

Operating Systems Project – Spring 2016

This is a group project. Each group will contain 3-4 members.

Due February 15

The first order of business will be to decide how the project is to be accomplished. The team must submit a master plan for the project. This master plan must include a list of all the components of the project, the amount of time the team feels each component will take to complete, and which team member(s) are responsible for each component.

In addition, each individual must submit to me an Individual Evaluation Plan. This IEP should list concrete goals that you will reach before the end of the semester and points for these goals. This plan is really a grading sheet - it should explain to me how you will earn points for the project grade.

Part of the goals in your master plan must be the completion of both system and user documentation. This documentation will be graded on correctness, completeness, spelling, grammar and writing style. Each IEP must also include at least 20 points for the complete project working correctly. The total points in the IEP must add up to 100. I will review each master plan and IEP and alter it if necessary. The IEP will be used to grade your project at the end of the semester.

Hint: The more small concrete goals you can list, the easier it will be to earn points. If you list only one large goal, then it is all or nothing for the project! It is possible to renegotiate your plan at any point up to March 31.

Due May 2

Each team should hand in (in one packet, not in pieces):

- Source and executable code for the project on a disk or memory stick. Make sure this is clearly labeled.
- Any data input files needed should be included. A mechanism should also be provided for me to create my own input files.
- User documentation with details of how I use the simulation software.
- System documentation.
- A hardcopy of the source code.

Specifications

You are going to write a program that simulates an operating system. Your operating system is to be designed to run on a computer with the following hardware specifications:

- It has 16Mb of RAM
- A timeslice occurs every second.
- A fetch-execute-check interrupt cycle takes 0.1 seconds.
- An I/O operation takes somewhere between 25 to 50 cycles.

The following features must be included in the operating system simulation:

- The use of Process Control Blocks. They need to record I/O request information.
- The movement of a set of at most 60 processes through the five state model.
- The use of a clearly indicated, standard method for process scheduling
- Preemptive multitasking
- Interrupt handling.
- Process sizes will vary from 1Mb to 8Mb in size.
- A process must reside completely in memory before it can execute.
- A process will have between 0 and 5 I/O requests.
- A process will take between 10 and 950 cycles to complete.
- Processes will arrive over a period of time.

The output for the program should:

- Display memory - showing all processes and where they are in memory.
- Show all states and the processes that are in each state.
- For each active process the following information should be displayed:
 - amount of CPU time needed to complete
 - amount of CPU time already used
 - priority (if relevant)
 - number of I/O requests satisfied
 - number of outstanding I/O requests

- This display should change each time one of the following occurs:

- a new process enters the system
- a processes state changes
- an I/O request is made
- an I/O request is completed
- memory is allocated or deallocated
- a process exits the system

The display should allow me to step through each change. Do not make me press a key for every clock tick and/or timeslice!

- Allow me (at any time) to tell the program to run to completion and watch the changes on the screen (i.e. the changes to the screen in this mode should occur at a reasonable pace!)

Sample Portion of a Master Plan

This plan is for a team writing a program to track packages.

Task	People Responsible	Expected Time
Design of overall system	All	4 hours
Input of new processes	C	3 hours
Design of PCB object	A	4 hours
Write user documentation	B and D	5 hours
System documentation	A, B, C and D	6 hours
Manage and organize group	A	15 hours

This plan is incomplete and not reasonable! It is for reference only!

Sample Portion of an IEP

Design data structure for PCB structure	5%
Implement class for PCB	5%
Document code for process tracking	5%
Implement code to read process info into system	10%
Clearly comment code for reading process info into system	3%
Write system documentation reading process info into system	
-- documentation is complete	2%
-- documentation is easy to read/follow	2%
-- documentation makes good use of pictures	2%
Write description of overall system and its structure for system documentation	4%
Manage and organize group:	
--- Call group meetings	5%
--- Keep records of decisions group makes and circulate to others	5%
--- Be responsible for making sure all materials are turned in on time	3%
Group participation	5%
....	
Total overall project is integrated and works correctly	20%

Note: Some items on the IEP will require your groups evaluation. For example, I cannot assess group participation. Neither can I assess if you did a good job of organizing group meetings. For these types of items, you will be required to create a form asking each of your team members to evaluate you. These forms must be placed in a sealed envelope and turned in with the group project.

