Cores Functionality

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1 Introduction

Modern computing systems utilize multiple CPU cores to improve performance by parallelizing tasks. Multicore processors allow applications to distribute workloads across several cores, leading to improved efficiency and responsiveness. However, some applications are not optimized for multicore usage, leading to uneven resource distribution. In this report, we analyze the behavior of multicore and single-core applications through system monitoring tools to understand how they utilize processing resources [1].

2 Methodology

To evaluate CPU core utilization, we opened different applications and monitored their resource usage using the Windows Task Manager. The applications were categorized into multicore and single-core, and their CPU activity was observed and captured in screenshots.

Multicore

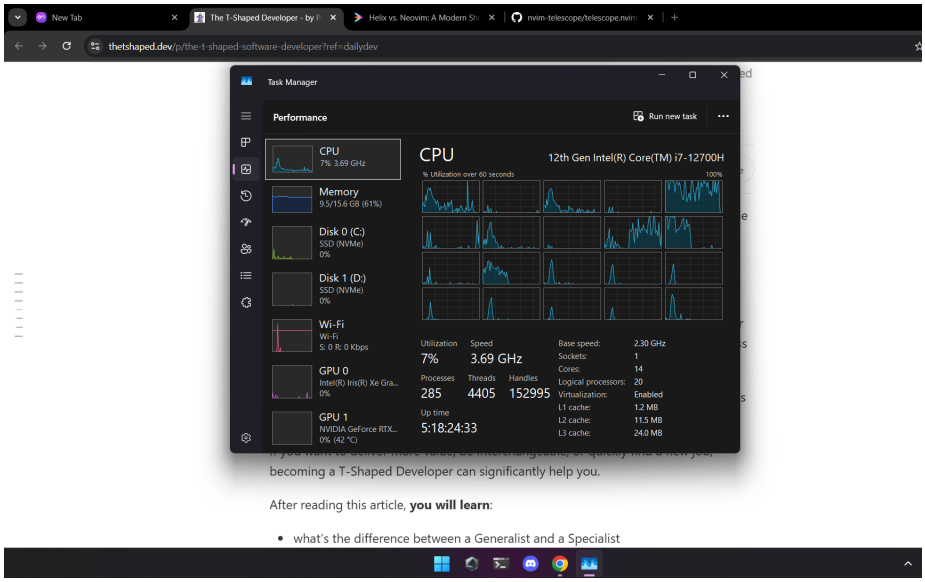

Figure 1: Google Chrome

Google Chrome utilizes multiple cores to manage multiple tabs and background processes.

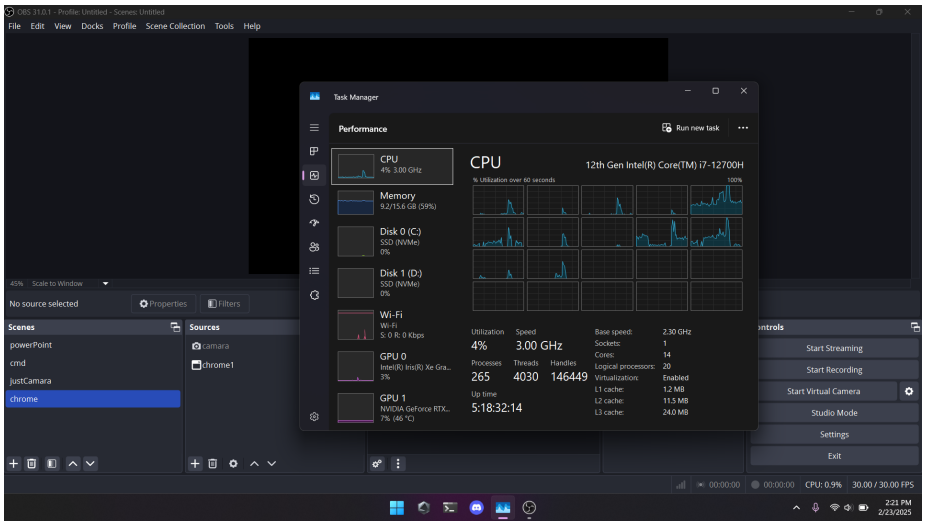

Figure 2: OBS software

OBS software makes use of multiple cores for video encoding and streaming.

Figure 3: League of Legends client

The League of Legends client employs multiple cores for rendering and network operations.

