Unit 25, Assignment 2

Maintaining Computer Systems

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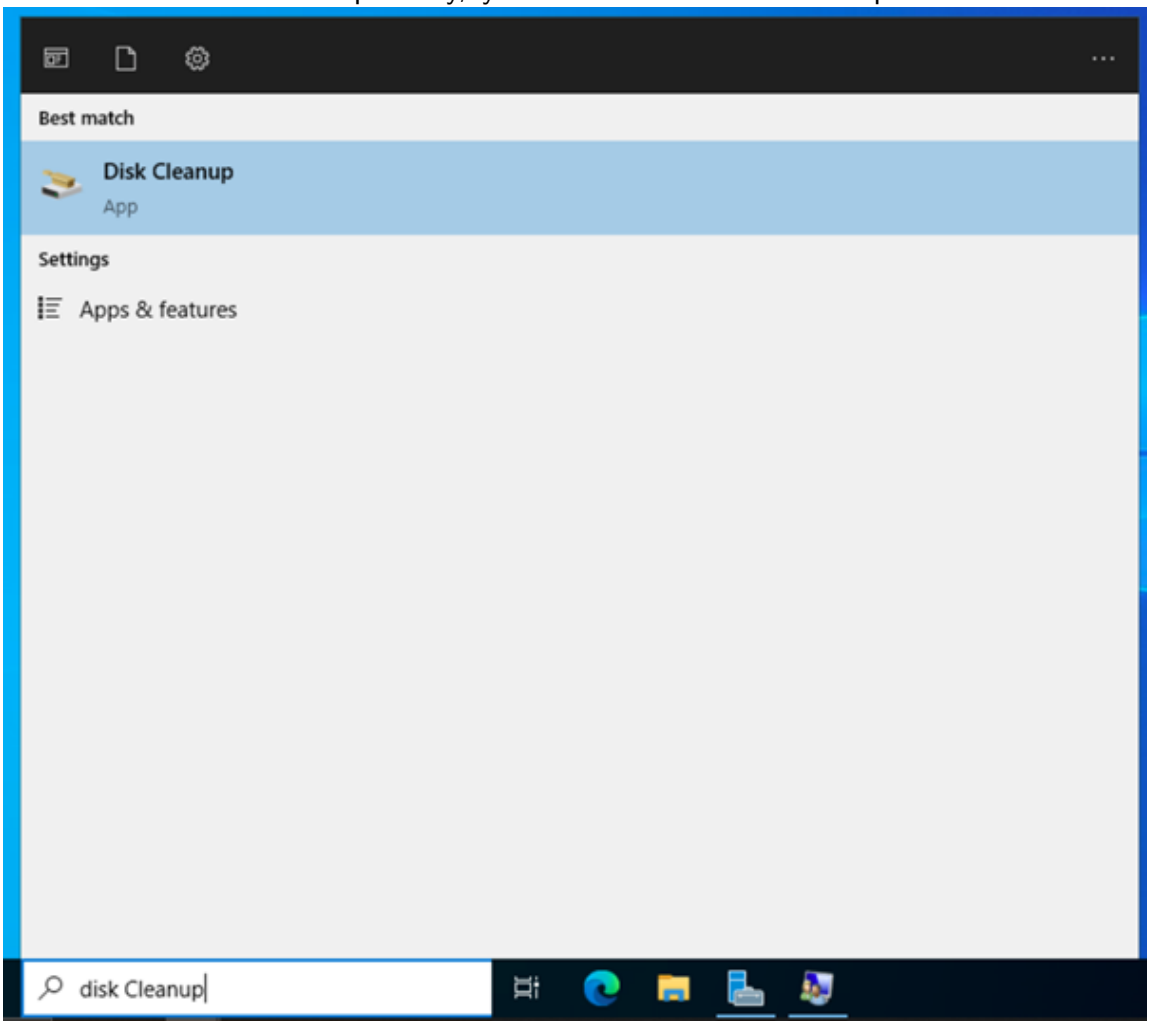
December 6, 2022

Routine Maintenance

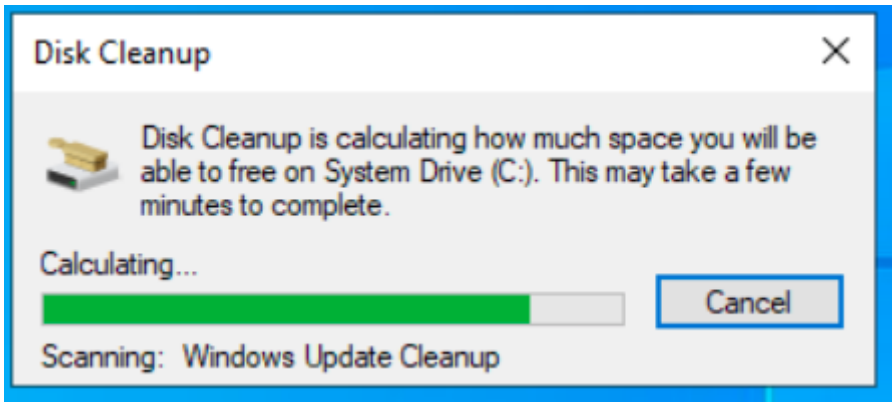
Software

Disk Clean-up

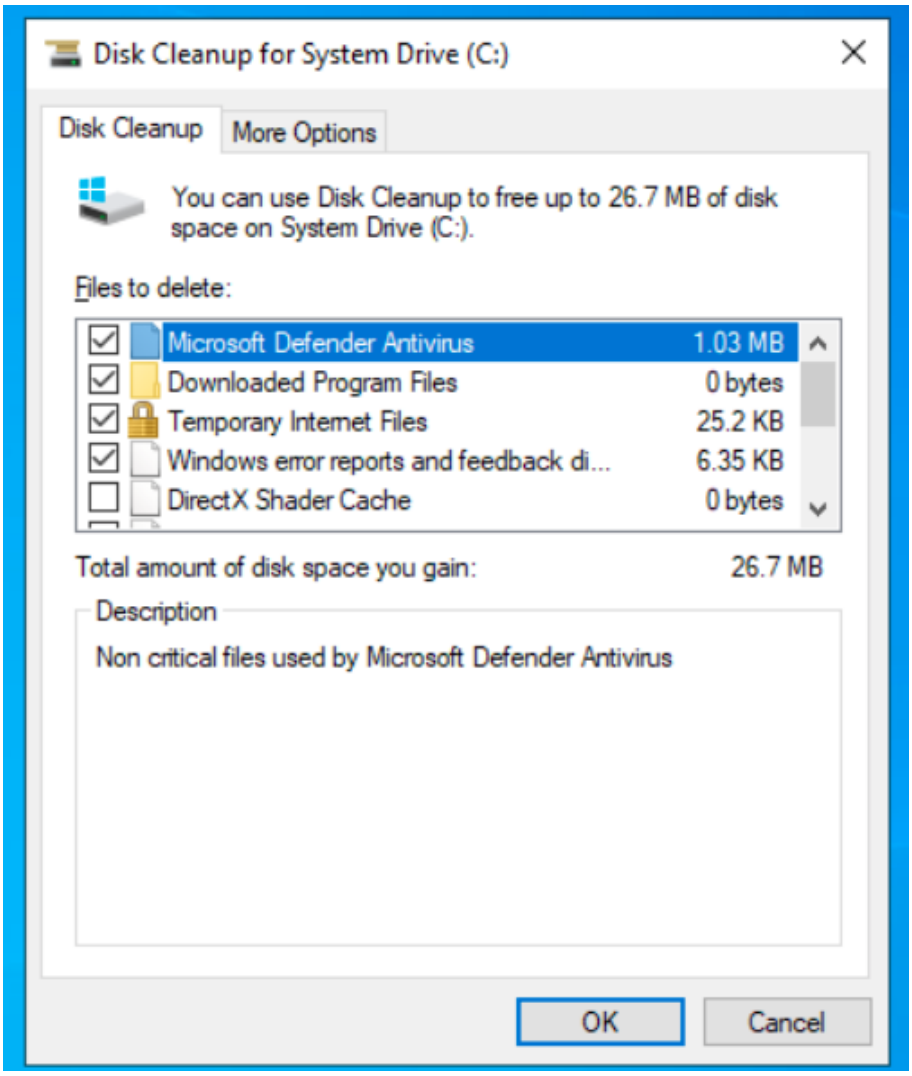
To access the file clean-up utility, you can search Disk Clean-up in the search bar.



