**INTRODUCTION**

Choosing the right laptop for programmers can sometimes be challenging due to the overwhelming number of options available. Today I will be comparing two of the most recommended laptops to determine which of them is better.

**BACKGROUND**

Web or application development can be divided into two: front-end development and back-end development. Front-end developers focus on client-side development. They usually work on the website’s aesthetics [1]. They design the website’s layout, colour palette, and design. Back-end developers, on the other hand, focus on server-side development. They work on the website’s ease of use, utility, etc. [2].

Determining the laptop on which a developer designs a website is very crucial. Working on a project using an outdated laptop could delay project development and risk losing important data.

This report aims to dissect and determine which laptop is better for front-end developers.

IMAGES [3]

**DEFINITION OF TERMS**

Pixel – *picture element* is the smallest detail in an image [4] (when you zoom in a picture far enough, you’ll see tiny squares. They’re called a pixel. Each pixel holds colour and when put together, can form an image or illustration)

Refresh rate – the number of times per second the computer monitor takes to display a new frame [5]

Core – part of the processor that performs one task at a time [6]

Thread – a virtual version of the core that allows the core to perform more than one task at a time [6]

**SCOPE AND LIMITATION**

In this report, I will be choosing two laptops. These are the two laptops that frequently came up in online articles: MacBook Pro 16-inch 2021 and HP Spectre x360 [7, 8, 9].

I will be getting the specifications directly from the manufacturer’s website only. Some parts of the laptop are upgradable. If that upgrade is not on their website, I will consider that they only offer that even if other websites claim that you can upgrade it to a higher one.

There are other features that should be considered when choosing laptops, but I have narrowed these criteria into three.

**CRITERIA**

1. Display – Having a laptop with good display features is very important because front-end development heavily focuses on design. Designing an HD application using a low-resolution computer, for example, could be very detrimental to the project because the laptop will not be able to handle the project’s requirements.
   1. Apple MacBook Pro
      1. **Display size: 16.2 inches**
      2. Display resolution: 3456 x 2234 pixels
      3. Touchscreen: No
      4. Pixels per inch: 254
      5. **Refresh rate: 120 Hz**
   2. HP Spectre x360 Laptop
      1. Display size: 16 inches
      2. **Display resolution: 3840 x 2400 pixels**
      3. **Touchscreen: Yes**
      4. **Pixels per inch: 283**
      5. Refresh rate: 60 Hz

The HP Spectre x360 trumps the MacBook Pro in this criterion. Even though the MacBook Pro has a higher display size and a faster refresh rate, the HP Spectre has a higher display resolution and has more pixels per inch. This means that images produced by HP Spectre are clearer than that of the MacBook Pro. On top of that, HP Spectre has a touch screen feature. This is especially helpful for front-end web developers who also need to sketch or draw to create illustrations or edit images.

1. Processor – The computer’s processor, also called the Central Processing Unit, is responsible for executing all the instructions received from the user, application, or other computers. The processor determines how quickly a computer can store and retrieve data [10].

Working on projects using a computer with a weak processor not only delays the work development but also risks losing progress. This is especially crucial because most applications used by front-end developers, such as Adobe Photoshop and Adobe Illustrator, require powerful processors. If the computer cannot handle the workload of the application, the computer could crash, and the developer could lose all the unsaved data.

* 1. MacBook Pro [11]

Apple M1 Max chip with 10-core CPU, 32-core GPU, and 16-core Neural Engine

* + 1. **Core: 10**
    2. **Thread: 10**
  1. HP Spectre x360 [12]

Intel® Core™ i7-11390H (up to 5.0 GHz, 12 MB L3 cache, 4 cores, 8 threads) + NVIDIA® GeForce RTX™ 3050 Laptop GPU (4 GB) + 32 GB (Onboard) (OLED)

* + 1. Core: 4
    2. Thread: 8

MacBook Pro has more cores and more threads than HP Spectre, which means that MacBook Pros perform way faster than its HP counterpart. This criterion can be very important to those who require their laptops to multitask.

