

National University of Computer and Emerging Sciences



System Call Implementation of

Sleeping Barber Problem

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**Description & Overview**

This project addresses the sleeping barber problem, employing pthreads, semaphores, and mutexes in C.

The Sleeping Barber Problem sets up a simulation of a barbershop scenario where a barber serves customers who arrive at the shop. It uses pthreads for concurrency, semaphores for synchronization, and mutexes for protecting critical sections.

Customers arrive at the shop, occupy available seats in the waiting room, and wait for their turn to be served by the barber. If no seats are available, they leave.

The barber serves customers one by one, either cutting their hair or sleeping if there are no customers waiting.

The project commenced on march and concluded by May. This report outlines the progress and key aspects of the project.

**Features**

The implemented solution encompasses the following features:

* Kernel Recompilation on Ubuntu 16 to implement System call
* Management of customer arrivals and barber services.
* Limitation of customers in the waiting room.
* Mutual exclusion ensuring only one customer occupies the barber chair at a time.
* Mechanism for the barber to sleep until a customer arrives.
* Regulation of customer waiting time until the barber finishes the haircut.
* Dynamic handling of customer and chair capacities.

**Technology used**

The project employs the following technologies:

* Ubuntu 16
* Programming Language: C
* Libraries: pthread.h, semaphores.h
* Concurrency Mechanisms: pthreads, semaphores, mutexes

**Conclusion:**

In conclusion, the current state of the project demonstrates successful implementation of the sleeping barber problem solution. The system effectively manages customer flow, ensuring orderly barber services while maintaining synchronization and concurrency. The project has progressed according to schedule, with all core functionalities

implemented and tested.

**Future Prospects:**

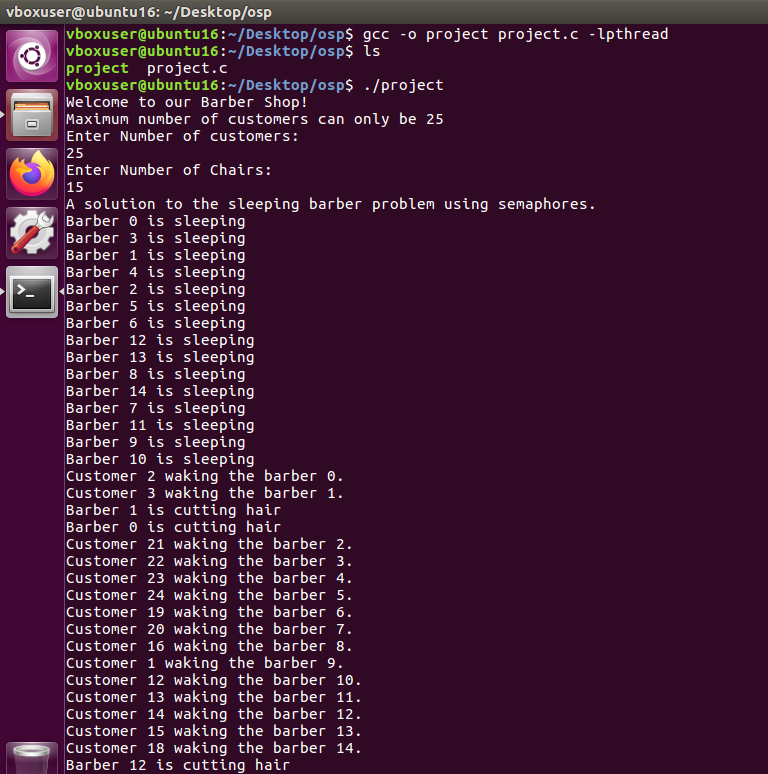
* Apply concurrency and synchronization techniques to optimize resource allocation in distributed systems or enhance performance in multi-threaded applications.
* Explore advanced synchronization mechanisms and concurrency models for further improvement in concurrent programming and parallel computing.
* Integrate the solution with emerging technologies like cloud computing for distributed environment adaptation and dynamic resource management.

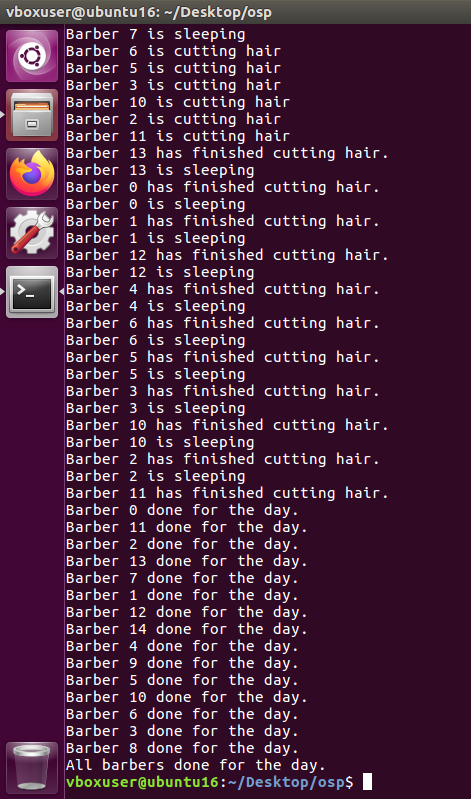
**References:**

<https://www.geeksforgeeks.org/sleeping-barber-problem-in-process-synchronization/>

[https://stackoverflow.com/questions/19692515/sleeping-barber-algorithm-with- multiple-barbers](https://stackoverflow.com/questions/19692515/sleeping-barber-algorithm-with-%20%20%20%20multiple-barbers)

**Code Snippets:**

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