Windows will now scan your drives looking for any files that can be cleaned up.



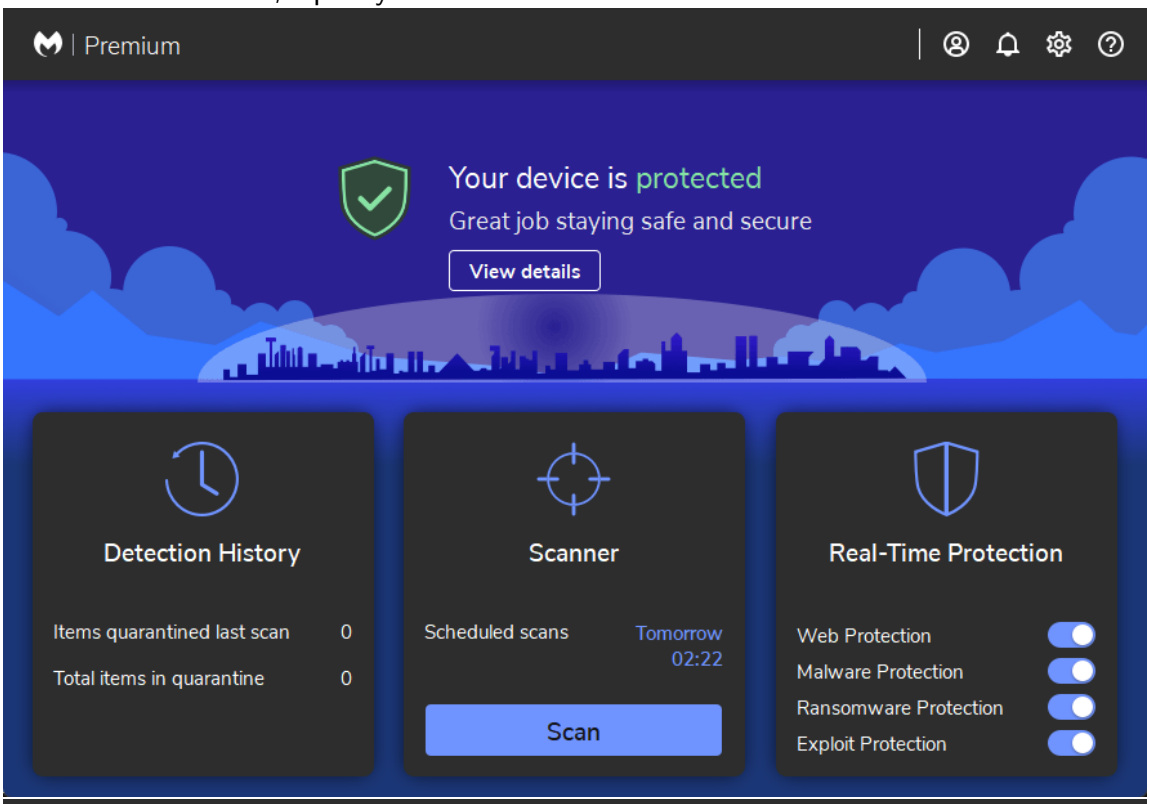
After this is completed, a summary of files will be shown, and you can choose what you want to be removed.

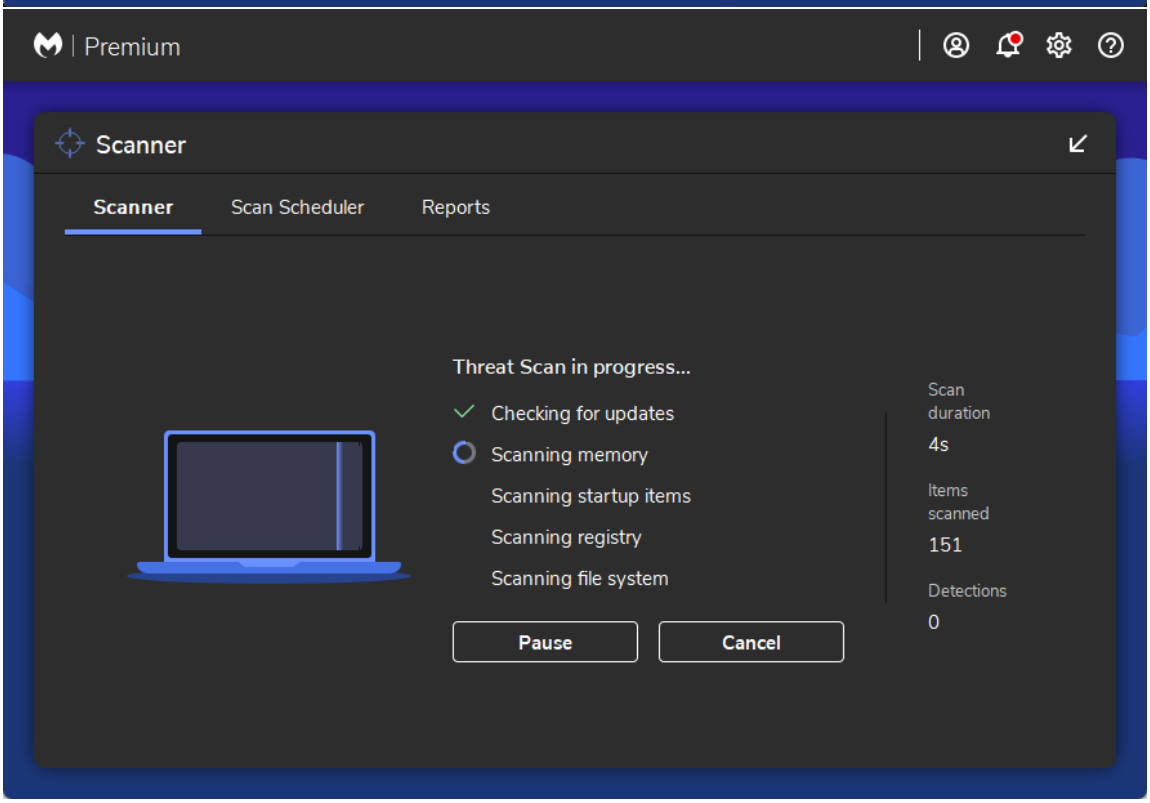


After pressing OK, the system will now start deleting the files selected.

