

**Department of Computer Science and Engineering**

**FACULTY OF ENGINEERING AND TECHNOLOGY  
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**CS-501**

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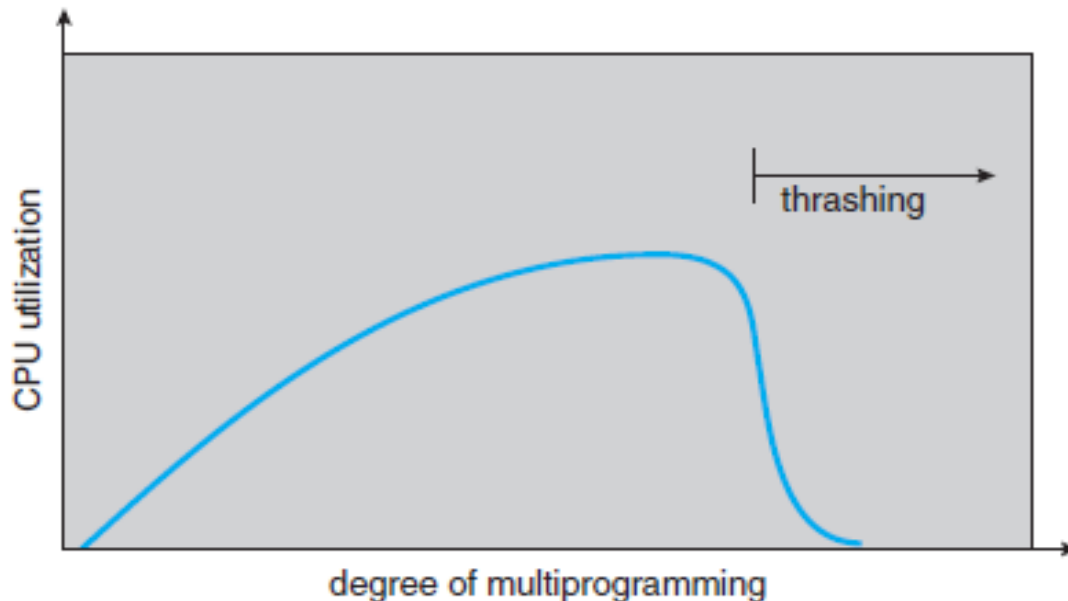
THRASHING

# Thrashing<sup>1/4</sup>

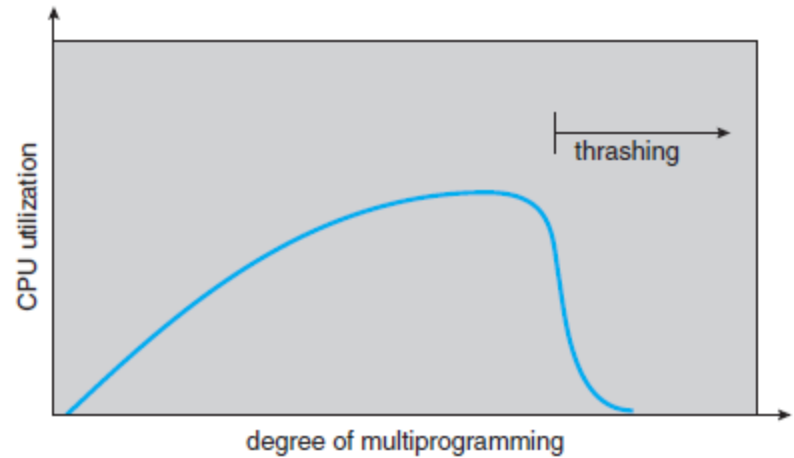
- If a process does not have “*enough*” pages, the page-fault rate is very high.
- This leads to:
  - *Low* CPU utilization
  - Operating system thinks that it needs to increase the *degree of multiprogramming*.
  - Again number of frames per process decrease so *page fault* rather increase more.

# Thrashing<sup>2/4</sup>

- *This high paging activity is called thrashing.*
- A process is thrashing if it is spending more time *paging* than executing.
- Thrashing results in severe *performance problems*.



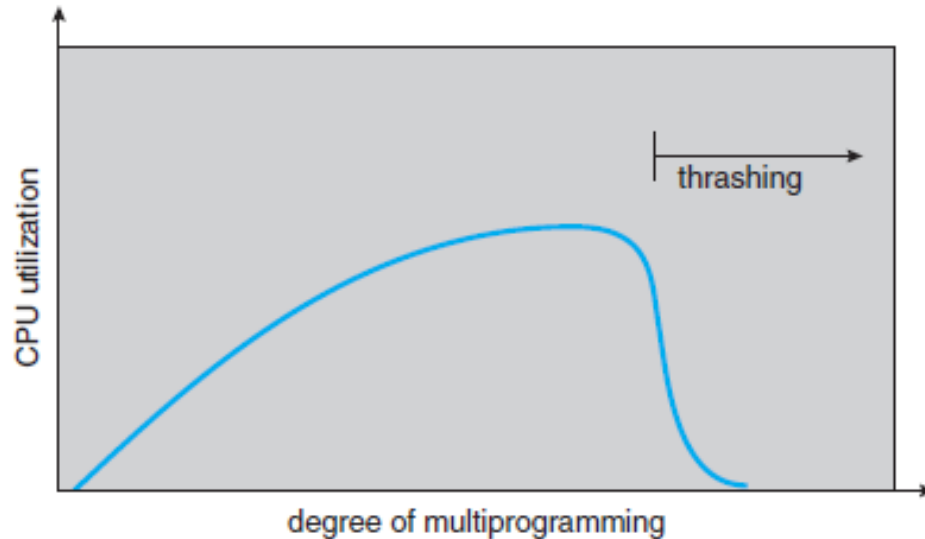
# Thrashing<sup>3/4</sup>



- **Explanation:**

- As the degree of multiprogramming increases, CPU utilization also increases until a *maximum* is reached.
- If the degree of multiprogramming is increased even further, *thrashing* sets in, and CPU utilization drops sharply.
- At this point, to increase CPU utilization and stop thrashing, we must decrease the *degree of multiprogramming*.

# Thrashing<sup>4/4</sup>



- **Solution:**

- The *locality model* states that, as a process executes, it moves from locality to locality.
- A locality is a *set of pages* that are actively used together.
- A *program* is generally composed of several different localities, which may overlap.

# Other Considerations

- **Prepaging:**

- Prepaging is an attempt to prevent this high level of initial paging.
- The strategy is to bring into memory at one time all the pages that will be needed.

# Other Considerations

- **Page Size:**

- The problem has *no best answer*.
- Some factors (*internal fragmentation, locality*) argue for a small page size, whereas others (*table size, I/O time*) argue for a large page size.
- However, the historical trend is toward larger page sizes, even for mobile systems.



# References

1. Silberschatz, Galvin and Gagne, “Operating Systems Concepts”, Wiley.
2. William Stallings, “Operating Systems: Internals and Design Principles”, 6<sup>th</sup> Edition, Pearson Education.
3. D M Dhamdhere, “Operating Systems: A Concept based Approach”, 2<sup>nd</sup> Edition, TMH.

**Thank You.**

