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TEB1113
Algorithm and data structure
Performance Report

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Introduction

The purpose of this report is to analyse the difference in performance between 3 different devices when attempting to run a drone flocking program. The different tests performed will include varying numbers of drones and varying hardware to capture the time the device takes to perform the algorithm and tasks. Overall, we are attempting to oversee the reasons behind optimization methods and the connection between hardware the the performance of the program. As mentioned, We will require 3 devices for this performance test which will be the ROG Strix, HPOmen and Victus.

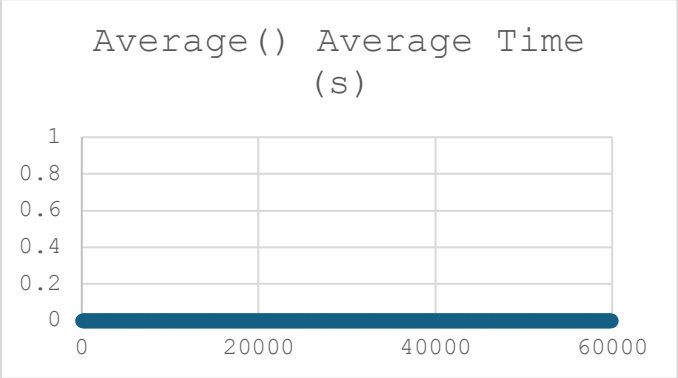
Through our initial observation of hardware we would hope to see the Victus to be the top performer for our testing seeing as the specifications for the device are slightly above the HPOmen and Strix. Followed by the Victus, The HPOmen will likely be the 2nd best performing device and during our testing we will hopefully detect the response between each device would be much faster with better hardware.

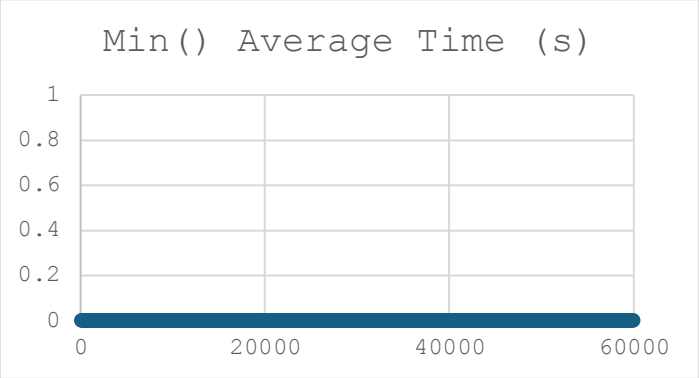
Devices

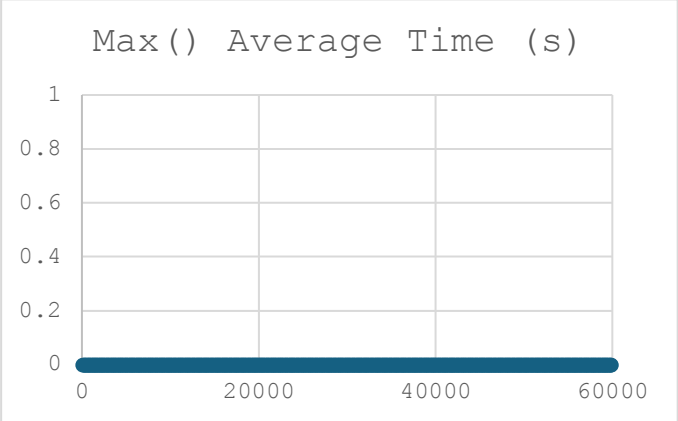
Model	Processor	Ram	OS
ROG Strix G513	AMD Ryzen 7 4800H	8GB	Windows 11 64-bit OS
HPOmen 2020	Intel(R) Core(TM) i7-10750H	16GB	Windows 11 64-bit OS
Victus by HP Laptop 16-e0xxx	AMD Ryzen 5 5600H	32GB	Windows 11 64-bit OS