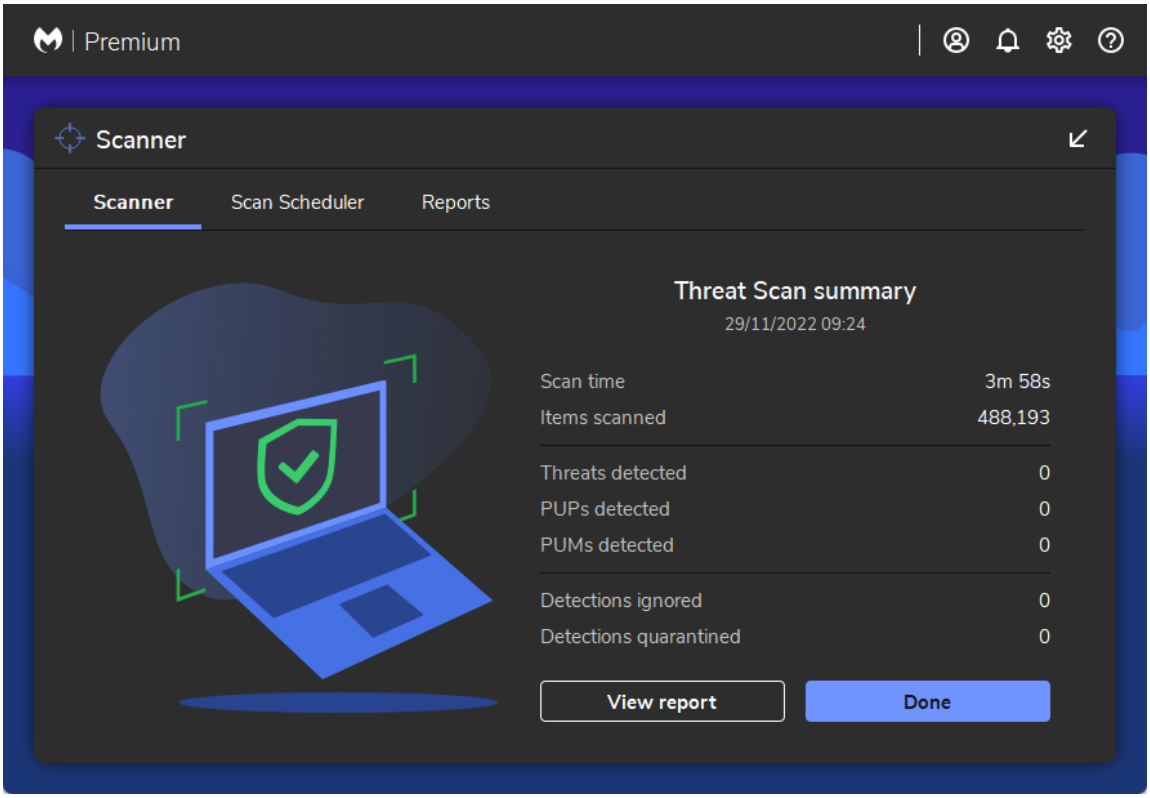
Virus Scans

To run a virus scan, open your anti-virus or anti-malware software and run a scan.





The anti-virus software will now scan all files on your device to check for any known threats. Once the scan is complete, a report will be given showing the results of the scan.



Hardware

Peripherals

To clean my keyboard, I first wiped it down around the edges using a duster.

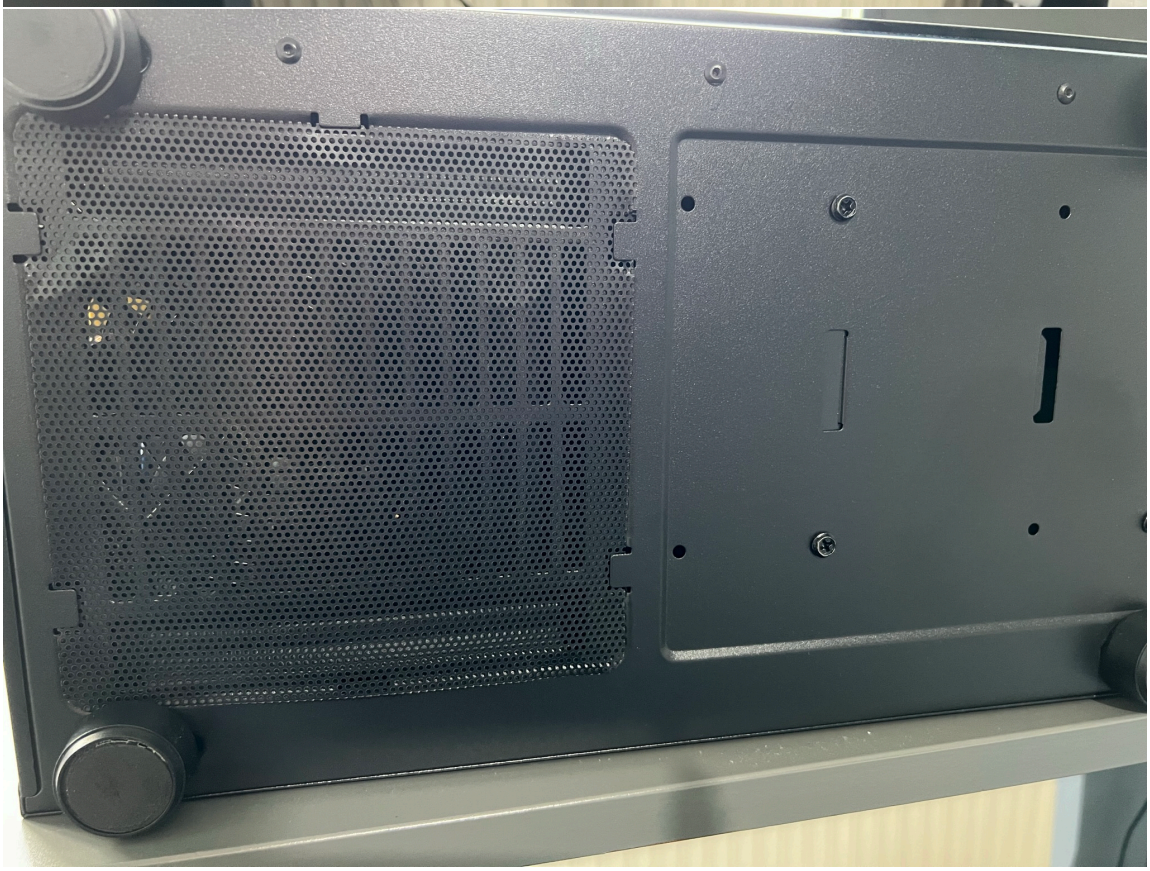
Finally, to clean out between the keycaps I used compressed air.

My keyboard is now clean from dust and crumbs!

