Report

Berkay Bakışoğlu 141044061

May 1, 2021

1 Nurses

All nurses can read from file without any protection because read thread safe.However an extra protection with nurseMutex(semaphore) is used for make only one nurse read a file at a time.All nurses waits for bufferFull semaphore,which created with bufferSize value.After they get this semaphore and reading is valid,vaccineMutex(semaphore) need to take to prevent access to vaccine buffer.Only one process must access that variables at a time.After then,nurse brings vaccine to buffer which increments its value by 1.Also the nurses checks the vaccine number in storage and when a 1 and 2 ready,it increases another crucial semaphore(vaccineReady) by one,which is all vaccinators should wait.After all nurses exit,the last nurse prints the terminating message.

2 Vaccinators

All vaccinators should wait for citizen process creation,so after they started,they prepare their variables and wait for allCitizenReady variable which can change with signal handler,last citizen that created,sends signals to all vaccinators to let them start. Then all vaccinators should wait for vaccineReady semaphore which increasing by nurses,whenever a vaccineReady,a vaccinator acquires that semaphore and wait for waitingCitizens semaphore,which increases by any citizen which waits for new vaccine.If this conditions satisfied,then vaccinators should access the citizens conditions one at a time, which are left turns and stil vaccinating ,citizenMutex semaphore keeps that variables from accessing.If all semaphores passed by,vaccinator detect citizen which is ready to vaccinate,add this citizen to his services,and invite him to clinic.Also changes citizen's turn to protect it from other vaccinators.A citizen must call once before it gets the vaccine.Then vaccine buffer values are decrements and increases bufferFull semaphore twice,which prevents the nurses from overflow.It signals to citizen which will be calling,and wait for its operation done with sigsuspend:A vaccinator should wait that the citizen vaccinate,before calling another one. Vaccinators exits when all citizens left.Last citizen process sends signal them before exits to let them know all operation has done.

3 Citizens

After citizen created,it checks that if all citizens created,if this is the last process that should be created,it signals the vaccinators that all citizens are ready and they may start. Citizen enters a loop that if it still needs to vaccinate or not.If last vaccine has applied,citizen will left.In this loop,firstly citizen increases waitingCitizens semaphore by one to let vaccinator knows that a citizen is waiting.Then it waits the signal from vaccinator to change its turn to 1.When if it is 1,he will enter the clinic and get the vaccine, it gets the vaccine,decrements its needed vaccine and send signal back to vaccinator.Then it return back to waiting or exit.

4 Bonus Part

All citizen pids holds on a shared array by their ages,then a vaccinator decides to call a citizen to vaccinate,it checks with a loop from oldest to youngest,and any of them available,call him to vaccinate.This way,its absolute that citizen with older age,called before the younger one.However,context switching might decide that that who's vaccinate operation finish first,if more than one vaccinator call more than one citizens,the younger one might says that i am vaccinated.