

# Operating System: Threads & Multi-threading

By: Vishvadeep Gothi



# VISHVADEEP GOTHI SIR

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



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



**14+ Years of Teaching Experience,  
10+ Years in GATE/IES**



**Subjects Taken:**  
Computer Organization & Architecture,  
data structure, operating system,  
C-Programming, Data science,  
Machine Learning, Python,  
coding interview problems,





# Vishvadeep Gothi

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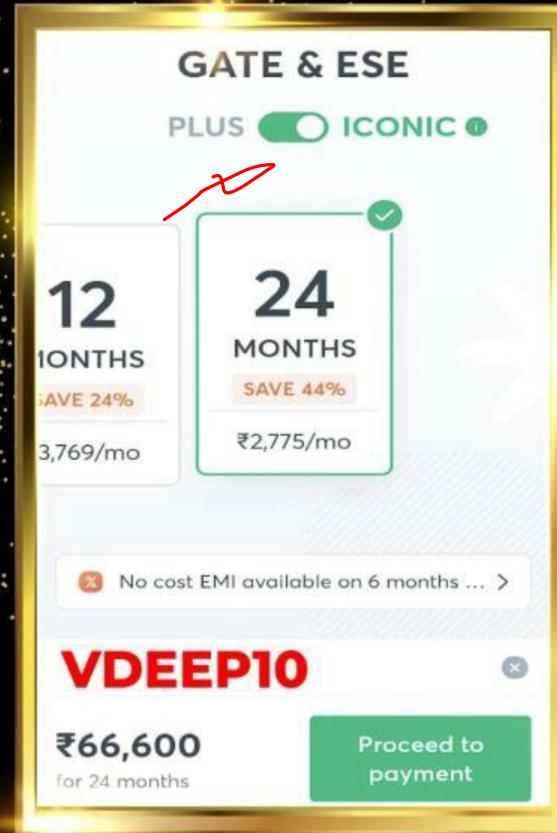
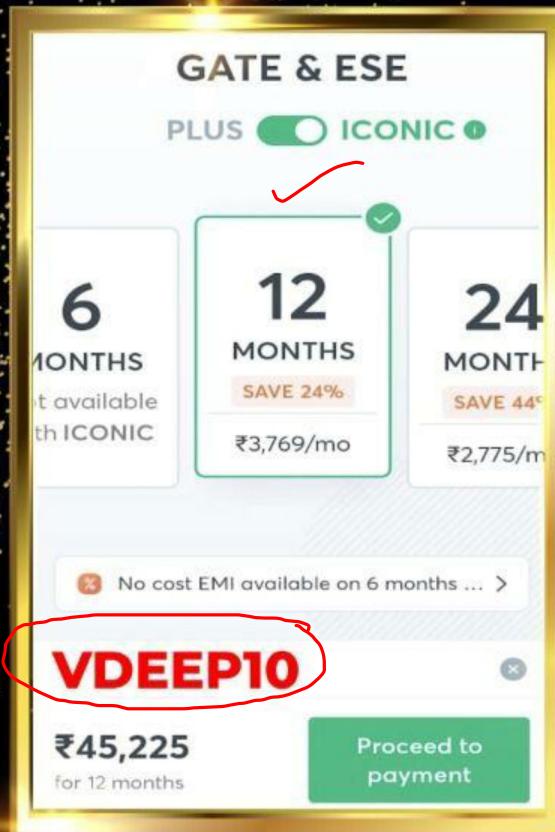
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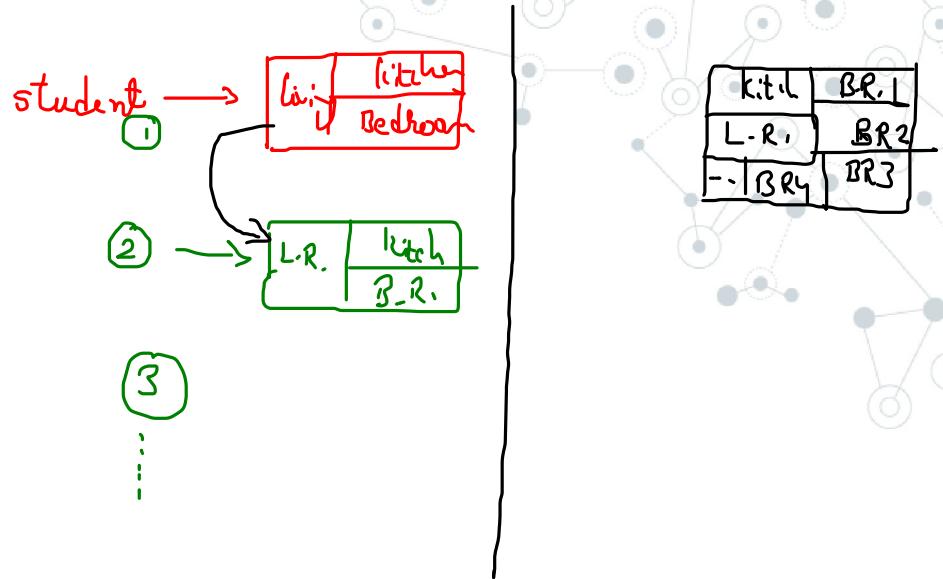
# Thread