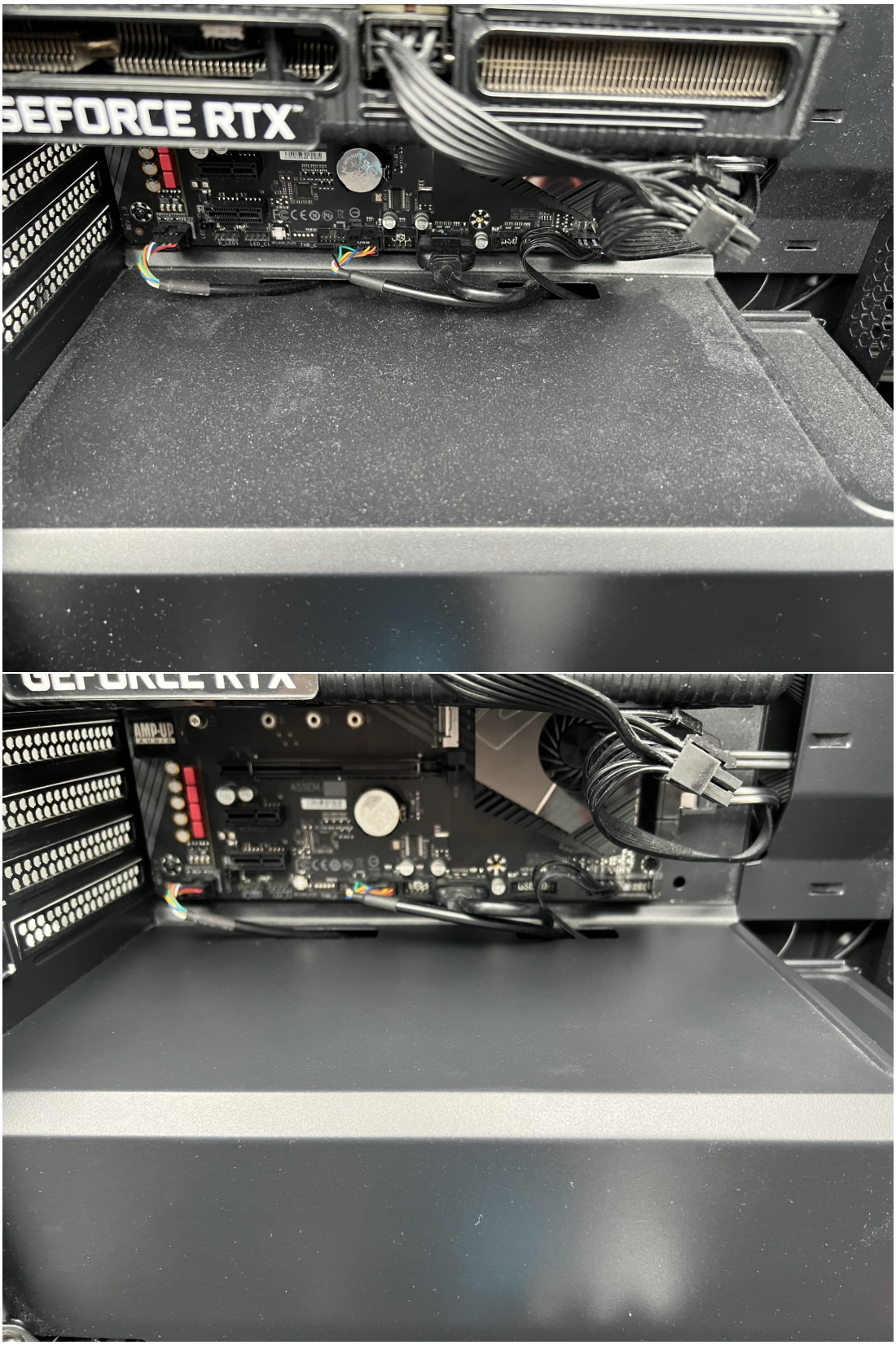
My Computer

To start with, I cleaned out my PSU's fan grills.

After spraying down the dust filter with compressed air, I used a duster and more air to clean the grill behind it.

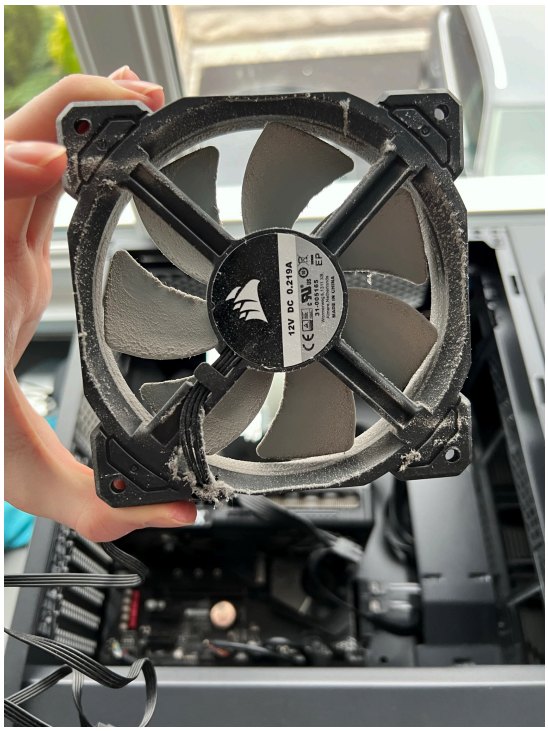


Next, I cleaned the inside of my case using a duster.



After the inside, I cleaned the CPU fan and its heat sink using compressed air.

Finally, I cleaned the system fan and its grill using a duster and compressed air.



Evaluating Maintenance

Maintenance is a critical routine that supports the longevity of a device and helps keep it running at peak standards. Maintenance can be split into two categories: hardware and software.

Hardware Maintenance

Hardware maintenance primarily involves cleaning and dusting the physical components within the computer, including any peripherals. To perform this, compressed air can be used in a well-ventilated area to blow the dust out of the case and components. This will help prevent any dust from building up within the system that could cause overheating. Whilst cleaning out the system, it is recommended to check for any loose cables as this can cause stability issues if not installed correctly. With recent graphics cards, specifically the RTX 4000 series cards, loose power cables have overheated and melted which could cause short circuits and potentially break the graphics card.

Software Maintenance

Software maintenance primarily involves keeping the operating system and device drivers up-to-date. To perform this, open the Windows setting application and check for updates. This can also be done within manufacturer-specific applications, such as NVIDIA Control Panel. This ensures devices such as your CPU and GPU operate correctly and stably with your operating systems. Keeping your operating system up-to-date also ensures your device is protected from security vulnerabilities and stability issues. Software maintenance can also include running virus scans to keep your data and security safe.

Data Backups

Another important maintenance routine is keeping your important and sensitive data backed up. This ensures that if you have a drive failure, natural disaster or drive stolen your data can still be restored. Typically, you can back your data up to cloud storage servers or an external hard drive.

Conclusion

To conclude, performing regular maintenance on your hardware and software is vital to ensure your system continues to run smoothly, avoid breakdowns and perform at its recommended specification. By cleaning your system of dust, updating your operating system and device drivers, and backing up data you are supporting the longevity of your system and ensuring it runs optimally.

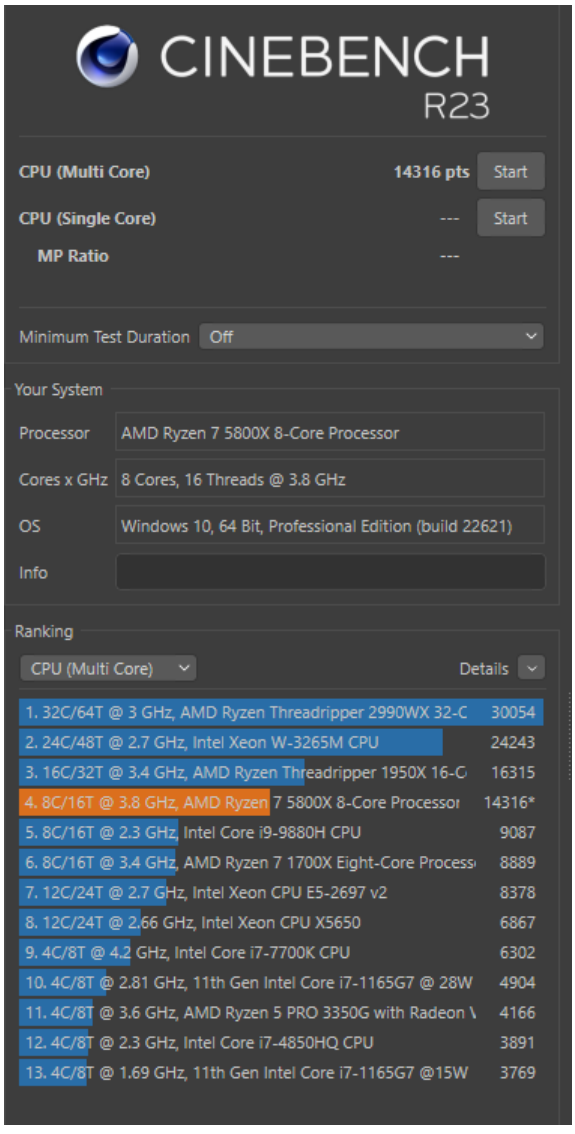
Testing my System

My systems specifications are:

- CPU: AMD Ryzen 7 5800X (8-cores, 16 threads @ 3.8 GHz)
- GPU: NVIDIA GeForce RTX 3060
- RAM: 16GB of Corsair DDR4 3600 MHz

Cinebench R23

Cinebench R23 is a benchmarking software by MAXON which tests the CPU's image rendering capabilities.



