

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,





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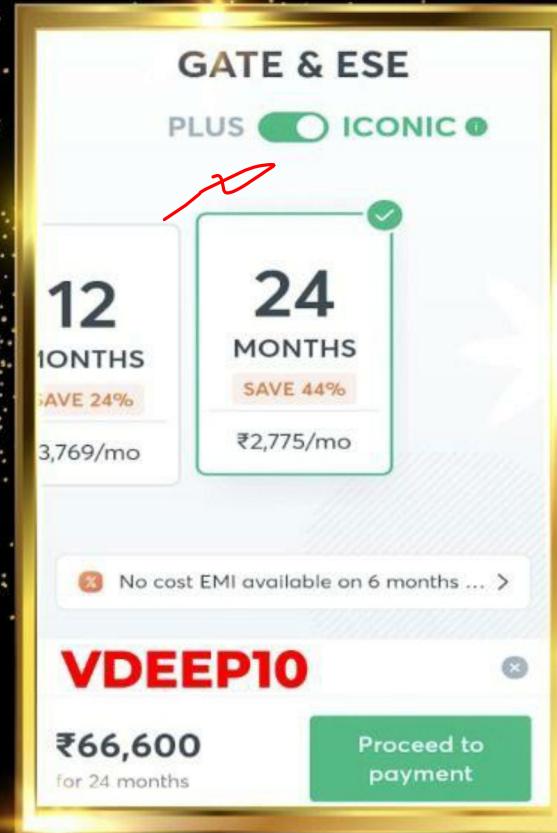
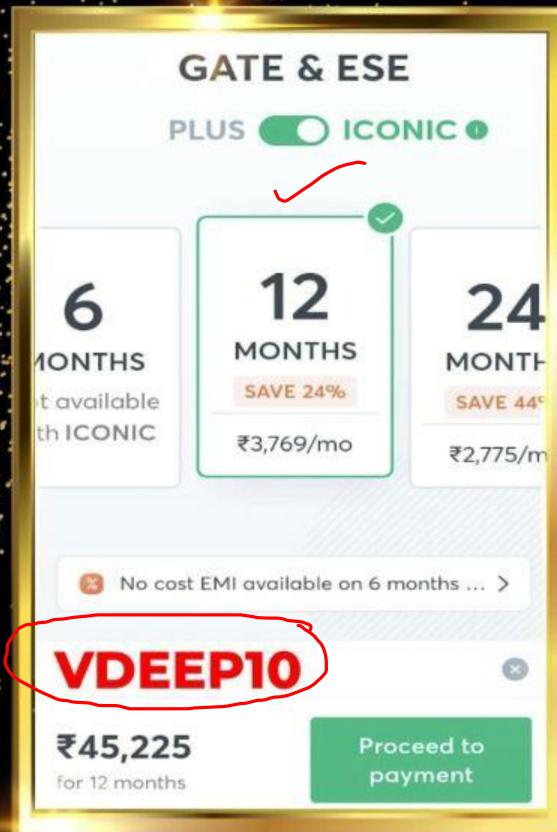
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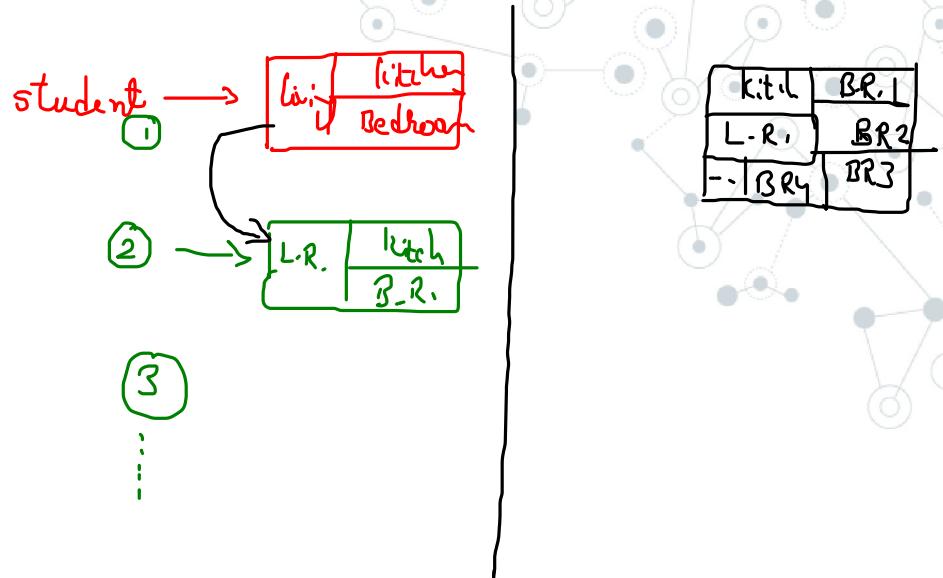
Thread

