

# Time Trials for Lertap5

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It's been two years or so since Apple jettisoned Intel processors, such as the i5 and i7, in favour of new processors currently referred to as M1 and M2, with Pro versions of each available as of the date above. These are found in Apple MacBook Pros and Apple MacBook Airs. I undertook some performance comparisons to see if the new M1/M2 MacBooks could match the performance of Windows 10 Intel-based laptops.

I began by running the [MathsQuiz](#) dataset through four Intel-using laptop computers with i5 processors running Windows 10. With Lertap5 running in its "[Production mode](#)", it took the fastest of the i5-based laptops 20 seconds to produce results. The slowest (and oldest) i5 laptop took 24 seconds. Times would be expected to be better (fewer seconds) with i7-based laptops.

Switching over to my Intel i5-based Apple MacBook Pro (year 2019), I noted a running time of 150 seconds (about 2.5 **minutes**). This was not at all unexpected; many have commented on the poor Excel performance with Intel-based MacBooks.

But then, running on a MacBook Pro with an M1Pro processor, I recorded running times of 23 to 26 seconds over repeated trials. Times would be even better (fewer seconds) with an M2 processor.

So, good news for Apple users! Apple's switch to new M1/M2 processors has turned the tide.

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Insert 20 January 2021 from a user running on an IBM ThinkPad with an i7 processor:

I ran two reports: one with 27,814 students and the other with 282,495. Each student took the same 40 question exam. The smaller report took around 15-20 minutes whereas the larger report took over an hour to load the "Elmillion" reports. Both reports behaved the same way: Excel froze and the top bar (screenshot below) turned from green to light green/white and said in parenthesis "(Not Responding)."

On the bottom of the page, it stated something about Lertap loading, but I was in a bit of a limbo where I wasn't sure if excel was not working at all. So I guess for troubleshooting the best advice would be "Don't worry even if Excel says "Not Responding" just don't quit out the program as it is likely working in the background." I was able to do other things on my computer while the report loaded as well, but I did quit out excel twice when it was not responding as I assumed it was not working. Eventually just leaving it alone was the solution!

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Update note: 18 April 2020

It has now been two years since the last significant effort was made to measure Lertap5 running times on laptops running Excel 2016.

Since then, the version of Excel 2016 for use with **Macintosh** computers has improved dramatically. It is now almost possible to port Excel VBA<sup>1</sup> code modules written using Excel for Windows over to Excel for macOS without the need for major changes.

I have used a 56-item multiple-choice test to compare Mac running times with those from Windows 10. In both cases the latest version of Excel 2016 was in use. For Windows 10, I used the Lenovo Yoga 920 seen in the original February 2018 trials below.

For macOS, I ran on a MacBookPro 13-inch 2019 laptop with a 1.4 GHz Quad-Core Intel Core i5 having 8GB 2133 MHz LPDDR3. This was, in April 2020, the least-powerful model in the MacBook Pro range.

I originally intended to include a test of the two [versions of Lertap5](#): "5.10.9.4" and "5.10.99.4". The latter version, 5.10.99.4, is the "MacWin" version, 99% identical to the Windows version; it will run under both Windows and Mac but 5.10.9.4 will not. However, I quickly noticed there was no performance difference between the two, and consequently employed 5.10.99.4 exclusively as it ran on both platforms.

I used Windows 10 Pro on the Lenovo, and both macOS Catalina and Windows 10 Home on the Mac. Parallels Desktop was used to host Windows 10 on the Mac.

Running the 56-item exam with 1,306 students on the Mac took **54** seconds to process with macOS, dropping to **16** seconds with Windows 10 running under Parallels Desktop on the Mac. It took **13** seconds to run the same test results on the Lenovo Yoga running Windows 10 Pro.

I then stepped the number of students up to 5,222 using the same 56-item test.

Running times on the Mac were then **94** seconds under macOS, and **34** seconds with Windows 10 running under Parallels Desktop on the Mac. It took **25** seconds on the Lenovo Yoga running Windows 10 Pro.

As a side check, I also used Excel 2010 on the Lenovo, finding that it took just **16** seconds to process results<sup>2</sup>.

It is clear that Excel 2016 under macOS is relatively slow. But things are improving – years ago it would have taken *much* more time to run datasets of this size under macOS.

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<sup>1</sup> Visual Basic for Applications

<sup>2</sup> Apparently Microsoft will soon drop support for Excel 2010.