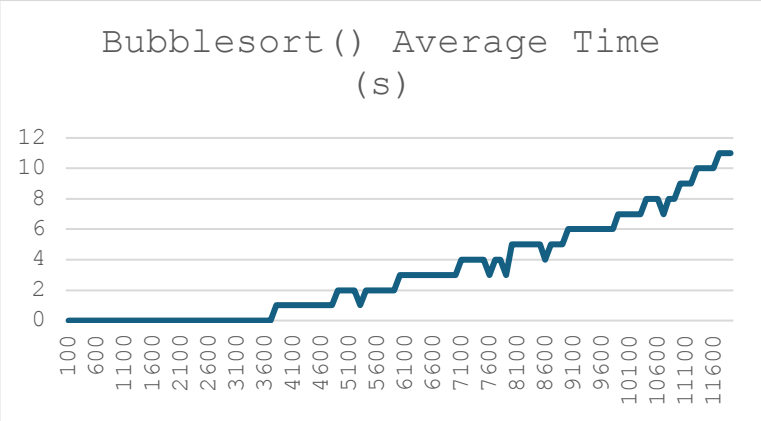
Response Time

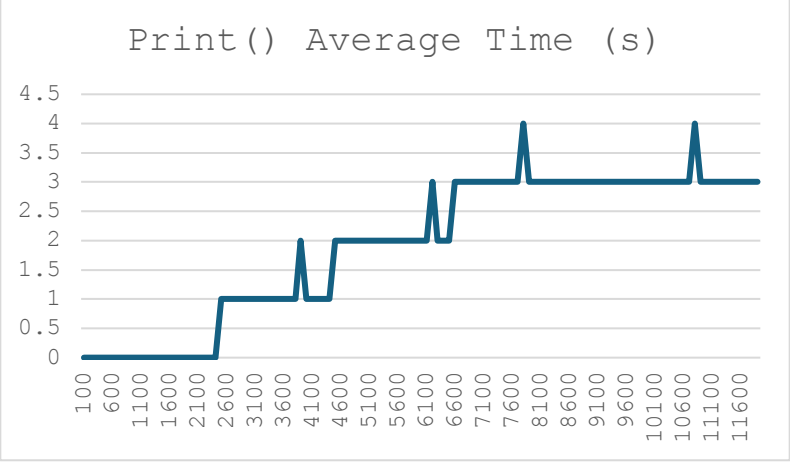
ROG Strix G513



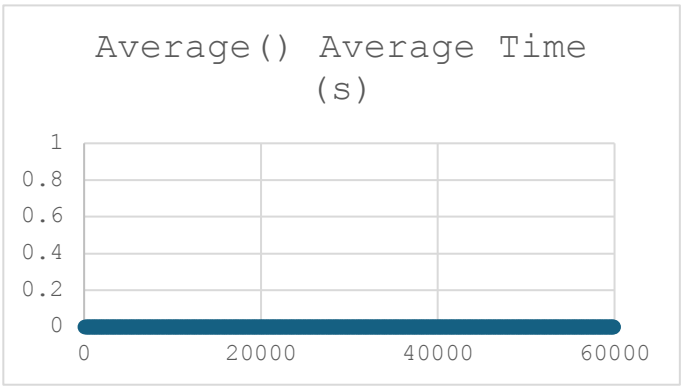


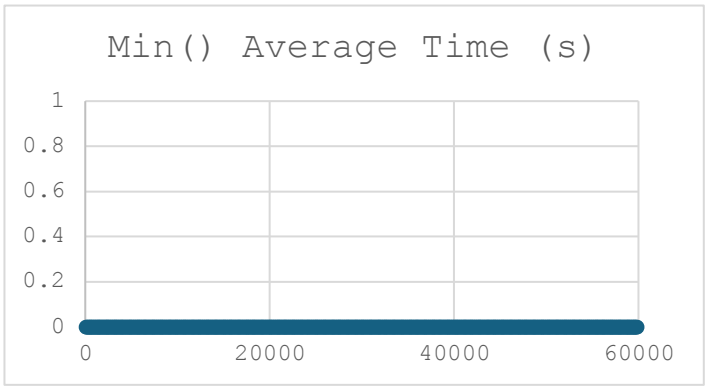


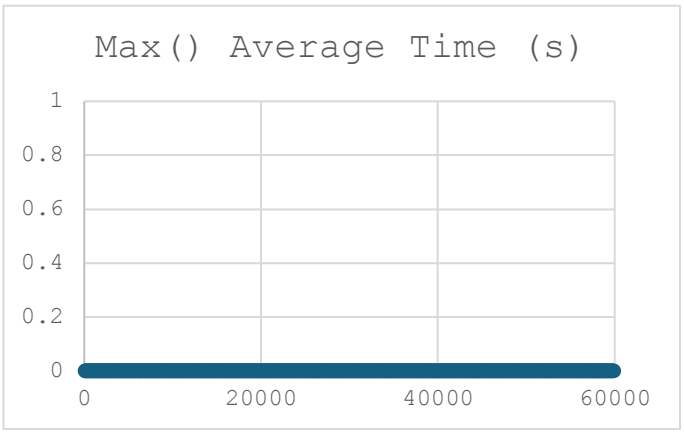


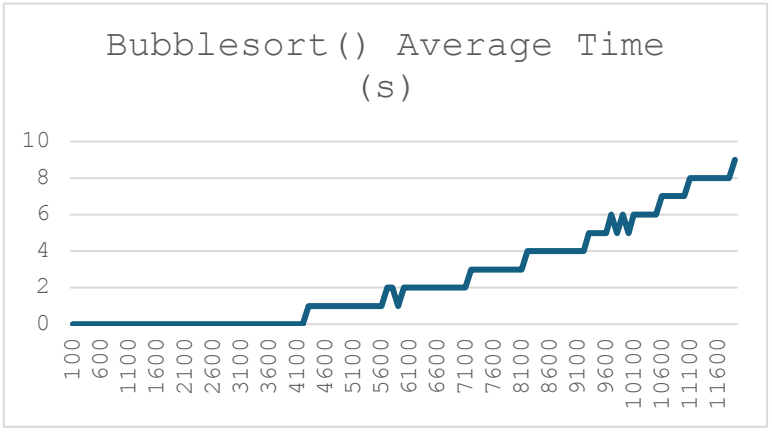


HPOmen 2020


Average() Average Time (s)
1
0.8
0.6
0.4
0.2
0
0
20000
40000
60000


Min() Average Time (s)
1
