Programming Assignment 2: Dinning Philosophers’ problem on your RaspberryPi or Linux Server

Due Date: May 8, 2014

Description

There are two parts of this assignment.

1) If you have not had the raspberry pi or linux sever, I would like to build or get one. You can use a pre-installed NOOBS SD card and download from this URL, http://www.raspberrypi.org/downloads/. Then, create a username “osgrader” and write the dinning philosophers’ program in pthread as described in part 2).

2) A dinning philosophers’ problem is a classic synchronization problem. Though, it does not notably represent a real-world problem, it provides a significant learning value, particularly in process synchronization. It is defined in our textbook as follows:

There are 5 philosophers who spend their time just thinking and eating. They sit at the table and each has his/her own chair. There is a rice bowl in the center of the table and there are 5 chopsticks which of each is laid next to the philosopher’s hand as shown below. When a philosopher thinks, he will not interact with others. Once in a while, a philosopher is hungry and tries to pick up chopsticks on his left and right-hand sides. A philosopher can pick only one chopstick at a time. When a hungry philosopher has chopsticks on both hands, he can start eating. When he is done eating, he puts both chopsticks down and starts thinking again.

Note: This picture is originally from Silberchatz’s book or instructor’s material.

Implement the above problem (5 philosophers) by creating 5 threads and using mutex for synchronization.

However, care must be taken to prevent a deadlock problem. One possible solution to alleviate the deadlock is known as “an asymmetric solution”, that is, an odd philosopher picks up first a left chopstick and then the right one, while an even philosopher picks up first a right chopstick and then the left one.
Write your program using pthread_create for each dinning philosopher. Your program should take two arguments; a number of time to eat and a number of philosophers’ eating’s from the command line.

% dphil 10 7  // each philosopher will eat 10 times before existing. There are 7 philosophers.
Philosopher 0 is thinking...
Philosopher 1 is eating...
Philosopher 3 is thinking...
Philosopher 4 is thinking...

How to Hand in yours & setup the user account on your linux/raspberryPi sever.

1. Print out 1st page of your program and sample of test results and submit them to me at the end of May 8 Class.
2. Allow my grader to login to your system. You can do either two following ways
   a) Set up your server and send an instruction to my grader on how to login. Your ip address and login name “osgrader” and passoword.
   b) Or bring in your raspberryPI or the system SD card and allow my grader to access your system at lab. You can make an appointment with him. His name is Wenjin and his e-mail address is wenjinpro@gmail.com