 0-20  
Minimum CPU time: 0.500000  
Maximum CPU time: 1.000000  
Arrival rates: 0.100000 per second  
The total number of jobs submitted: 20  
Average turnaround time: 0.00 seconds  
Average CPU time: 0.00 seconds  
Average waiting time: 0.00 seconds  
Throughput: 93.2540 No./second

Workload Conditions for test:

Priority Range: 0-20  
Minimum CPU time: 1.000000

Maximum CPU time: 10.000000  
Arrival rates: 0.100000 per second  
The total number of jobs submitted: 20  
Average turnaround time: 53.82 seconds  
Average CPU time: 5.11 seconds  
Average waiting time: 48.71 seconds  
Throughput: 0.1958 No./second

Workload Conditions for test:

Priority Range: 0-20  
Minimum CPU time: 0.100000  
Maximum CPU time: 0.500000  
Arrival rates: 0.200000 per second  
The total number of jobs submitted: 20  
Average turnaround time: 0.01 seconds  
Average CPU time: 0.01 seconds  
Average waiting time: 0.00 seconds  
Throughput: 47.8729 No./second

Workload Conditions for test:

Priority Range: 0-20  
Minimum CPU time: 0.100000  
Maximum CPU time: 1.000000  
Arrival rates: 0.200000 per second  
The total number of jobs submitted: 20  
Average turnaround time: 0.01 seconds  
Average CPU time: 0.01 seconds  
Average waiting time: 0.00 seconds  
Throughput: 48.3129 No./second

Workload Conditions for test:

Priority Range: 0-20  
Minimum CPU time: 0.500000  
Maximum CPU time: 1.000000  
Arrival rates: 0.200000 per second  
The total number of jobs submitted: 20  
Average turnaround time: 0.01 seconds  
Average CPU time: 0.01 seconds  
Average waiting time: 0.00 seconds  
Throughput: 47.7620 No./second

Workload Conditions for test:

Priority Range: 0-20  
Minimum CPU time: 1.000000  
Maximum CPU time: 10.000000  
Arrival rates: 0.200000 per second  
The total number of jobs submitted: 20  
Average turnaround time: 55.43 seconds  
Average CPU time: 5.26 seconds  
Average waiting time: 50.17 seconds  
Throughput: 0.1902 No./second

Workload Conditions for test:

Priority Range: 0-20  
Minimum CPU time: 0.100000  
Maximum CPU time: 0.500000  
Arrival rates: 0.500000 per second  
The total number of jobs submitted: 20  
Average turnaround time: 0.01 seconds  
Average CPU time: 0.01 seconds  
Average waiting time: 0.00 seconds  
Throughput: 19.6520 No./second

Workload Conditions for test:  
Priority Range: 0-20  
Minimum CPU time: 0.100000  
Maximum CPU time: 1.000000  
Arrival rates: 0.500000 per second  
The total number of jobs submitted: 20  
Average turnaround time: 0.01 seconds  
Average CPU time: 0.01 seconds  
Average waiting time: 0.00 seconds  
Throughput: 19.7137 No./second

Workload Conditions for test:  
Priority Range: 0-20  
Minimum CPU time: 0.500000  
Maximum CPU time: 1.000000  
Arrival rates: 0.500000 per second  
The total number of jobs submitted: 20  
Average turnaround time: 0.01 seconds  
Average CPU time: 0.01 seconds  
Average waiting time: 0.00 seconds  
Throughput: 19.7015 No./second

Workload Conditions for test:  
Priority Range: 0-20  
Minimum CPU time: 1.000000  
Maximum CPU time: 10.000000  
Arrival rates: 0.500000 per second  
The total number of jobs submitted: 20  
Average turnaround time: 47.24 seconds  
Average CPU time: 4.86 seconds  
Average waiting time: 42.38 seconds  
Throughput: 0.2059 No./second