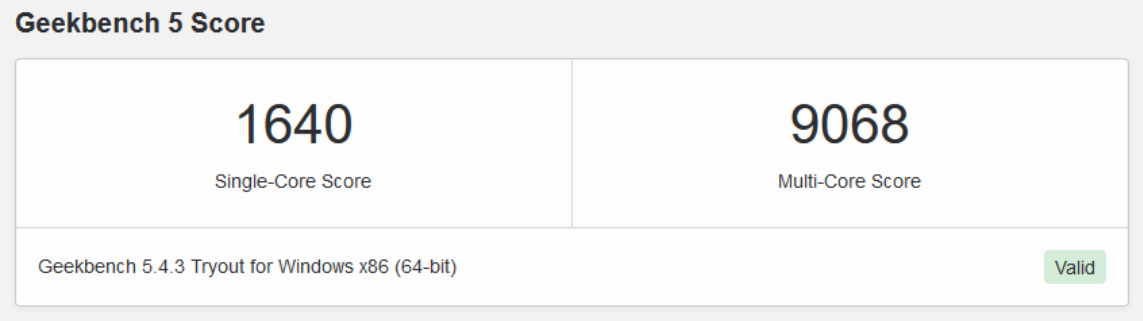
In this test, my PC scored 14,316. Compared to an Intel i9-9880H processor, mine was 1.58 times faster.

Geekbench 5

Geekbench 5, by Primate Labs, benchmarks the CPU and GPU of a system by running common everyday tasks, such as text compression and PDF rendering and physics.

CPU Test

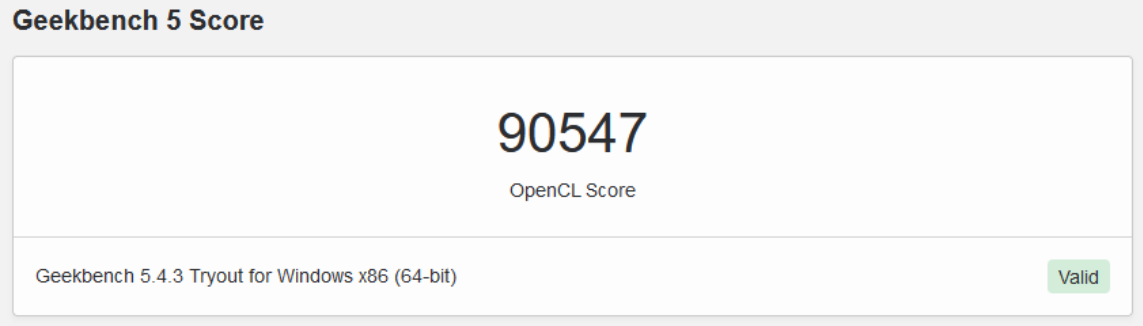
In this test, my CPU scored 9,068 multi-core and 1,640 single-core.



Compared to my previous system, running a Ryzen 5 3350G, my system scored over 2.8 times faster.

GPU Test

In this test, my GPU scored 90,547 in the OpenCL benchmark.



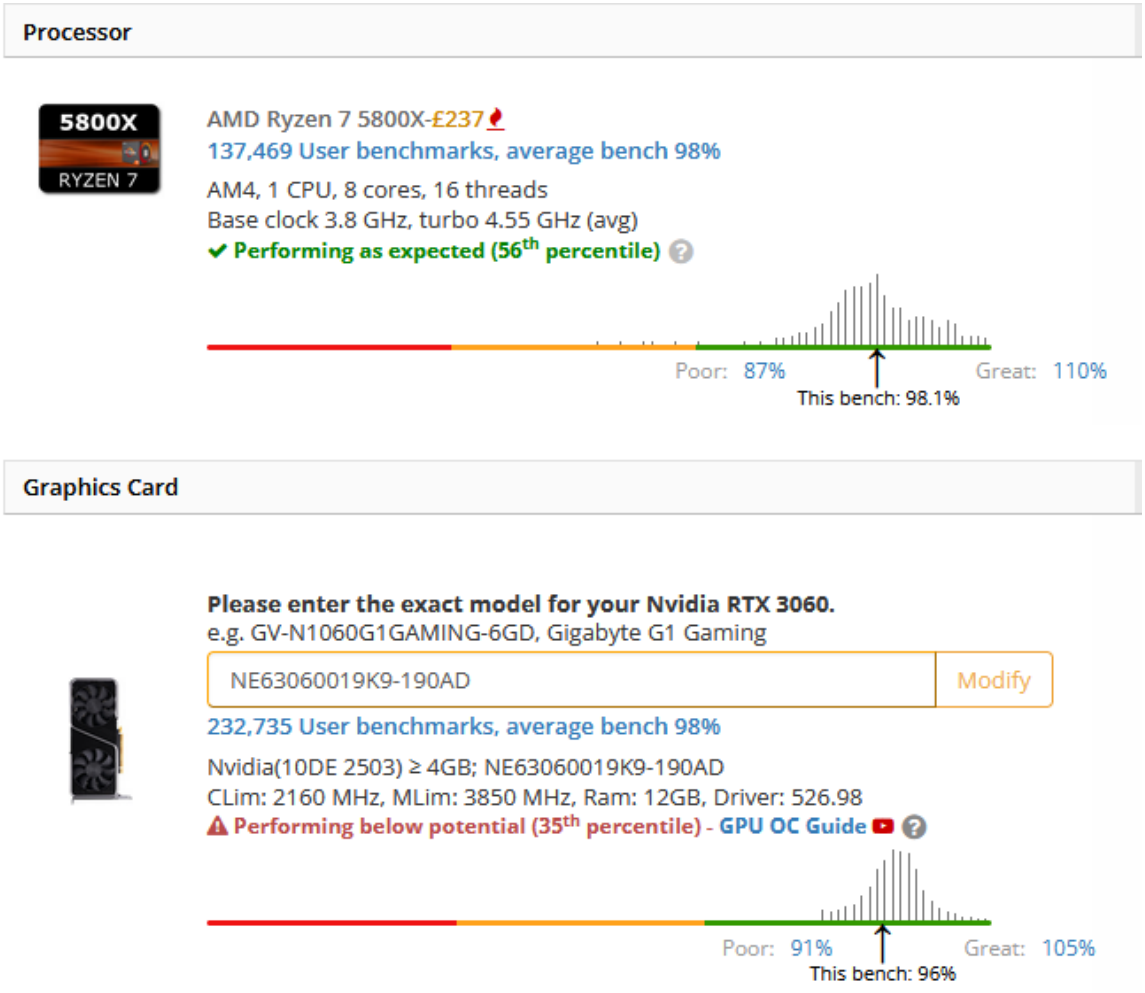
Compared to my previous system, running a Radeon RX 5800, my system scored over 1.9 times faster.

UserBenchmark

UserBenchmark runs tests on all aspects of the system to ensure they're performing as expected. UserBenchmark also rates your system's suitability for gaming, desktop and workstation use.

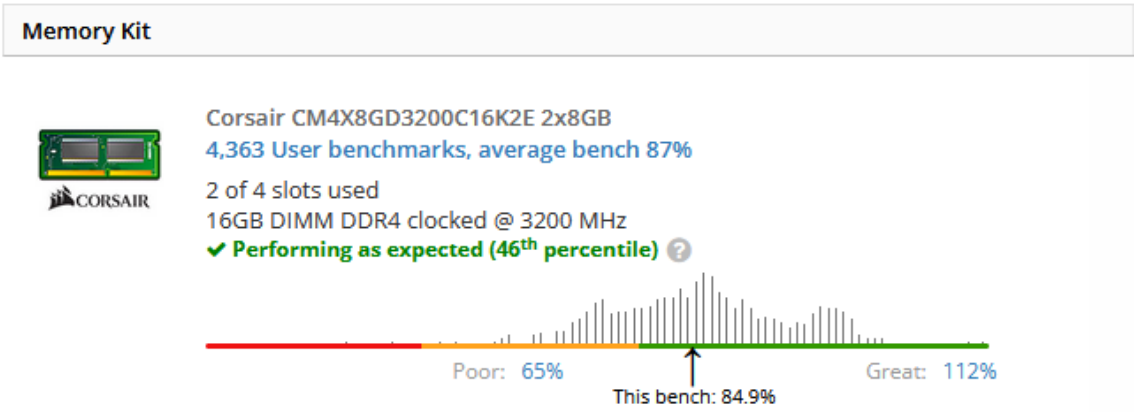
CPU and GPU

In these tests, my CPU was performing as expected, whilst my GPU was reported as performing below potential. However, I believe the GPU report to be in error as the graph indicates it is within the green. Both components were rated as Outstanding.