0.8
0.6
0.4
0.2
0
0
20000
40000
60000


Max() Average Time (s)
1
0.8
0.6
0.4
0.2
0
0
20000
40000
60000


Bubblesort() Average Time (s)
10
8
6
4
2
0
100
600
1100
1600
2100
2600
3100
3600
4100
4600
5100
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6100
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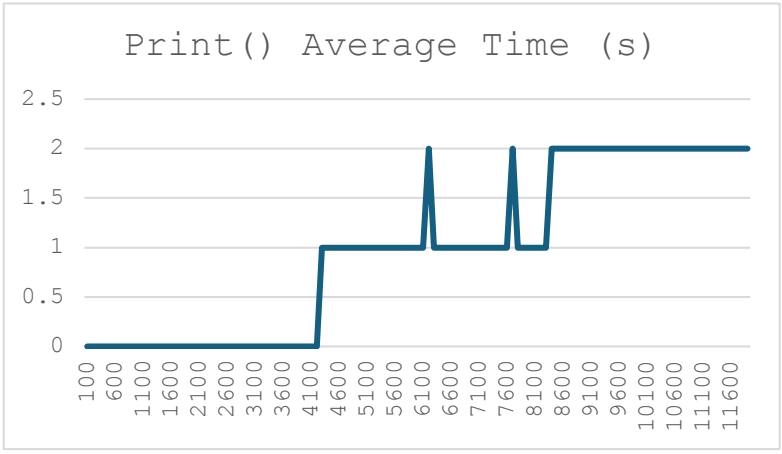
8600
9100
9600
10100
10600
11100
11600