Workload Conditions for test:  
Priority Range: 0-20  
Minimum CPU time: 0.100000  
Maximum CPU time: 0.500000  
Arrival rates: 1.000000 per second  
The total number of jobs submitted: 20  
Average turnaround time: 0.01 seconds  
Average CPU time: 0.01 seconds  
Average waiting time: 0.00 seconds  
Throughput: 9.9416 No./second

Workload Conditions for test:  
Priority Range: 0-20  
Minimum CPU time: 0.100000  
Maximum CPU time: 1.000000  
Arrival rates: 1.000000 per second  
The total number of jobs submitted: 20  
Average turnaround time: 0.01 seconds  
Average CPU time: 0.01 seconds  
Average waiting time: 0.00 seconds  
Throughput: 9.9411 No./second

Workload Conditions for test:  
Priority Range: 0-20  
Minimum CPU time: 0.500000  
Maximum CPU time: 1.000000  
Arrival rates: 1.000000 per second  
The total number of jobs submitted: 20  
Average turnaround time: 0.01 seconds  
Average CPU time: 0.01 seconds

Average waiting time: 0.00 seconds  
Throughput: 9.9366 No./second

Workload Conditions for test:

Priority Range: 0-20  
Minimum CPU time: 1.000000  
Maximum CPU time: 10.000000  
Arrival rates: 1.000000 per second  
The total number of jobs submitted: 20  
Average turnaround time: 48.42 seconds  
Average CPU time: 4.51 seconds  
Average waiting time: 43.91 seconds  
Throughput: 0.2219 No./second

Workload Conditions for test:

Priority Range: 0-25  
Minimum CPU time: 0.100000  
Maximum CPU time: 0.500000  
Arrival rates: 0.100000 per second  
The total number of jobs submitted: 25  
Average turnaround time: 0.01 seconds  
Average CPU time: 0.00 seconds  
Average waiting time: 0.00 seconds  
Throughput: 93.9398 No./second

Workload Conditions for test:

Priority Range: 0-25  
Minimum CPU time: 0.100000  
Maximum CPU time: 1.000000  
Arrival rates: 0.100000 per second  
The total number of jobs submitted: 25  
Average turnaround time: 0.01 seconds  
Average CPU time: 0.00 seconds  
Average waiting time: 0.00 seconds  
Throughput: 94.6153 No./second

Workload Conditions for test:

Priority Range: 0-25  
Minimum CPU time: 0.500000  
Maximum CPU time: 1.000000  
Arrival rates: 0.100000 per second  
The total number of jobs submitted: 25  
Average turnaround time: 0.00 seconds  
Average CPU time: 0.00 seconds  
Average waiting time: 0.00 seconds  
Throughput: 94.7361 No./second

Workload Conditions for test:

Priority Range: 0-25  
Minimum CPU time: 1.000000  
Maximum CPU time: 10.000000  
Arrival rates: 0.100000 per second  
The total number of jobs submitted: 25  
Average turnaround time: 59.00 seconds  
Average CPU time: 4.73 seconds  
Average waiting time: 54.27 seconds  
Throughput: 0.2116 No./second

Workload Conditions for test:

Priority Range: 0-25  
Minimum CPU time: 0.100000  
Maximum CPU time: 0.500000  
Arrival rates: 0.200000 per second

The total number of jobs submitted: 25  
Average turnaround time: 0.01 seconds  
Average CPU time: 0.01 seconds  
Average waiting time: 0.00 seconds  
Throughput: 48.2662 No./second

Workload Conditions for test:  
Priority Range: 0-25  
Minimum CPU time: 0.100000  
Maximum CPU time: 1.000000  
Arrival rates: 0.200000 per second  
The total number of jobs submitted: 25  
Average turnaround time: 0.01 seconds  
Average CPU time: 0.01 seconds  
Average waiting time: 0.00 seconds  
Throughput: 48.2115 No./second

