SIENA*college*
Computer Science

Computer Science 330
Operating Systems
Siena College
Fall 2022

Lab 4: Process Interleavings

Due: 9:20 AM, Friday, October 21, 2022

In this brief lab, you will think more about race conditions and how they can be problematic for concurrent access to a single shared variable.

You may work alone or in groups of size 2 or 3 on this lab.

Learning goals:

1. To think more carefully about race conditions and atomic operations

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Getting Set Up

In Canvas, you will find link to follow to set up your GitHub repository, which will be named `interleavings-lab-yourgitname`, for this lab. Only one member of the group should follow the link to set up the repository on GitHub, then others should request a link to be granted write access.

Process Interleavings

Write a C program that will list all possible orderings of the machine instructions generated for the critical sections of the Producer-Consumer example from class. Recall that the statements `counter++` and `counter--` actually generate machine code such as

Producer		Consumer	
P_1	`R0 = counter;`	C_1	`R1 = counter;`
P_2	`R0 = R0 + 1;`	C_2	`R1 = R1 - 1;`
P_3	`counter = R0;`	C_3	`counter = R1;`

Your program should list all possible interleavings of the statements P_1, P_2, P_3, C_1, C_2, and C_3. Also have your program print which interleavings produce a correct result (that `counter` has the same value it started with).

Important: You are *not* writing a multithreaded program here! You are writing a program that generates the possible interleavings, computes the final value of `counter` for each interleaving, and prints the interleaving and the value of `counter`, along with an annotation that the answer is correct or incorrect.

Write your program in a file called `interleaving.c`.

Submission

Commit and push!

Grading

This assignment will be graded out of 15 points.

Feature	Value	Score
`Makefile`	1	
Correctness	10	
Documentation	2	
Efficiency and Elegance	2	
Total	15	