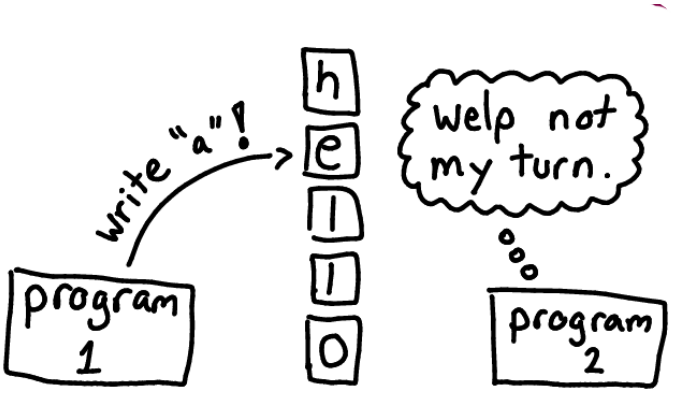
Lab Assignment
CPE 357
Systems Programming

CAL POLY
SAN LUIS OBISPO

Lab 7



Exercise:

Mutual Exclusion!
We have two programs this time to submit, each using a different algorithm to solve the critical section problem:
Write two programs which each utilize one of the following mutex algorithm (you choose):
Peterson's algorithm
Dekker's algorithm
Szymański's algorithm
Lamport's bakery algorithm
Eisenberg & McGuire algorithm
Maekawa's algorithm

Needless to say, your two programs must utilize different ones.
The difficulty of each algorithm is highlighted by the color (green – easy, yellow – not easy, red – hard).

- For that, have one shared memory array of 1000 characters.
- Fork into two processes, both will have an infinity loop!
- The child process is **alternatively** strcpy two long sentences into the shared array. You choose the sentences yourself, but they should have a character count bigger than 80!
- The parent process is strcpy the shared array text into its own array and printing it on the screen.
- You can stop the program anytime with ctrl + C or the MAC equivalent, so don't overwrite the signal(s)!
- Without mutex, you should see >sometimes< a mixture of both sentences on the screen due to concurrency.
- Correctly implementing the mutex will lead to eliminate that effect.

How we test

We will run your two programs for a while and check it the mutex is indeed working. Then we check if you indeed used the algo.

Submission:

Submit the two source code files and the executable: MYNAME_mutex_lab7**.zip**
Name each file: MYNAME_ALGONAME_lab7.c!
We will run https://theory.stanford.edu/~aiken/moss/ on the codes, so don't copy/paste from others or both get 0 points.

Bonus:

- There is a 20% (of the lab assignment) bonus, when getting the two algorithms into a C++ class (each of it) with methods "lock()" and "unlock()". Since you need ID integers for the algorithms, maybe you can do something with the PID?
- There is a 20% (of the lab assignment) bonus when doing a *green-yellow* combination.
- There is a 30% (of the lab assignment) bonus when doing a *green-red* combination.
- There is a 40% (of the lab assignment) bonus when doing a *yellow-red* combination.
- There is a 60% (of the lab assignment) bonus when doing a *red-red* combination.

There is a golden emblem waiting for you if you come up with your working own solution. Unfortunately, we don't have the time to check if it's kinda too similar with an existing algorithm, so there will be no bonus points…

Resources:

Maekawa:
https://en.wikipedia.org/wiki/Maekawa%27s_algorithm
https://www.geeksforgeeks.org/maekawas-algorithm-for-mutual-exclusion-in-distributed-system/