Component of process

or

Lightweight Process

- Provide a way to improve application performance through parallelism

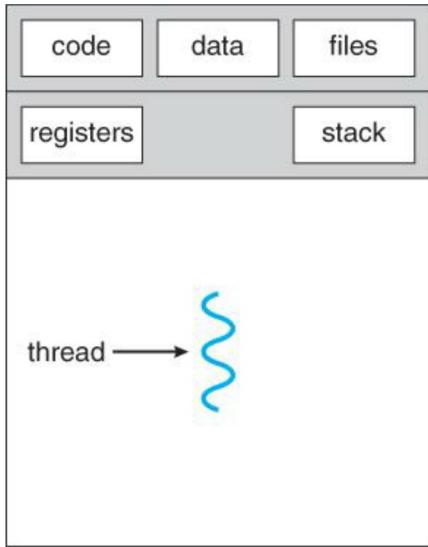


# Thread

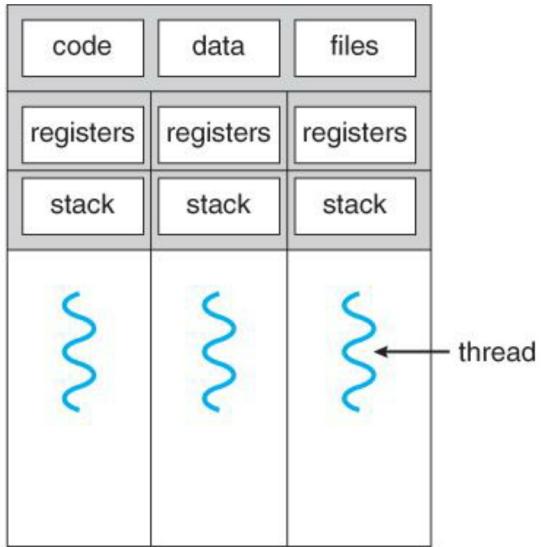
Shared Among Threads	Unique For Each Thread
Code Section	✓ Thread Id
Data Section	✓ Register Set
OS Resources	✓ Stack
Open Files & Signals	✓ Program Counter