Print() Average Time (s)
2.5
2
1.5
1
0.5
0
100
600
1100
1600
2100
2600
3100
3600
4100
4600
5100
5600
6100
6600
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8100
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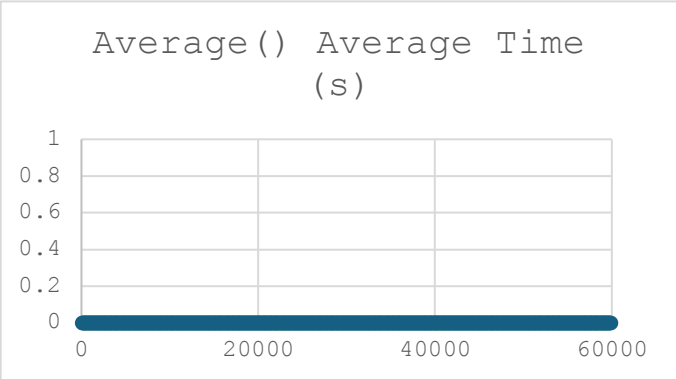
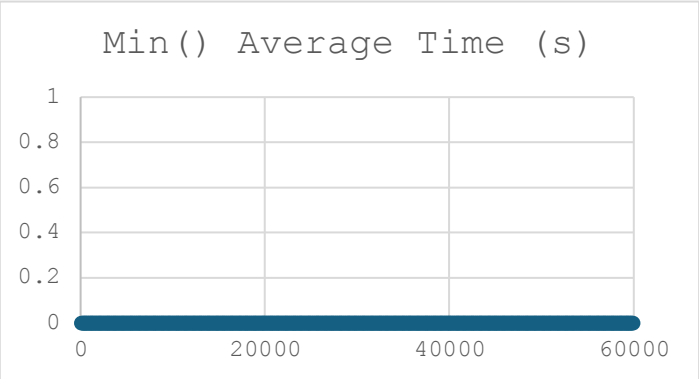
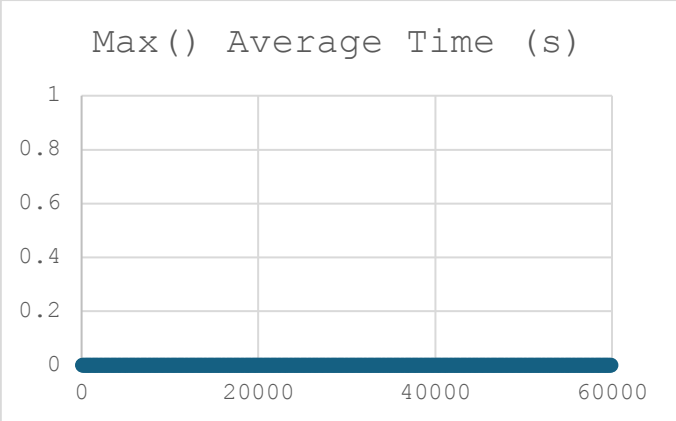
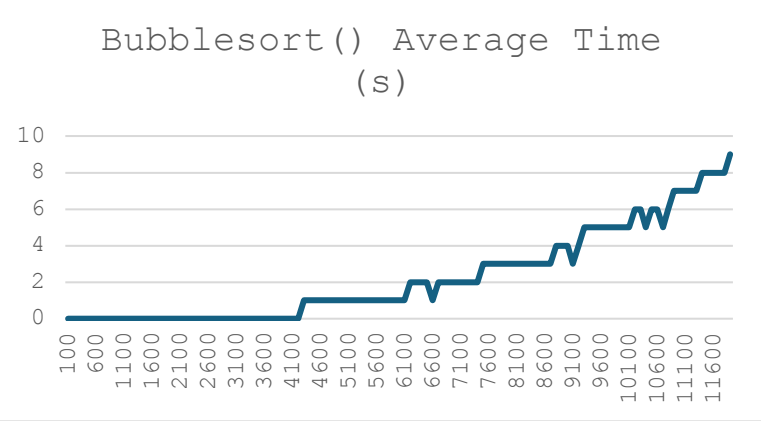
9100
9600
10100
10600
11100
11600

