

Operating System: Dining-Philosopher Problem

By: Vishvadeep Gothi



VISHVADEEP GOTHI SIR

**AIR- 19, 119, 440, 682
in GATE**



**ME from IISc Bangalore
Mtech BITS Pilani in Data
Science**



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10+ Years in GATE/IES**



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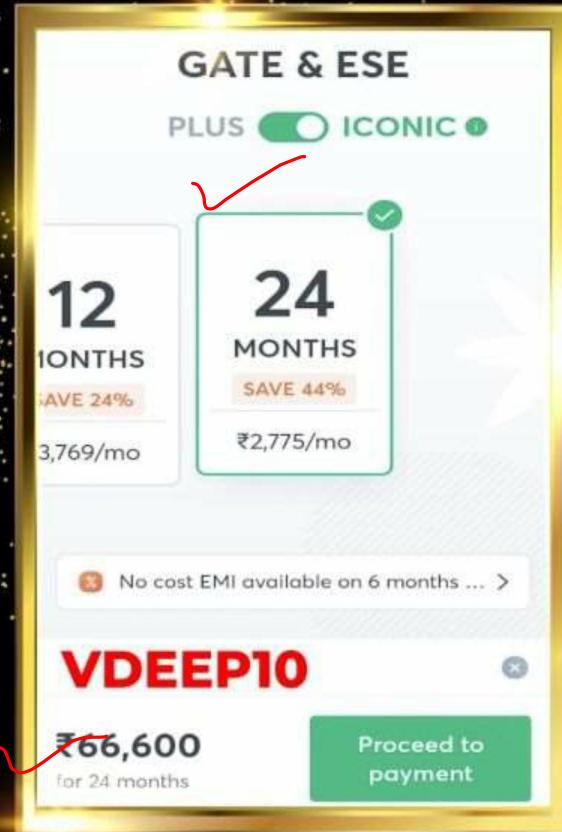
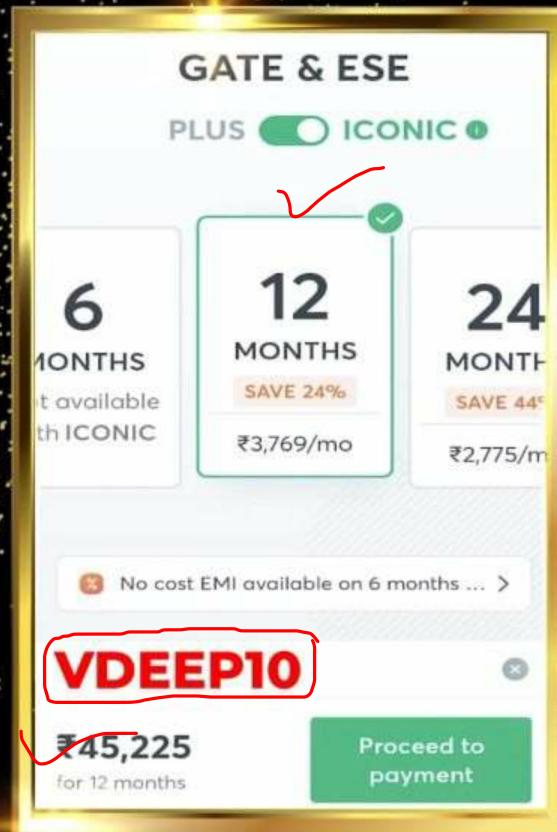
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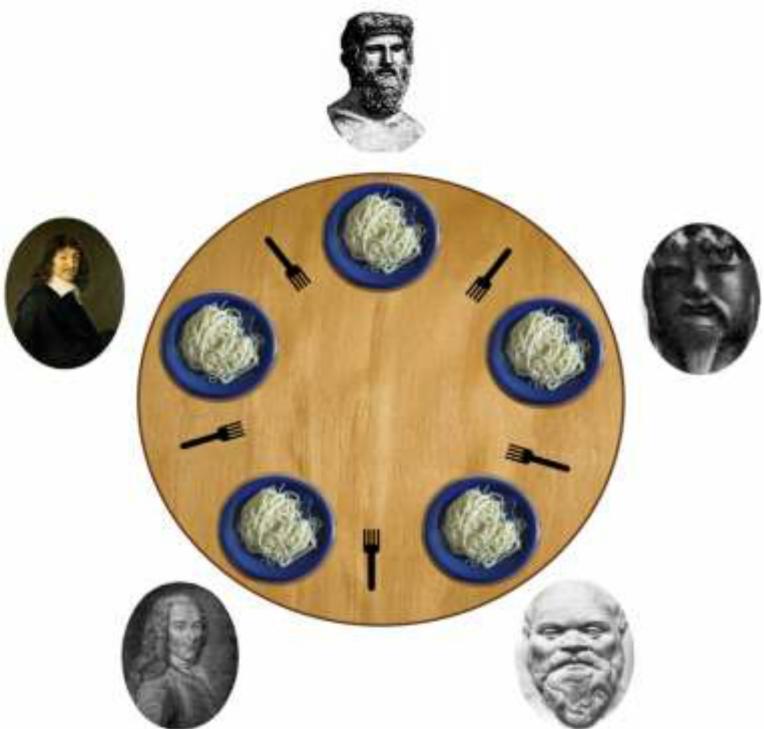
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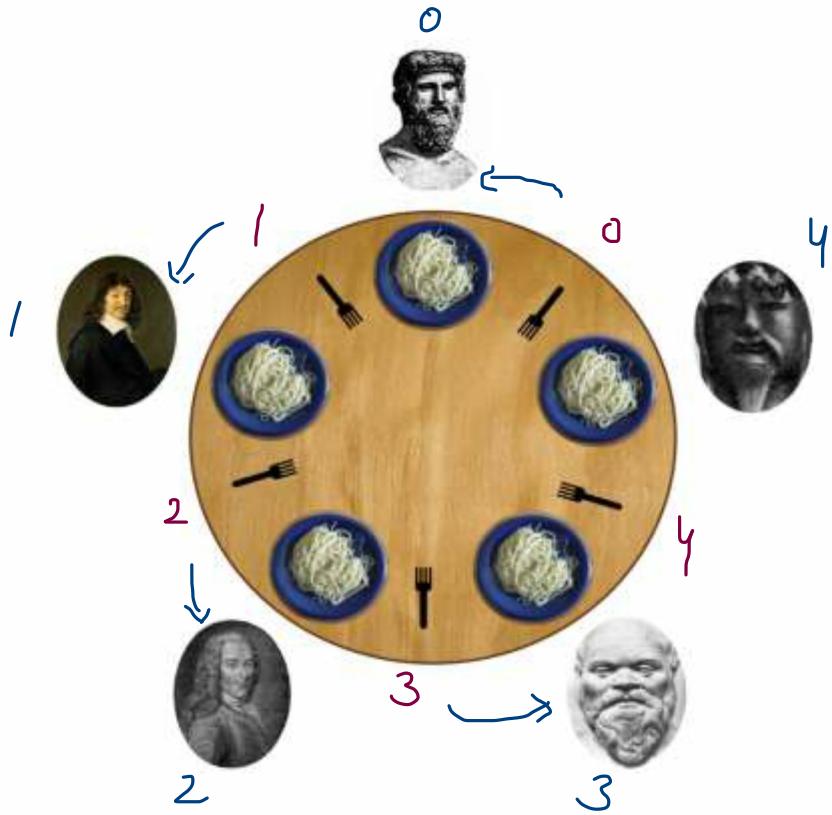
Dining Philosopher Problem

