OPERATING SYSTEMS (CS-2006)

PROJECT:

DINING PHILOSOPHER PROBLEM (SYSTEM CALL)

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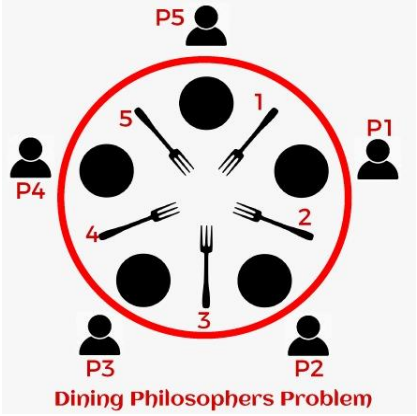
INTRODUCTION:

The dining philosopher's problem is the classical problem of synchronization which says that Five philosophers are sitting around a circular table and their job is to think and eat alternatively. A bowl of noodles is placed at the centre of the table along with five chopsticks for each of the philosophers. To eat a philosopher needs both their right and a left chopstick. In case if both immediate left and right chopsticks of the philosopher are not available then the philosopher puts down their (either left or right) chopstick and starts thinking again.



PROBLEM STATEMENT:

The Dining philosopher problem is an example of process synchronization problem. Philosopher is an analogy for process and chopstick for resources, we can try to solve process synchronization problems using this.

DESCRIPTION:

There are three states of the philosopher: THINKING, HUNGRY, and EATING.

Each philosopher must alternately think and eat. However, a philosopher can only eat noodles when they have both left and right forks. Each fork can be held by only one philosopher at a time and so a philosopher can use the fork only if it is not being used by another philosopher. After an individual philosopher finishes eating, they need to put down both forks so that the forks become available to others. A philosopher can only take the fork on their right or the one on their left as they become available, and they cannot start eating before getting both forks.

Eating is not limited by the remaining amounts of noodles or stomach space; an infinite supply and an infinite demand are assumed.

The problem is how to design a discipline of behaviour (a concurrent algorithm) such that no philosopher will starve, i.e., each can forever continue to alternate between eating and thinking, if no philosopher can know when others may want to eat or think.