Component of process

or

Lightweight Process

- Provide a way to improve application performance through parallelism

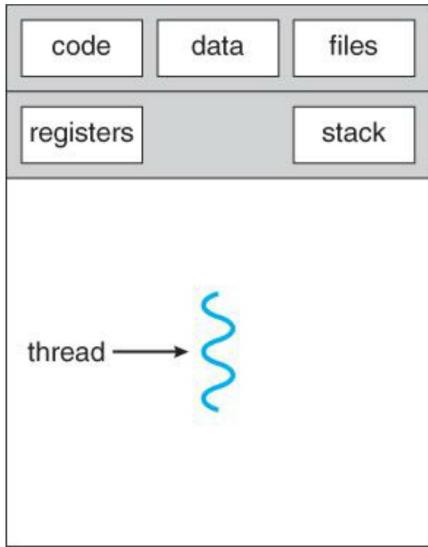


Thread

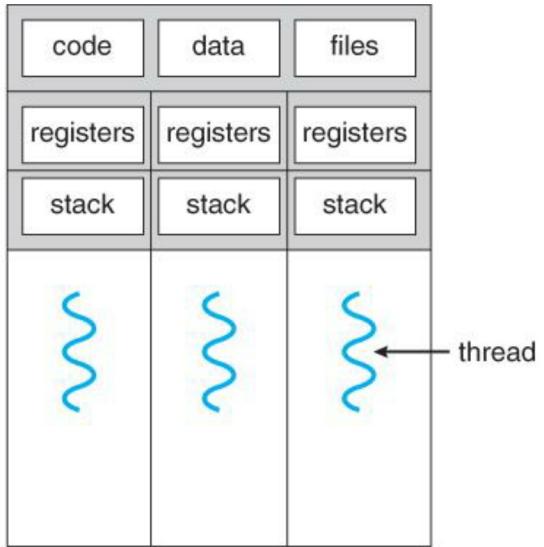
Shared Among Threads	Unique For Each Thread
Code Section	✓ Thread Id
Data Section	✓ Register Set
OS Resources	✓ Stack
Open Files & Signals	✓ Program Counter



Thread



single-threaded process



multithreaded process



Advantages of Multithreading

- 
1. Responsiveness Threads are like small process and they share a common area so they are fast .
 2. Faster Context Switch Large process have a slower context switch and threads are smaller so
 3. Resource Sharing
 4. Economy Require less size memory .
 5. Communication
 6. Utilization of Multiprocessor Architecture On multiple CPUs we can run multiple threads concurrently and all are parallel.
- 

