भारतीय प्रौद्योगिकी संस्थान तिरुपति
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CS3500 Operating Systems Lab - Software Process Synchronization

1. (5 marks) No use of semaphores: Folder name is rollnumber_lab5. Version 1 discussed in class today, in rollnumber_lab5a.c file, with two Xinu processes, implement a software based acquire (using spin wait programming logic), and release lock functions. Use an integer variable named 'held' (taking values 0 and 1), in a 'C' struct named 'lock'. Test your implementations on the following two scenarios: (*i*) Toggling between two processes, and (*ii*) Critical Section problem. Attach respective output snapshots in the folder.

2. (10 marks) No use of semaphores: Extend the rollnumber_lab5a.c to rollnumber_lab5b.c by implementing the algorithm of Peterson's solution, and test them on aforementioned two scenarios. Attach respective snapshots (for each scenario) in the folder.

3. (30 marks) rollnumber_lab5c.c. Dining philosophers problem using semaphores: Five philosophers sit on a circular table with five chopsticks (between them). Each philosopher (Xinu process) either 'eats' or 'thinks'. While thinking means doing nothing, eating requires two chop sticks by picking the two near-by ones. After eating, the philosopher puts down the chopsticks and returns to thinking. Identify the critical section parts (either eating, or thinking), and implement this scenario with process synchronization in Xinu.

    - Note1: During eating or thinking, the process just prints its process name, and state (i.e, eating or thinking).
    - Note2: Plain working implementation that solves critical section problem will be awarded 15 marks. Complete working implementation that both solve critical section problem, and prevent any potential deadlocks will be awarded with full 30 marks.
    - Note3: Explain your strategy, and implementation (especially highlighting what potential deadlocks may occur, and how that is prevented by your implementation) in a text file named, rollnumber_lab5c_readme.txt.

Note: In the main folder of rollnumber_lab5, attach all the .c, .txt files (if any), and screenshot images. Proper naming and explaining your implementation in readme file carries additional 5 marks. Problems 1 and 2 should not use semaphores or any hardware level process synchronization features.