- ◎ K philosophers seated around a circular table
- ◎ There is one chopstick between each philosopher
- ◎ A philosopher may eat if he can pick up the two chopsticks adjacent to him
- ◎ One chopstick may be picked up by any one of its adjacent followers but not both



Dining Philosopher Problem: Solution

Chopstick [5]



Dining Philosopher Problem: Solution

Philosopher $\Rightarrow i$

`pick (chopstick [i])`

`pick (chopstick [(i + 1) % k])`

`// eat`

`release (chopstick [i])`

`release (chopstick [(i + 1) % 5])`

Solution using Semaphore :-

Binary Semaphore array $\text{chopstick}[5] = \{ 1, 1, 1, 1, 1 \}$

{
 wait(chopstick[i])
 wait(chopstick[(i+1) % k])

//eat

 signal(chopstick[i])
 signal(chopstick[(i+1) % 5])
}

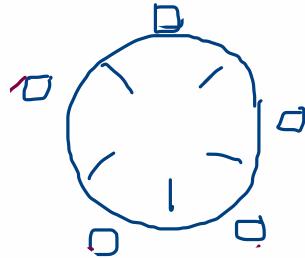
Dining Philosopher Problem: Solution

- ◎ This solution can lead to a deadlock

Dining Philosopher Problem: Solution

Some of the ways to avoid deadlock are as follows –

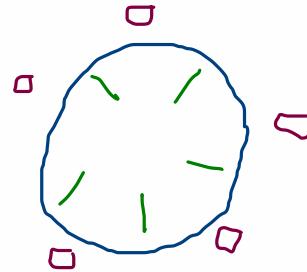
1. There should be at most $(k-1)$ philosophers on the table



Dining Philosopher Problem: Solution

Some of the ways to avoid deadlock are as follows –

1. There should be at most $(k-1)$ philosophers on the table
2. A philosopher should only be allowed to pick their chopstick if both are available at the same time



Dining Philosopher Problem: Solution

Some of the ways to avoid deadlock are as follows –

1. There should be at most $(k-1)$ philosophers on the table
2. A philosopher should only be allowed to pick their chopstick if both are available at the same time
3. One philosopher should pick the ~~left~~^{right} chopstick first and then ~~right~~^{left} chopstick next; while all others will pick the right one first then left one

Dining Philosopher Problem: Solution

all will run



wait(chopstick[i])

wait(chopstick[(i+1)%k])

//eat

signal(chopstick[i])

signal(chopstick[(i+1)%k])

1 philosopher will run

wait(chopstick[(i+1)%k])

wait(chopstick[i])

//eat

signal(chopstick[(i+1)%k])

signal(chopstick[i])

Next Class

Deadlock

~~Dining Philosopher Problem~~

~~Classical Problems on
Synchronization~~

Revision tom. → 9 am

2 interviews → 11 am
→ 12 pm

>>>> ▶ + ⏴

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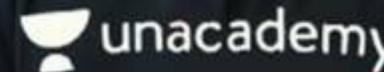
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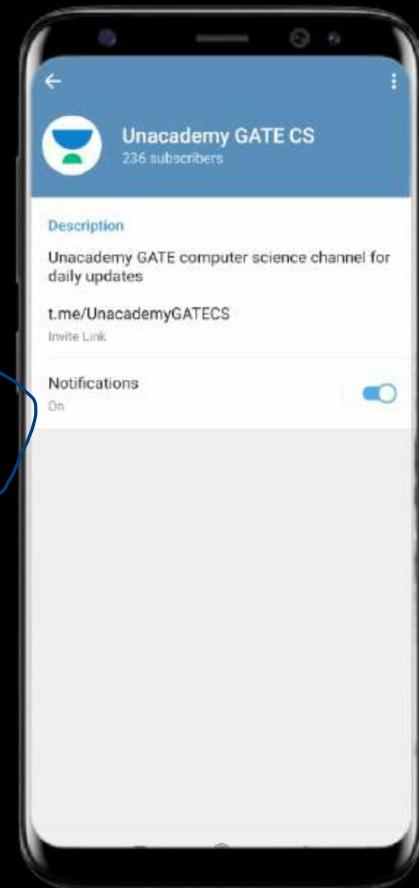
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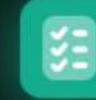


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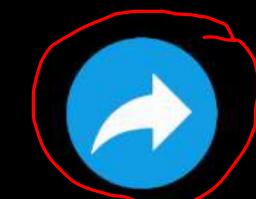
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