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Lab Report-Writing for Engineering

***ABSTRACT***

The purpose of this lab report is to explore the graphics performance differences between macOS and Windows, with benchmarking from games and tools across both platforms. To test for graphics performance, I used Boot Camp to create a dual-boot macOS. For the MacBook, I ran macOS 10.14 For Windows, I ran Windows 10 Home Edition. I created a framerate demo in Portal that would appropriately test framerate in each operating system. I also ran Cinebench R11.5’s OpenGL test to evaluate the benchmarks. Experiments were done on a variety of common laptops from Apple. These systems spanned the range of processors from the older intel i3 Dual Core through the latest i7 6 Core processor.

The research showed that the fastest operating system on an MacBook was Windows 10, which was a full 15% faster than macOS on the same hardware, based on the results of the selected benchmarking tools used in this research.

***INTRODUCTION***

The computer industry is one that is constantly changing; the leading manufacturers   
of processors, Intel and AMD, release major revisions to their hardware on a regular basis. In addition, companies such as Microsoft and Apple are constantly releasing updates to their operating systems. The ever‐changing nature of the industry can have a heavy impact on business decisions made by companies who standardize their desktop environments.

To some users, the OS they use is irrelevant. The choice of operating system is   
driven by the need for specific research software tools and the platforms those tools are   
deployed on. People have debated the issue of operating systems for years ‐ every time an   
OS is released, it is a certainty that there will be a myriad of important questions about it. It   
is important to find answers for exactly these kinds of questions, because they can directly   
influence the decisions of information technology decision makers. Specifically, I intend to   
focus on finding the answers to the questions: , "What is the fastest OS? The Windows 10 or the macOS? ".

***METHODS***

In this research, Experiments were done on a variety of apple laptops. These systems spanned the range of processors from the older intel i3 Dual Core through the latest i7 6 Core processor.

I tested on three different laptops below:

1) 1.3GHz dual-core Intel Core i5 MacBook with Intel HD Graphics 615

2) 2.6GHz 6-core Intel Core i7 MacBook with Radeon Pro 560X

3) 1.6GHz dual-core Intel Core i5 MacBook air with Intel UHD Graphics 617

A description of the tools used, and technical terms is given below:

**CineBench** [1]: a cross‐platform tool that runs several tests on a system to measure the   
capabilities of its processor(s) and graphics card(s) in real‐world situations. CineBench   
performs two main tests on a system. In the first test, a realistic image is rendered using   
only the main processing core, and then using all available processing cores. In the second   
test, a 3D animation is played back, rendered in real‐time using only the GPU, in order to   
test the card's ability to render the scene in the shortest possible amount of time.

**Boot Camp** [2]: a free utility made by Apple that comes built into Mac OS X Leopard. It is used   
to create a Windows partition on a Mac and assist in the process of completing a Windows installation on the system. It also generates a special set of drivers that allow Windows to function properly on Apple hardware.

**Frame rate [3]:** (expressed in frames per second or fps) is the frequency (rate) at which consecutive images called frames appear on a display. The term applies equally to film and video cameras, computer graphics, and motion capture systems. Frame rate may also be called the frame frequency and be expressed in hertz.

First, I set up the boot camp for all the laptop in order to use both Windows and macOS in the same laptop. Then, I downloaded portal from steam and then ran the game in different operating systems and recorded the framerate from different laptops. After getting the framerate of portal, I installed the benchmarking tools to all the laptops and ran. Then I executed the benchmarks five times, which enabled us to get the average of the scores. The results were then obtained and analyzed.

The best benchmarking tool is probably CineBench, due to the thoroughness of its results and it gives a detailed look at graphics capabilities.

***DATA***

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| **Games graphics performance:****Mac OS X 10.14 vs. Windows 10 framerate(fps)** | | |
|  | ***Portal*** | ***Cinebench*** |
| **1.3GHz dual-core Intel Core i5 Macbook with Intel HD Graphics 615 (macOS)** | 102.5 | 56.2 |
| **1.3GHz dual-core Intel Core i5 Macbook with Intel HD Graphics 615 (Windows)** | 111.5 | 65.2 |
| **2.6GHz 6-core Intel Core i7 Macbook with Radeon Pro 560X**  **(macOS)** | 212.7 | 96.2 |
| **2.6GHz 6-core Intel Core i7 Macbook with Radeon Pro 560X**  **(Windows)** | 232.5 | 116.2 |
| **1.6GHz dual-core Intel Core i5 macbook air with Intel UHD Graphics 617(macOS)** | 118.5 | 67.4 |
| **1.6GHz dual-core Intel Core i5 macbook air with Intel UHD Graphics 617(Windows)** | 130.7 | 80.4 |

***DISCUSSION AND CONCLUSION***

Due to the results of my tests, I can say with some certainty that Windows 7 beated Mac OS on almost every test, at least on the same hardware. It can also be said that, judging by the results the Windows is faster than macOS. The testing makes a couple things clear. If you are using macOS, there’s no downside to staying current, especially If you’re a gamer that’s making dedicated use of Steam for Mac. However, Windows still gets the better end of performance. While the macOS has decent frame rates for games, if you want the best gaming experience, Windows is the fastest way to go.

***REFERENCES AND CITATIONS***

[1] “Cinebench,”  *- Article - MAXON | 3D FOR THE REAL WORLD*. [Online]. Available: https://www.maxon.net/en/products/cinebench/. [Accessed: 05-Mar-2019].

[2] “Apple,” *iPhone Service Pricing - Apple Support*. [Online]. Available: https://support.apple.com/boot-camp. [Accessed: 05-Mar-2019].

[3] “A Beginners Guide to Frame Rates,” *Aframe RSS*. [Online]. Available: http://aframe.com/blog/2013/07/a-beginners-guide-to-frame-rates/. [Accessed: 05-Mar-2019].