Singlecore

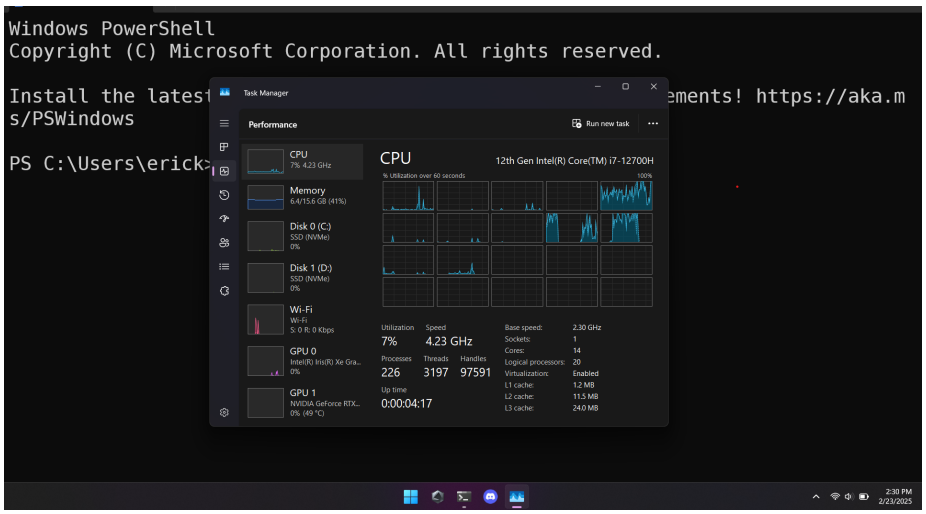

Figure 4: Powershell

Powershell is expected to use a single core, but background processes may distribute the load.

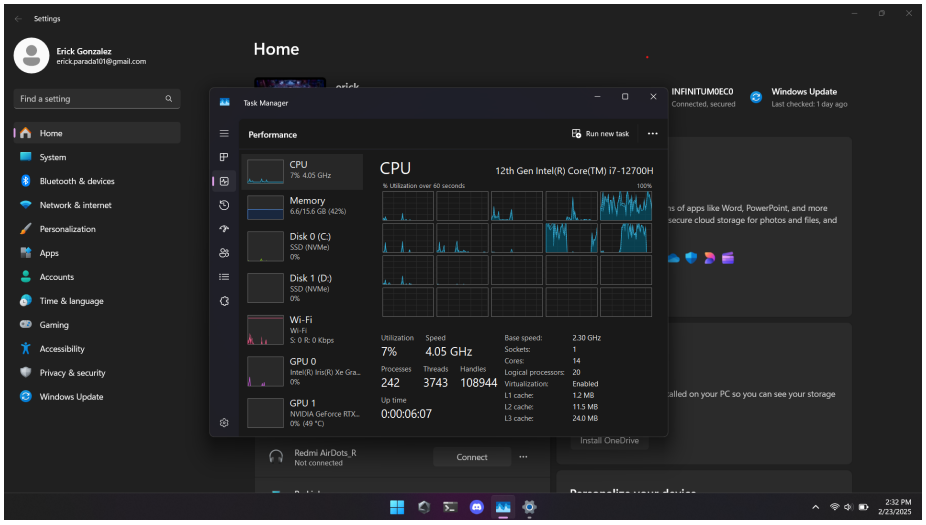

Figure 5: Windows Settings app

The Windows Settings app is mostly lightweight but interacts with system services that may involve multiple cores.

Figure 6: Calculator

The Calculator is a basic application that should use minimal CPU resources but may still involve multiple threads.

3 Analysis

Despite being categorized as single-core applications, the observed programs did not exclusively utilize a single core. This can be attributed to modern operating system scheduling, which dynamically assigns processes across multiple cores for efficiency. Even lightweight applications have background processes and system interactions that lead to activity on more than one core.

Multicore applications, such as Google Chrome and OBS, are optimized to distribute workloads efficiently across available cores. Chrome, for example, assigns different processes to separate cores, while OBS offloads encoding tasks to multiple threads. This improves performance but also increases overall CPU utilization.

Application	Cores Used
Google Chrome	Multiple
OBS Software	Multiple
League of Legends Client	Multiple
Powershell	Multiple
Windows Settings	Multiple
Calculator	Multiple

Table 1: Observed applications and their core usage.

4 Conclusion

The experiment demonstrates that even applications traditionally considered single-core do not exclusively use a single processor core. This behavior is due to the operating system's task scheduling and the presence of background tasks. Applications optimized for multicore processors exhibit improved responsiveness and performance, while those that are not may experience inefficiencies when handling complex tasks. Understanding core utilization helps in evaluating system performance and optimizing workload distribution.

References

[1] What are CPU cores? How many CPU cores do I need? (2021, May 28). The Windows Club; TheWindowsClub. https://www.thewindowsclub.com/what-are-cpu-cores