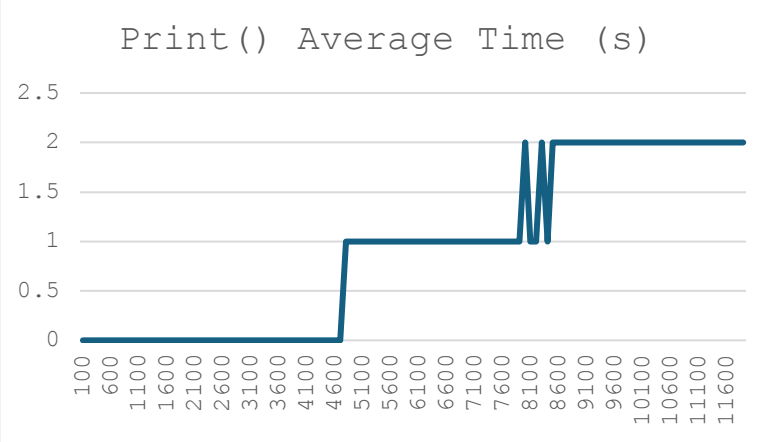
Victus by HP Laptop 16-e0xxx











Analysis

ROG Strix G513

While computing basic functions such as Average(), Maximum(), or Minimum(), the device had no issues with the response time maintaining a constant 0 for 11500 drones which is likely because the sample is too small for a basic task such as calculating the average or finding the smallest and largest value in an array and thus resulted in 0s for each drone during testing. However, During our test for more complicated functions such as the bubblesort algorithm which uses $O(n^2)$ notation or displaying an output to the terminal we can observe a stagnant in performance especially in bubblesort which had slowed down to 11s per drone when calculating for the last few drones. Regardless, we can also notice dips of better performance which is likely because as the array is sorted less and less values are needed to be swapped around and are already in the correct places. For the print function we can see that as more drones are required to be displayed the longer it takes for the device to compute the display to the terminal reaching even 4s per drone to display text to the user.

HPOmen 2020

The HPOmen similiarly does not have any varying response time when it comes to making simple calculations such as finding the Average(), Maximum(), or Minimum() temperature. During the bubblesort() testing however the device showed slightly better performance as when calculating the final drones it had only reached 9s per drone. Likewise, The print() function also showed slightly better performance reaching a stable 2s per drone to display. This result of better performance is likely due to slightly better Cpu and Ram thus allowing the program to allocate more resources for calculating meaning the program can run much faster.

Victus by HP Laptop 16-e0xxx

The victus also showed no struggle when doing the Average(), Minimum() and Maximum() functions which is to be expected as it has best hardware comparatively to the other devices. Although when tested with the bubblesort() and

print() functions it is comparatively similar in regards to the end performance which may be explained due to the hardware being somewhat similar and better hardware becomes redundant when tested with a smaller sample size. A sample sizze with 40000 drones for example we may have a easier time identifying better performance with the Victus as slightly better hardware may be able to calculate for much longer.

Conclusion

Overall, Through our analysis we can clearly indicate a relationship between the hardware of a device and the performance of a program. Through our testing, the Victus device has somewhat emerged as the better performing device compared to the other devices. With our analysis, the Victus is able to calculate more drones at a lower response time however compared to the HPOmen where the hardware is less distinguishable and even the Strix the performance is generally negligible as the user would not be able to identify a difference in perfomance unless the statistics of the performance was recorded. Nevertheless, The Victus which has better hardware is able to run the program and receive responses much faster in comparison to the HPOmen or Strix and therefore we can conclude that better hardware can improve performance of the program rather than optimizing the program itself however it will of course be more costly to keep spending on better hardware rather than trying to optimize the program as far as possible.