# Thread



single-threaded process

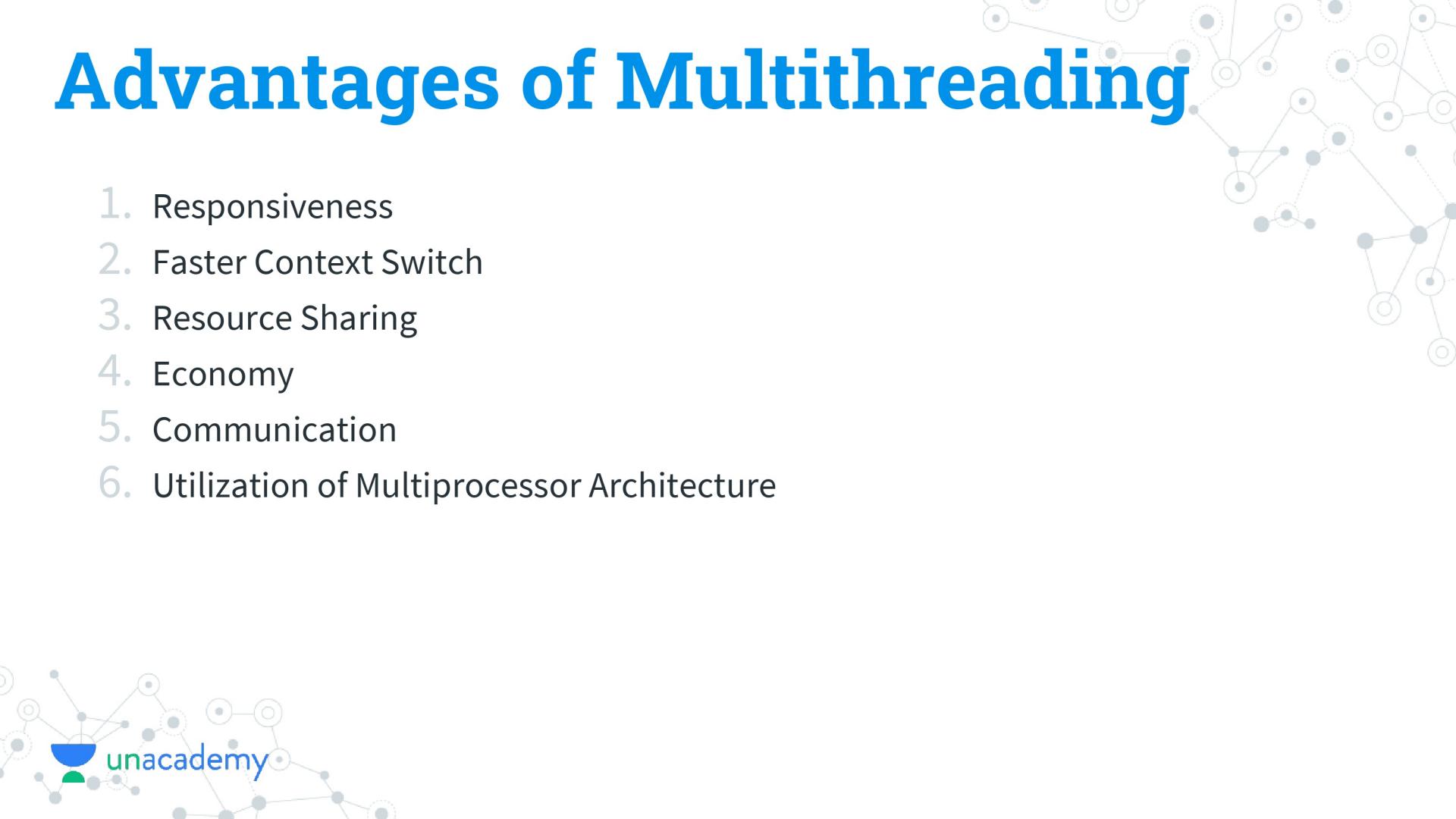


multithreaded process



# Advantages of Multithreading

1. Responsiveness
2. Faster Context Switch
3. Resource Sharing
4. Economy
5. Communication
6. Utilization of Multiprocessor Architecture



# Types of Thread

1. User Level Thread
2. Kernel Level Thread

multithreading in user process

in os [kernel] processes



# Types of Thread

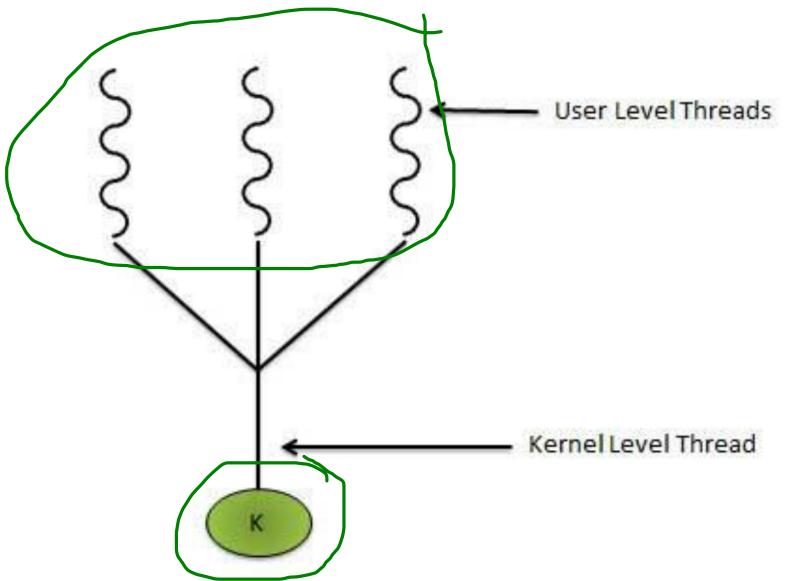
User Threads	Kernel Thread
Multithreading in user process	Multithreading in kernel process
Created without kernel intervention	Kernel itself is multithreaded
Context switch is very fast	Context switch is slow
If one thread is blocked, OS blocks entire process	Individual thread can be blocked
Generic and can run on any OS	Specific to OS
Faster to create and manage	Slower to create and manage