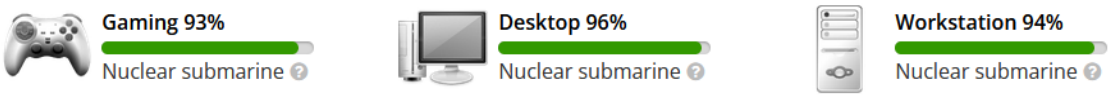
Memory

My RAM was reported running as expected in this test under the Excellent category. My RAM lacked a fast response time with high latency.



System Suitability

As explained above, UserBenchmark rates your system's suitability for 3 different purposes: Gaming, Desktop and Workstation.



Despite UserBenchmark using questionable rating names, they rank systems by percentage: 100% being the best, then 90% and so on. My system performed above 90% for all three purposes ranking it in the second highest category: Nuclear submarine.

Recommending Upgrades

Whilst my system is performing excellently, there is still room for improvement.

CPU Upgrades

A suitable upgrade for the CPU would be to 7th generation Ryzen, specifically a Ryzen 7 7700X. This would provide great improvements with an upgraded base clock speed of 4.5 GHz (compared to 3.8 GHz) giving a hefty boost to any CPU-heavy workloads. A 7700X would also provide support for DDR5 memory, allowing you to utilize next-generation speeds.

GPU Upgrades

For the GPU, I would recommend an upgrade to an NVIDIA GeForce RTX 3080 or 3090. With increased video memory, the GPU can render higher-quality textures and resolutions. More video memory can also help drive higher-quality displays. More CUDA cores help drive ray-tracing experiences and provide sharper textures. The increase of CUDA cores can also assist in cryptography tasks such as hashing.

Memory Upgrades

Based on my tests, a memory upgrade isn't particularly needed. However, with my recommend CPU supporting DDR5 an upgrade to DDR5 3600 MHz memory could help boost the speed of some applications when operating in memory. Some games can also benefit from faster memory, such as Minecraft.

Storage Upgrades

To help improve boot times and application load times, and with my recommend processor supporting PCIe Gen 5, I would recommend a PCIe 5.0 M.2 NVME SSD. This specification can support up to 10 GB/s read and write speeds, allowing applications to boot in seconds. Increased speeds also benefit games using direct-storage technology as the system can load new textures in record time.

Upgrading a System

Current specifications:

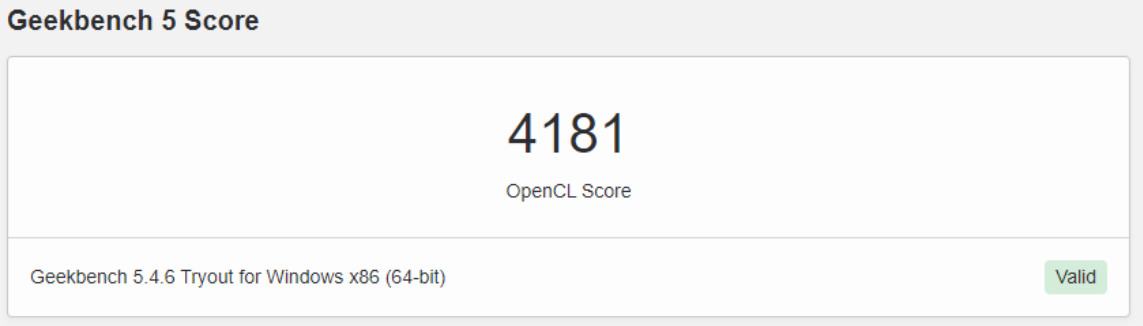
- CPU: Intel Core i5-8400
- GPU: Intel UHD Graphics 630
- RAM: 8GB of Hypex DDR4

In this upgrade, I will upgrade my GPU to an NVIDIA GeForce GT 1030 and 16GB of Corsair DDR4.

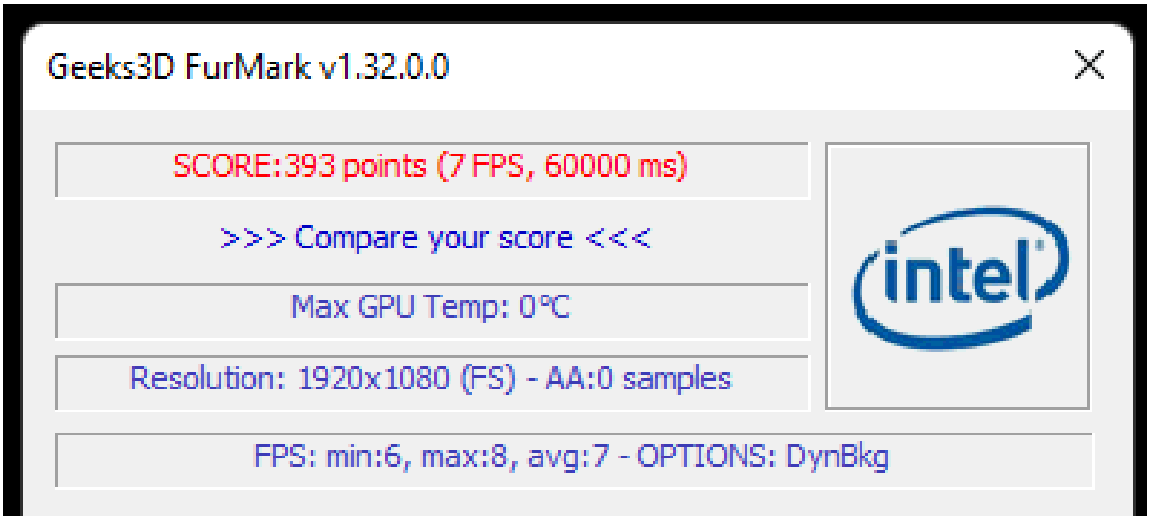
Pre-Upgrade Tests

Before upgrading my system to ensure the significance of my upgrades can be measured, I will run several benchmarks.
These are my system specifications:

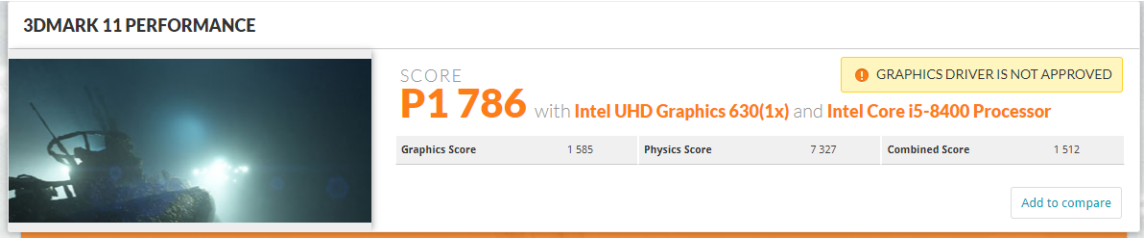
Geekbench 5 OpenCL



Furmark @ 1080p



3DMark @ 720p



Memory Read and Write

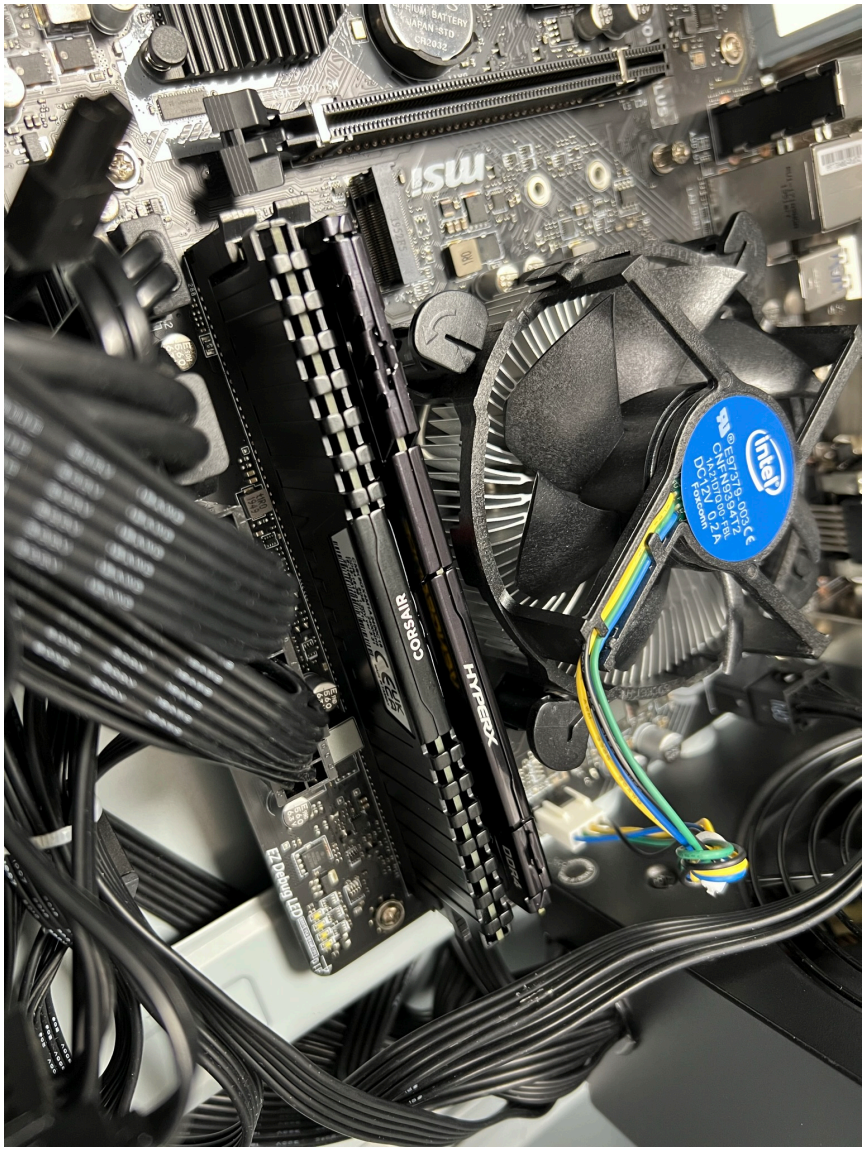
CPU	CPU Clock	Motherboard	Chipset	Memory	CL-RCD-RP-R...
19267 MB/s 6x Core i5-8400	3800 MHz	[TRIAL VERSION]	H310C Int.	DDR4-2667 SDR...	16-18-18-39 ...
CPU	CPU Clock	Motherboard	Chipset	Memory	CL-RCD-RP-R...
18753 MB/s 6x Core i5-8400	3800 MHz	[TRIAL VERSION]	H310C Int.	DDR4-2667 SDR...	16-18-18-39 ...

Upgrading the System

This is the system I shall be upgrading. To start with, I will upgrade from one 8GB stick of RAM to 2x8GB for a total of 16GB of Corsair DDR4 memory.

Installing the RAM

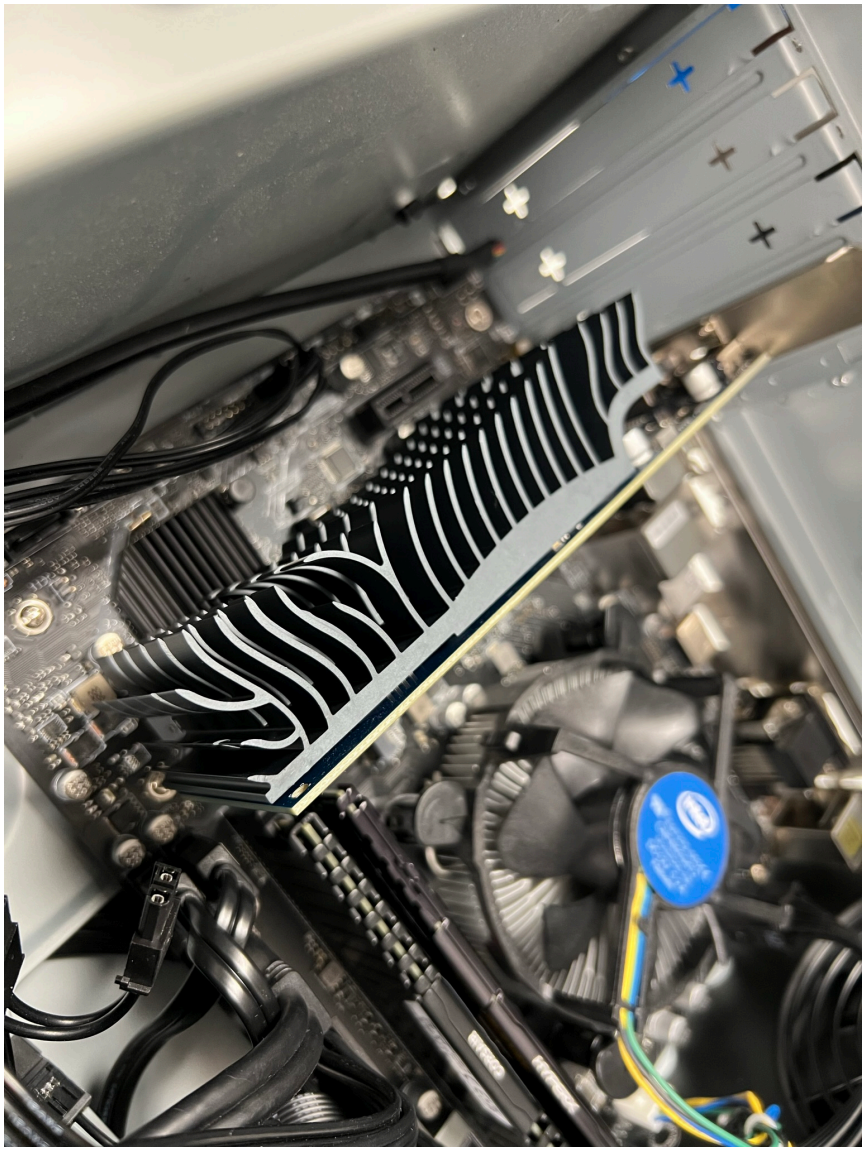
To install the RAM, I lined up the stick with the slot, taking into account the notch at the bottom, and pressed it in until the tabs at either side clicked into place.



With the second stick of RAM now installed, I can install the GPU into the PCIe 16x slot.

Installing the GPU

To install the GPU, I once again lined up the GPU with the slot and the PCIe shield and pressed it in until the tab at the right of the slot clicked into place. I then aligned the CPU with the PCIe shield and screwed it into place.



With the GPU installed, I can now benchmark the system and measure performance improvements.

Testing a System

To ensure our upgrades are working properly, I will create a table with the relevant benchmarks and previous results to help plan my tests. Included in the table is an increase multiplier column. If the result of this column is above 1, improvements have been made.
To calculate the increase multiplier, calculate: after upgrade ÷ before upgrade.

