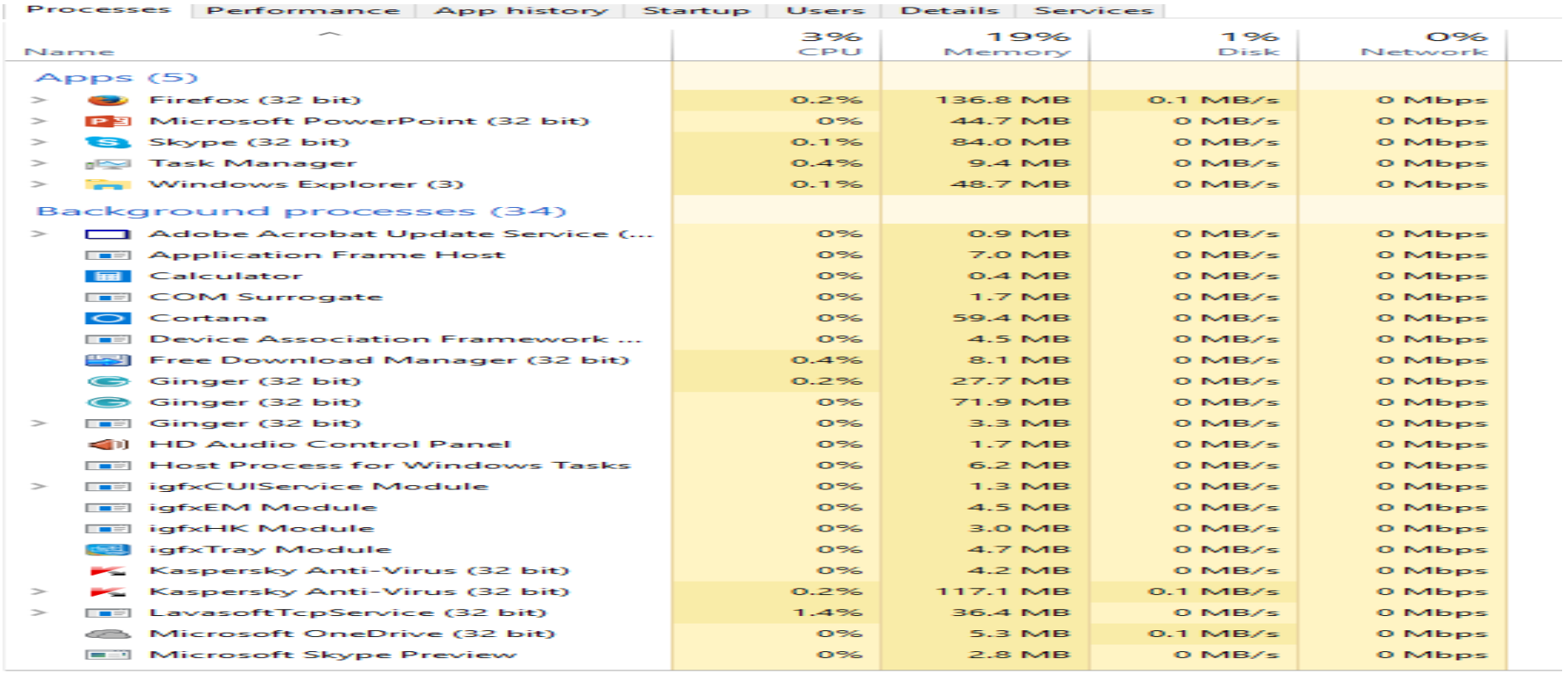
Topics

- What is a Process, Process Control Block?
- What is Multitasking?
- What is Mutithreading ?
- Thread vs Process?

What is Process ?

- Process is nothing but an instance of program in execution (Unit of work in modern time-sharing systems)
- Modern operating systems can concurrently execute multiple processes.



What is Process Control Block?

https://en.wikipedia.org/wiki/Process_control_block

- Process Control Block (PCB) is a Data Structure Maintained by Operating System for each Process
- PCB Contains Information which is Required to Manage Each Process
- A Typical PCB Generally Contains

1. Program Counter (PC)
2. Stack Pointer (SP)
3. CPU Registers
4. Process State Information

What is Context Switching?

- Each Process Runs in its Own Address Space and OS Maintains a Separate PCB for Each Process [No Sharing of Memory]
- Context Switching Means Shifting the Control of CPU from the Currently Running Process to Some Other Process
- During Context Switching the Present State of the Currently Executing Process is Saved onto a Specialized Memory Area Known as Stack.
- Program Counter, Stack Pointer and Other Important CPU Registers are loaded with values according to the Process which is Going to be Executed Next
- Context Switching is Quite Expensive in Processes

What is Multitasking?

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- *"The ability to have more than one program working at what seems like at the same time"*

Examples :

- **You can Edit while Printing a document**
- **Web Page may be Loading Multiple Images while Accepting User Inputs**

Multitasking Ways

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- **Preemptive Multitasking → OS Simply Suspends the Currently Running Process and Shifts the Control to Some Other Process (Windows 3.1, Mac OS)**
- **Cooperative Multitasking → OS Shifts the Control to Some Other Process Only When the Currently Running Process Yields control. (Non-preemptive Multitasking) Linux, Windows NT,95**

What is a Multithreading?

- Basis of Multi-Tasking at an Individual Program Level
- An Individual Program will Appear to do Multiple Tasks at the Same Time. Each Individual Task is Handled by a Thread
- "A thread of execution is a program unit that is executed independently of other parts of the program" [Light Weight Process]
- If a Program Creates Multiple Threads then all These Threads will Execute in the Same Address Space and Will Use the Same Data Structures [Sharing of Memory]

Process vs Thread

S.No	Process	Thread
1	No Sharing of Memory	Sharing of Memory
2	Can Not Corrupt Data Structures	Can Corrupt Data Structures
3	Context Switching is Expensive	Context Switching is Cheaper

Thank You