# Multithreading Model

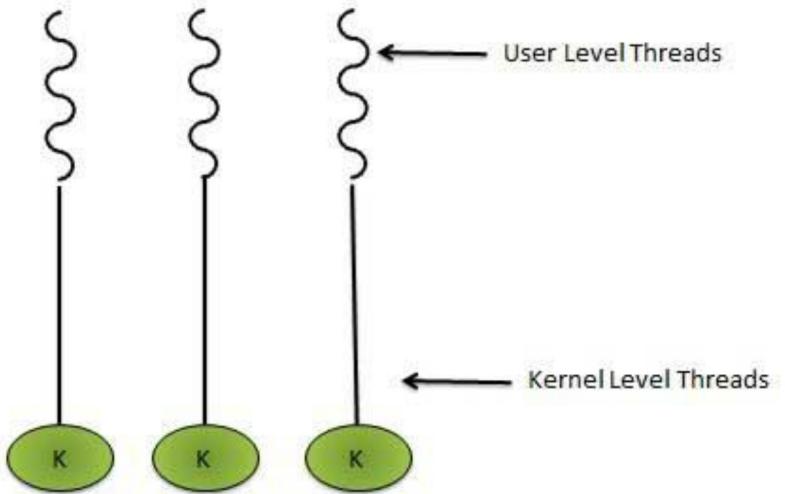
1. Many-to-One Model
2. One-to-One Model
3. Many-to-Many Model



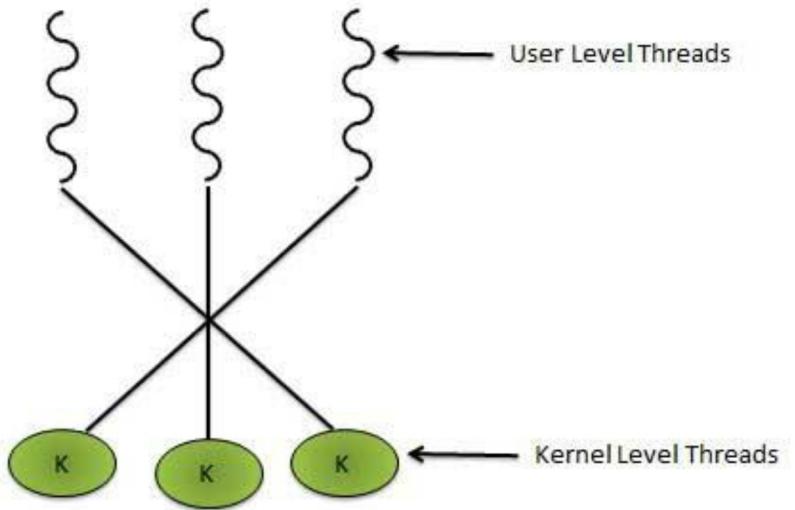
# Many-to-One



# One-to-One



# Many-to-Many



# Next Class

System Call ✓

Saturday :- JS Revision  
9 AM



Friday :- Most imp. - logic  
{ memory management }

✓ fork()

Friday :- 4:15 pm → Complex problem  
on CPU scheduling

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SAVE 44%

₹2,775/mo

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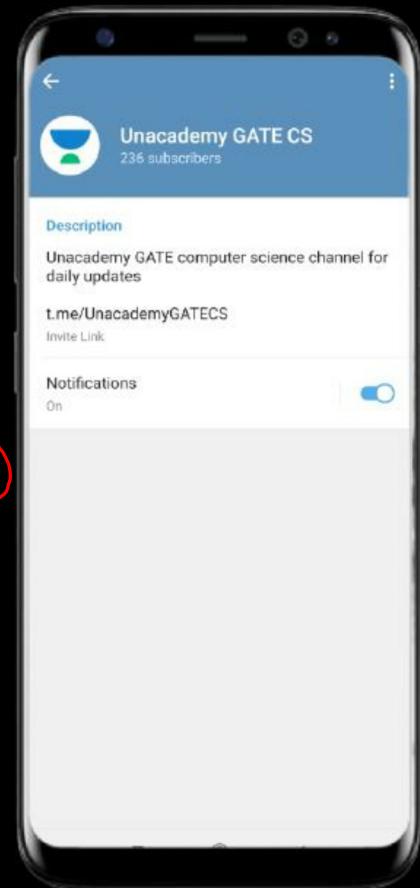
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