Benchmark	Before Upgrade	After Upgrade	Increase Multiplier
Geekbench 5 OpenCL	4,181	-	-
Furmark @ 1080p	393	-	-
3DMark @ 720p	1,786	-	-
Memory Read	19,267 MB/s	-	-
Memory Write	18,753 MB/s	-	-
Memory Copy	19,072 MB/s	-	-

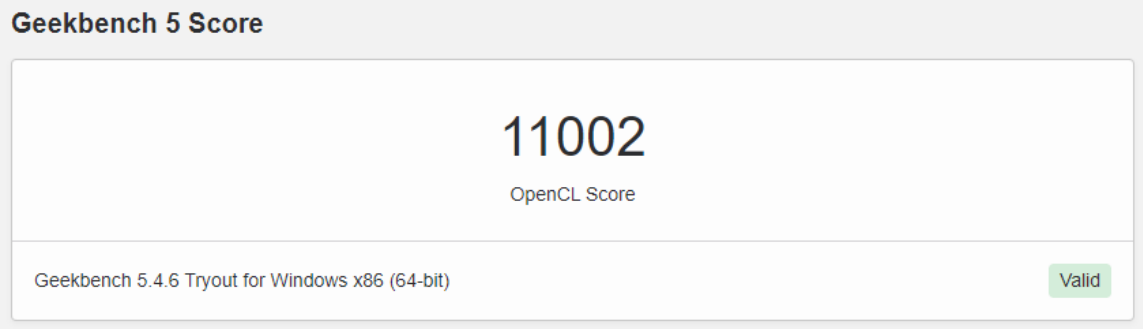
Upgraded Specifications

As a reminder, here are the upgraded specifications:

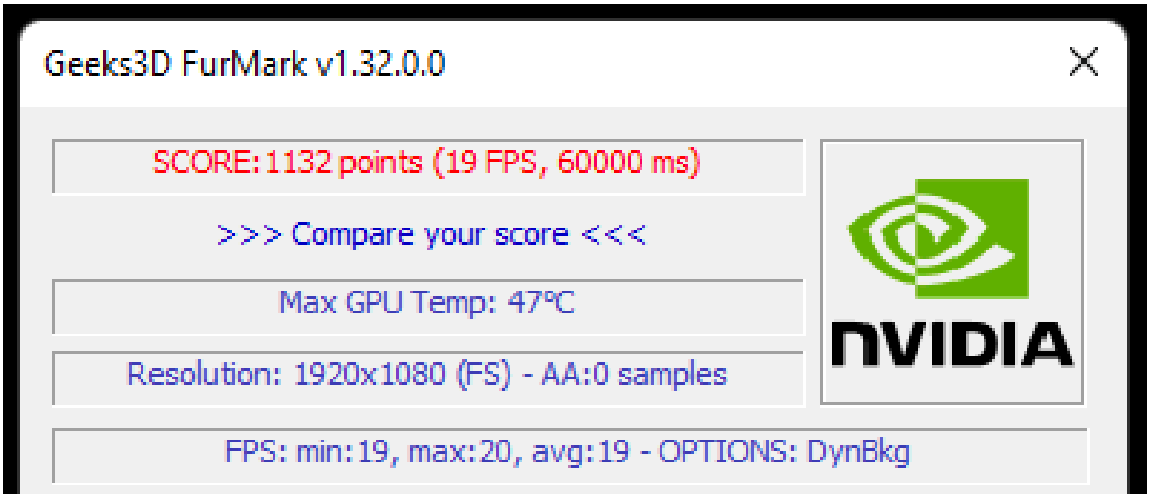
- CPU: Intel Core i5-8400
- GPU: NVIDIA GeForce GT 1030
- RAM: 16GB of Corsair DDR4

Post-Upgrade Tests

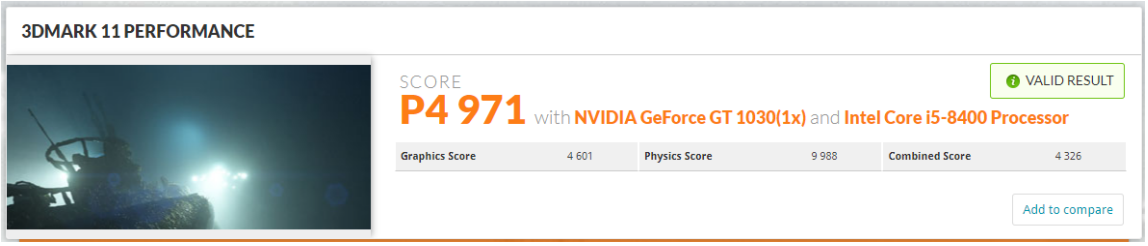
Geekbench 5 OpenCL



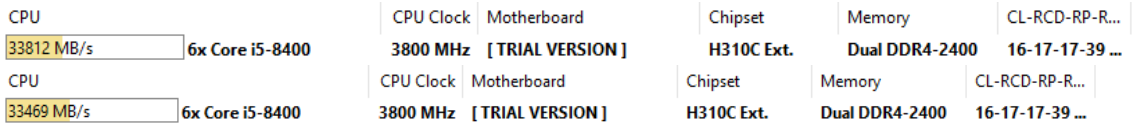
Furmark @ 1080p



3DMark @ 720p



Memory Read and Write



Upgrade Results

After combining all my results in the table above and calculating the increase multiplier, the table shows my upgrades have provided in most cases up to two times the performance.

Benchmark	Before Upgrade	After Upgrade	Increase Multiplier
Geekbench 5 OpenCL	4,181	11,002	x2.63
Furmark @ 1080p	393	1,132	x2.88
3DMark @ 720p	1,786	4,971	x2.78
Memory Read	19,267 MB/s	33,812 MB/s	x1.75
Memory Write	18,753 MB/s	33,469 MB/s	x1.78
Memory Copy	19,072 MB/s	30,227 MB/s	x1.58

Evaluating the Upgrades

Cost

At the time of writing, December 6, 2022, the prices of the upgraded components are as followed:

- NVIDIA GeForce GT 1030: £20-£35 pre-owned
- 16GB of Corsair DDR4: £35-£70 pre-owned

This means at a theoretical maximum, the total upgrade would cost £105. Considering the performance improvement in 1080p and 720p games, up to two times the performance for the low cost, it is perfect for lower budgets and for people who want a cost-effective way of improving GPU performance.

Time Taken and Work Involved

The overall upgrade took me about 10 minutes to complete, making it a quick and easy task for people at all levels of PC building to complete. As the components aren't that easy to damage, it further makes it a low-risk upgrade to complete. Within the upgrade only one screw was required to screw the GPU into the PCIe cover, everything else was attached via easy-to-use clips.

Frequency of Improvements

Unfortunately, as games evolve the demand for more powerful graphics increases drastically. With our GPU being primarily for 720p and 1080p gaming, it will not run well with more recent and higher-demanding games. This means unless a more significant upgrade is performed, such as upgrading to a 30 or 40-series NVIDIA card, our system will likely need many minor incremental improvements.

For our RAM, in its current state, it is more than enough for most modern games and applications. Most games only require 8GB of RAM to run and most recommend 16GB as the sweet spot for their games. However, with the introduction of DDR5 and newer CPUs dropping support for DDR4, our RAM may have to be upgraded if our CPU is upgraded to modern 7th-generation AMD or 13th-generation Intel.

Overall Conclusion

To conclude, our upgrades have over doubled GPU performance in lower 720p and 1080p applications. For the low price, the upgrade is cost-effective and helps those on a lower budget. Unfortunately where our upgrade lacks is in more modern games and applications. This is due to our graphics card not being designed for modern gaming and works best on 720p games. This means that our system will be unlikely to be able to run more demanding games that require more GPU power. However, our upgraded memory will be more than sufficient for a long time to come, until our CPU is upgraded to a modern processor which requires new DDR5 memory. Most modern applications and games recommend 16GB and therefore you should run into no issues with a lack of memory.