So far, there’s one point for HP Spectre and one point for MacBook Pro. The tiebreaker will be the next criterion, which is the budget.

1. Budget – It is important to consider the budget when choosing the right laptop for developers. While most office-employed developers are paid well and are usually provided computers by their employers, there are freelance/self-employed developers who need to provide their own equipment. Some developers who are still starting or are still studying also may not have much to start with.
   1. MacBook Pro: $3,499
   2. **HP Spectre x360: 2,369.99**

**CONCLUSION**

**RECOMMENDATION**

Determine your needs.

Do your own research.

REFERENCES

# References

|  |  |
| --- | --- |
| [1] | J. Wilkins, "freeCodecamp," 23 April 2021. [Online]. Available: https://www.freecodecamp.org/news/front-end-developer-what-is-front-end-development-explained-in-plain-english/. [Accessed 28 March 2022]. |
| [2] | N. Babich, "What are the Similarities & Differences Between UI Design and UX Design," Adobe, 4 October 2019. [Online]. Available: https://xd.adobe.com/ideas/process/ui-design/ui-vs-ux-design-understanding-similarities-and-differences/. [Accessed 28 March 2022]. |
| [3] | FlatIcon, "Flat Icon," Flat Icon, [Online]. Available: https://www.flaticon.com/free-icons/graphic-design. [Accessed 06 April 2022]. |
| [4] | D. Silveira, "What is a Pixel, Anyway?," Adobe Xd, 20 July 2021. [Online]. Available: https://xd.adobe.com/ideas/principles/web-design/what-is-a-pixel/. [Accessed 06 April 2022]. |
| [5] | Intel Inc., "What is Refresh Rate and Why is it Important?," Intel Inc., [Online]. Available: https://www.intel.com/content/www/us/en/gaming/resources/highest-refresh-rate-gaming.html#:~:text=The%20refresh%20rate%20of%20your,image%20144%20times%20per%20second.. [Accessed 06 April 2022]. |
| [6] | S. Harding, "What is a CPU Core? A Basic Definition," Future US Inc., 23 August 2018. [Online]. Available: https://www.tomshardware.com/news/cpu-core-definition,37658.html. [Accessed 06 April 2022]. |
| [7] | R. Hornby, "The Best Laptops for Programming in 2022," Future US Inc, 03 March 2022. [Online]. Available: https://www.laptopmag.com/best-picks/laptops-for-programming-2021. [Accessed 06 04 2022]. |
| [8] | A. Topper, "Best Laptop for Programming in 2022," BGFG UK, 01 February 2022. [Online]. Available: https://www.pcguide.com/laptop/guide/best-for-programming/. [Accessed 06 April 2022]. |
| [9] | M. Hanson and M. R. Uy, "Best Laptop for Programming in 2022," Future US Inc., 07 January 2022. [Online]. Available: https://www.techradar.com/news/best-laptop-for-programming. [Accessed 06 April 2022]. |
| [10] | Iintel, "RAM vs Processor," [Online]. Available: https://www.intel.ca/content/www/ca/en/business/small-business/resources/ram-vs-processor.html#:~:text=of%20the%20Processor-,The%20processor%2C%20also%20known%20as%20the%20CPU%2C%20provides%20the%20instructions,computer%20think%20and%20work%20faster.. [Accessed 28 March 2022]. |
| [11] | Apple Inc., "MacBook Pro (16-in, 2021) - Technical Specifications," 2021. [Online]. Available: https://support.apple.com/kb/SP858?locale=en\_US. [Accessed 07 April 2022]. |
| [12] | HP Development Company, L.P., "HP Spectre x360 Convertible Laptop - 16t-f000," [Online]. Available: https://www.hp.com/us-en/shop/pdp/hp-spectre-x360-convertible-laptop-16t-f000-39r27av-1. [Accessed 07 April 2022]. |