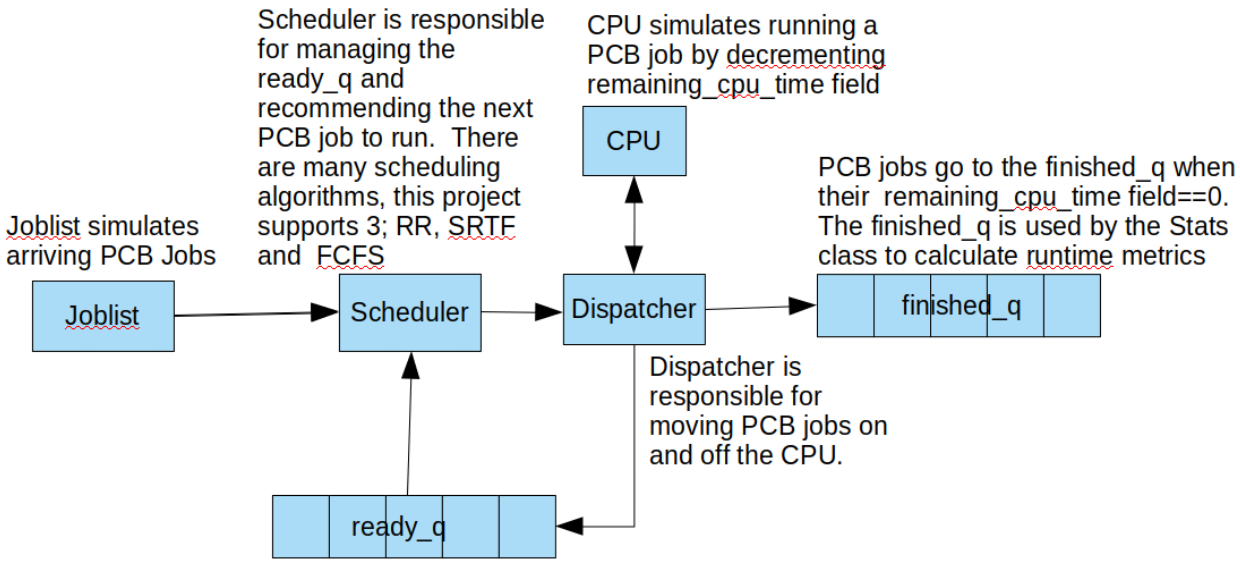
CPSC 410

Project 2 Scheduler Algorithms

Overview

You are given most of a project which simulates the process queuing model shown below.



Your task is to provide the scheduling and dispatch portions of this code base. Specifically you are responsible for implementing several scheduling algorithms (Round Robin (RR), Shortest Remaining Time First (SRTF) and First In First Out (FIFO)), a scheduler base class, a dispatcher, and Stats, a scheduling metric calculation class.
You are given the header files for all of these classes, so you only have to provide the implementations for each cpp file. This project builds off of project 1.

Teams
None: Please work individually on this project.

File_io (given to you)
You are given a file that has an unknown number of rows, and 4 columns of integers. Assume there are no malformed rows (ie != 4 columns). It looks like the following.

```
process_number, start_time, cpu_time, io_time
1,1,6,1
2,3,10,5
3,4,4,1
4,5,3,1
```

This file can have any name, but I will call it testdata1.txt for the purposes of this document. The first row describes what is in each column of this file and is overlooked by File_io. File_io provides functions for loading and sorting this data by process arrival time.

Job List (given to you)
Job list uses File_IO to load jobs to execute. Its purpose is to feed jobs to the scheduler.

Scheduler
Please see scheduling header files in includes directory for a description of the functions to implement. Please place all your scheduler cpp files in the scheduler directory. This is the only way your files will compile with my test harness.

Dispatcher
Please see dispatcher.h header file in includes directory for a description of the functions to implement. Please place your dispatcher.cpp file in the Dispatcher directory. This is the only way your file will compile with my test harness.

Stats
Please see stats.h header file in includes directory for a description of the functions to implement. Please place your stats.cpp file in the stats directory. This is the only way your file will compile with my test harness.

Output

The program prints a lot of information to the console to help with debugging. I will use this output to gauge your programs accuracy. I will also use different test data than what I provided in the sample project.