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

User level threads are typically fast

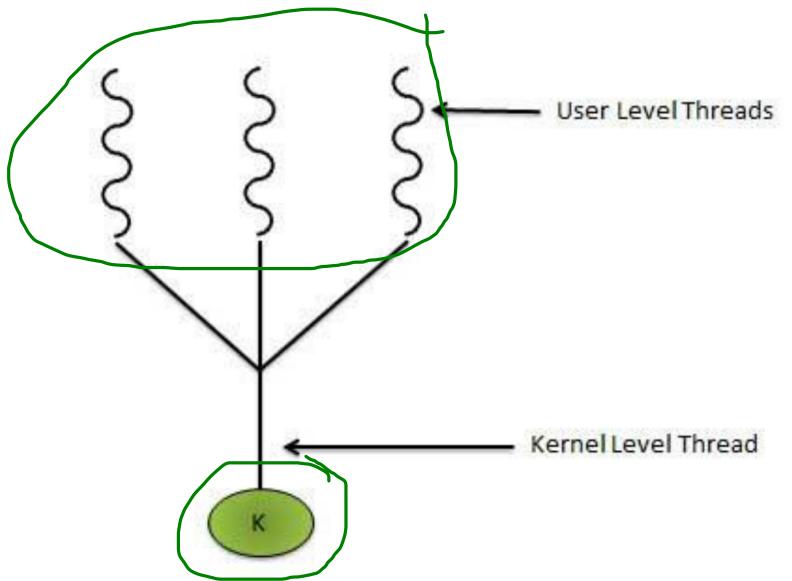
Kernel level threads are typically slow

Multithreading Model

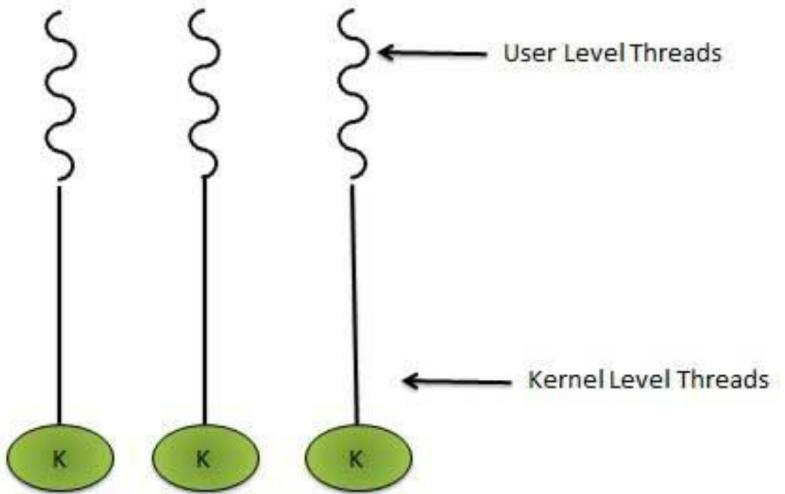
1. Many-to-One Model
2. One-to-One Model
3. Many-to-Many Model



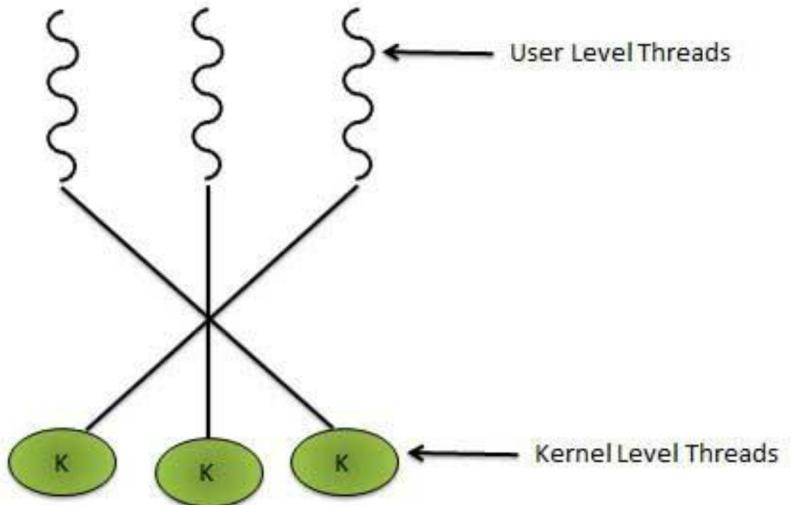
Many-to-One



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%

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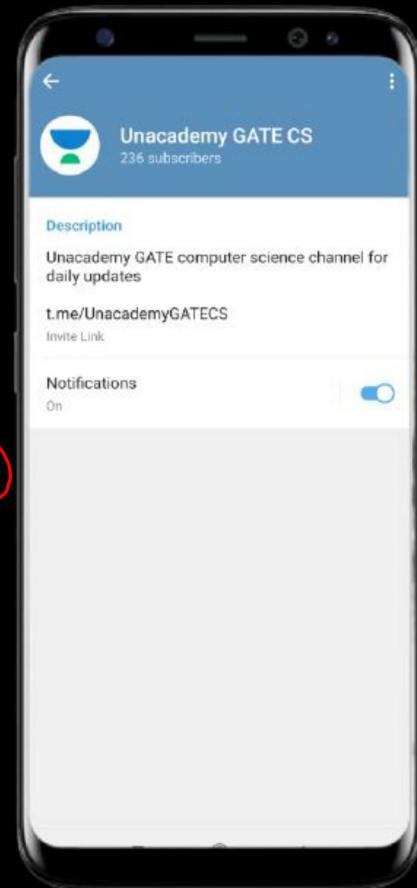
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