**“Operating System” Experimental Guide**

**Experiment 1:** First Come First Served and Short Job Priority Process Scheduling Algorithm

**Experimental Hours:** 6 hours recommended

**Experimental Platform:** Visual C++ or Visual Studio,etc.

**[Objective]**

Through this experiment, the understanding of the concept of the process scheduling is deepened. Specifically, the strategy of the First Come First Served and Short Job Priority process scheduling algorithm , and the evaluation method of the these algorithm are further grasped.

**[Content]**

**Problem Description:**

The design program simulates the process first-come-first-served FCFS and short job-first SJF scheduling process.

The program requirements are as follows:

1. Suppose there are n processes that arrive at the system at times T1, ..., Tn, and the CPU burst (the service time) they need are S1,..., Sn. It is required to use the FCFS and SJF to separately schedule the process running, calculate the start time ,the end time , the turnaround time, and waiting time for each process, and calculate the average turnaround time and the average waiting time of all processes for each algorithm.
2. Input:
3. Input the following information for processes as a chart, such as:

Process Num. Arrival Time CPU Burst

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Or prepare these information in a file, and input the file name, if using this way, the chart of information should be displayed on the screen.

1. Input the type of the algorithm(1-FCFS, 2-SJF).
2. Output:
3. It is required to simulate the entire scheduling process and output the states of the processes at each moment, that is,to output the ready queue, and the process using CPU, such as:

Process Num. Start Time End Time Ready Queue

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(2) Display the turnaround time and waiting time of each process, such as:

Process Num. Turnarround Time Waiting Time

01 ------------ -----------

02 ------------ -----------

(3) Display the average turnaround time and the average waiting time of each algorithm, such as:

Algorithm Average Turnaround Time Average Waiting Time

FCFS ----------------------------- ----------------------

SJF ----------------------------- ----------------------

**Implementation Tips:**

* Realize two algorithms in a program:FCFS and SJF.

For an input of the information of processes, user can choose one of the algorithm to run.

There is a cycle structure for user to choose the algorithm until user press a specific character such as “Q” to quit.

* The simulation realization of ready queue.

1. Think about the data structure of ready queue: Array or Linklist?
2. Should the ready queue be sorted for specific algorithm in advance or not?

* Think about realization of preemptive SJF for improvement.

**[Requirements]:**

1. Independent programming of FCFS and SJF simulation, and debugging the program when running on the machine.
2. According to the specific experimental requirements, complete the experimental report, including:
3. **Requirements analysis**

* The task of programming;
* The form of input and the range of input values;
* The form of output;
* Test data: including correct input and output results, and incorrect input and output results.

1. **Outline design**

Describes the definition of all the abstract data types used in this program;

Design the procedures, and describe the functions that each procedure can achieve;

The flow of the main program, and the hierarchical (invocation) relationship between the procedures.

1. **Detailed design**:Realize the specific algorithm or the flow of each procedure.
2. **Debug analysis**

The recommended contents may include:

* How to solve the problems encountered in the debugging process and the analysis of the reasons of the problems;
* Spatio-temporal(时空的) analysis of the algorithm (including the analysis of time and space complexity of basic operations and other algorithms) and improvement ideas;
* Experience（体验和感受）.

1. **Test results:**

List your test results by printscreen button, including input and output. The test data here should be complete and strict.

1. **User instructions:** Explains how to use the program you write and lists each step in detail.
2. **Appendix**. Annotated source program. （代码无需罗列在报告中，而是以附件的形式提供）