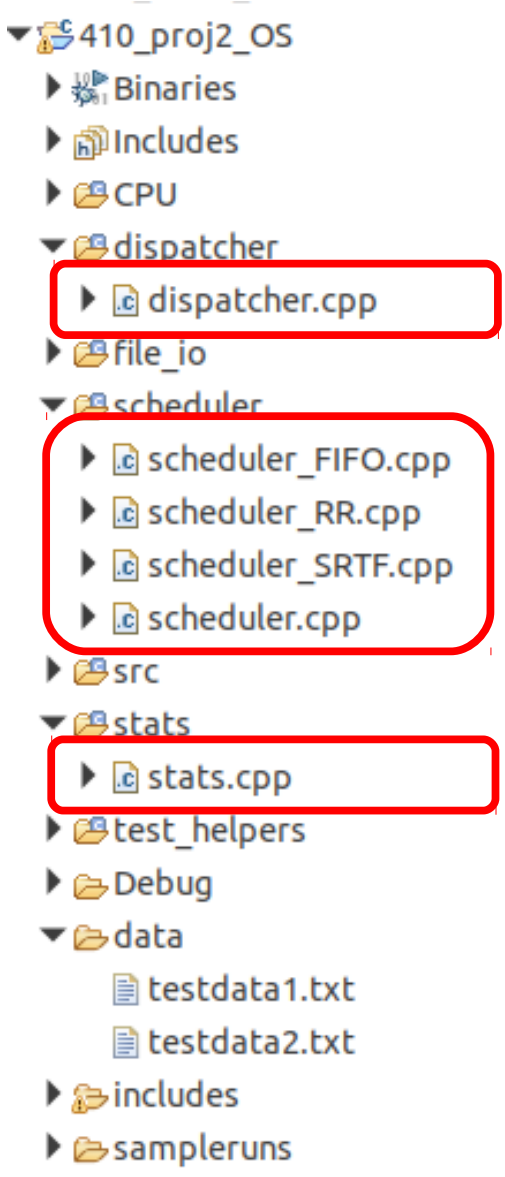
Documentation and Testing

Make sure you comment each function and the program as a whole. Please be mindful of the coding standards on the course projects page.

To help you I have included sample input and correpnisdong output files (see sampleruns folder). All were run with the defaults given in constants.h.

Directory Structure

Please provide implementations for the following 6 files



To Turn in

Please submit the following files. Please do not zip them.
scheduler_FIFO.cpp
scheduler_RR.cpp
scheduler_SRTF.cpp
scheduler.cpp
stats.cpp file
dispatcher.cpp

My test setup

Eclipse IDE for C/C++ Developers Version: 2019-06 (4.12.0)
g++ version version 7.4.0
Ubuntu 18.04

Submission and grading

I will drop your files into the appropriate places in my project. Then compile and run.

5% project files correctly submitted
30% scheduler.cpp works correctly
15% scheduler_SRTF.cpp works correctly
10% scheduler_FIFO.cpp works correctly
10% scheduler_RR.cpp.cpp works correctly
20% stats.cpp works correctly
10% dispatcher.cpp works correctly

Please make sure your project compiles before submission otherwise I will have no way to give you credit.

This assignment is complex and is weighted 1.5 times the weight of project 1

Possibly useful information

Scheduler is the base class for all the scheduling algorithms. The pure virtual function sort() makes scheduler an abstract base class(ABC). See the lectures from CPSC 327 if you don't remember what this is.

Please see the simulate function (in file src/410_proj2_OS.cpp) to see how the above process queuing model is implemented.

SRTF every time you add a PCB to the ready_q you must then call sort to ensure that the shortest remaining time process is at the front of the line

When calculating timeslices for each process, the timeslice begins when the PCB has been loaded onto the CPU by the dispatcher.

Resources:

The project starter files
https://github.com/CNUClasses/410_proj2_scheduler.git

CPSC 327 lectures: Note,you will need to download this file and then open it in a browser for proper rendering
https://github.com/CNUClasses/CPSC327/blob/master/navbar/Lectures_COMPLETE.html

A decent overview of OS scheduling;
https://en.wikipedia.org/wiki/Scheduling_%28computing%29#Long-term_scheduling

The OSTEP online text

APIs that may help

```
#include <queue>
std::queue<PCB> ready_Q;

//to add
ready_Q.push(myPCB);

//to remove
runningPCB = ready_Q.front();       //get its value
ready_Q.pop();                      //remove from queue
```