Workload Conditions for test:  
Priority Range: 0-25  
Minimum CPU time: 0.500000  
Maximum CPU time: 1.000000  
Arrival rates: 0.200000 per second  
The total number of jobs submitted: 25  
Average turnaround time: 0.01 seconds  
Average CPU time: 0.01 seconds  
Average waiting time: 0.00 seconds  
Throughput: 48.6290 No./second

Workload Conditions for test:  
Priority Range: 0-25  
Minimum CPU time: 1.000000  
Maximum CPU time: 10.000000  
Arrival rates: 0.200000 per second  
The total number of jobs submitted: 25  
Average turnaround time: 65.48 seconds  
Average CPU time: 5.05 seconds  
Average waiting time: 60.43 seconds  
Throughput: 0.1982 No./second

Workload Conditions for test:  
Priority Range: 0-25  
Minimum CPU time: 0.100000  
Maximum CPU time: 0.500000  
Arrival rates: 0.500000 per second  
The total number of jobs submitted: 25  
Average turnaround time: 0.01 seconds  
Average CPU time: 0.01 seconds  
Average waiting time: 0.00 seconds  
Throughput: 19.7461 No./second

Workload Conditions for test:  
Priority Range: 0-25  
Minimum CPU time: 0.100000  
Maximum CPU time: 1.000000  
Arrival rates: 0.500000 per second  
The total number of jobs submitted: 25  
Average turnaround time: 0.01 seconds  
Average CPU time: 0.01 seconds  
Average waiting time: 0.00 seconds  
Throughput: 19.7283 No./second

Workload Conditions for test:  
Priority Range: 0-25

Minimum CPU time: 0.500000  
Maximum CPU time: 1.000000  
Arrival rates: 0.500000 per second  
The total number of jobs submitted: 25  
Average turnaround time: 0.01 seconds  
Average CPU time: 0.01 seconds  
Average waiting time: 0.00 seconds  
Throughput: 19.7753 No./second

Workload Conditions for test:

Priority Range: 0-25  
Minimum CPU time: 1.000000  
Maximum CPU time: 10.000000  
Arrival rates: 0.500000 per second  
The total number of jobs submitted: 25  
Average turnaround time: 62.47 seconds  
Average CPU time: 4.61 seconds  
Average waiting time: 57.87 seconds  
Throughput: 0.2171 No./second

Workload Conditions for test:

Priority Range: 0-25  
Minimum CPU time: 0.100000  
Maximum CPU time: 0.500000  
Arrival rates: 1.000000 per second  
The total number of jobs submitted: 25  
Average turnaround time: 0.01 seconds  
Average CPU time: 0.01 seconds  
Average waiting time: 0.00 seconds  
Throughput: 9.9310 No./second

Workload Conditions for test:

Priority Range: 0-25  
Minimum CPU time: 0.100000  
Maximum CPU time: 1.000000  
Arrival rates: 1.000000 per second  
The total number of jobs submitted: 25  
Average turnaround time: 0.01 seconds  
Average CPU time: 0.01 seconds  
Average waiting time: 0.00 seconds  
Throughput: 9.9425 No./second

Workload Conditions for test:

Priority Range: 0-25  
Minimum CPU time: 0.500000  
Maximum CPU time: 1.000000  
Arrival rates: 1.000000 per second  
The total number of jobs submitted: 25  
Average turnaround time: 0.01 seconds  
Average CPU time: 0.01 seconds  
Average waiting time: 0.00 seconds  
Throughput: 9.9211 No./second

Workload Conditions for test:

Priority Range: 0-25  
Minimum CPU time: 1.000000  
Maximum CPU time: 10.000000  
Arrival rates: 1.000000 per second  
The total number of jobs submitted: 25  
Average turnaround time: 68.08 seconds  
Average CPU time: 5.41 seconds  
Average waiting time: 62.68 seconds  
Throughput: 0.1850 No./second