The data below were compiled on: 1 February 2018

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Computers:

Lenovo **Yoga 920** (92013IKP), Intel i5-8250U, 8GB / 256GB SDD  
 Dell **XPS-13**, Intel i7-7560U, 8GB / 256GB SDD  
 HP Spectre x360, Intel i5-6200U, 8GB / 256GB SDD

Software:

On the **Yoga 920**:  
 Windows 10 Home, Excel 2016 (16.0.8827.2131, 64-bit),  
 Excel 2010 (14.0.7192.5000, 64-bit)  
 On the **XPS**:  
 Windows 10 Pro, Excel 2016 (16.0.8827.2131, 64-bit).  
 On the **HP**:  
 Windows 10 Home; Excel 2016 (16.0.8827.2131, 64-bit).

Notes:

The three machines were laptop computers designed to provide good battery life and cool running, something they do at the expense of processor speed. Note they were running 64-bit versions of Excel. *The 32-bit versions of Excel 2013 and 2016 are quite likely to run into memory restrictions when Lertap 5 is run with N=5,000 or more.*

Times below are shown in minutes:seconds. A time of 1:02, for example, means 1 minute 2 seconds. N is number of students. Subs is number of subtests in use.

The datasets may be found at, and downloaded from, [this site](#).

| No. | Dataset Name | N     | Items | Subs | HP Excel 2016     | XPS Excel 2016    | Yoga Excel 2016 | Yoga Excel 2010 |
|-----|--------------|-------|-------|------|-------------------|-------------------|-----------------|-----------------|
| 1   | Cook's Tour  | 60    | 35    | 3    | 0:12              | 0:09              | 0:07            | 0:05            |
| 2   | HalfTime     | 424   | 100   | 1    | 0:22              | 0:17              | 0:14            | 0:09            |
| 3   | MNursing     | 1,769 | 60    | 1    | 0:19              | 0:16              | 0:13            | 0:09            |
| 4   | Zmed         | 2,470 | 100   | 1    | 0:31              | 0:24              | 0:20            | 0:14            |
| 5   | LenguaBIg    | 5,504 | 50    | 1    | 0:30              | 0:23              | 0:20            | 0:13            |
| 6   | LenguaBIg    | 5,504 | 50    | 3    | 1:01 <sup>3</sup> | 0:46 <sup>4</sup> | 0:41            | 0:27            |

A larger dataset was also put through time trials. With N=35,000 / Items=44 / Subs=1, times with HP 2016, XPS 2016, and Yoga 2016 were: 2:09, 1:39<sup>5</sup>, and 1:36<sup>6</sup>. Using the same N=35,000 dataset with Excel 2010 on the Yoga took 1:03 – this

<sup>3</sup> Was 8:09 in the previous version of Lertap.

<sup>4</sup> Was 2:28 in the previous version.

<sup>5</sup> Excel at times said “not responding” during this run, but nonetheless all results were as expected.

<sup>6</sup> Excel evidenced the same “not responding” notice at times, but results were not affected.

dataset was half of an original dataset having 70,000 data records – Excel 2010 processed the whole 70,000 in 2:19<sup>7</sup>.

### **Production mode**

The figures above were derived by using a stopwatch to time Lertap version 5.10.9 as it ran in "[Production mode](#)". I put "yes" in row 35 of the System worksheet, and "no" in rows 36, 37, and 38. The result was equivalent to running the "[Interpret](#)" option followed immediately by the "[Elmillion](#)" option.

A check was made by running through each dataset twice.

Running times will be lowest when Excel is the only program running on the computer and when there are only two Excel workbooks open: Lertap5.xlsm and the workbook with test results (such as HalfTime, MNursing, and so on).

Running time may also be reduced by turning off a couple of Lertap 5's options. The [Stats1ul](#) report takes a lot of time to create; it may be turned off by putting "no" in row 10 of the [System](#) worksheet.

Another (very) time consuming activity concerns getting Excel to adjust its page breaks so that quantile / [quintile plots](#) do not get split in the middle when they're printed. Adjusting page breaks may be turned off by putting "no" in row 92 of the [System](#) worksheet.

Excel 2010? It's the fastest version of Windows Excel I currently know of; its performance advantage is obvious in the figures above. As of January 2018, Excel 2010 was still actively supported by Microsoft and could still be purchased (unlike Excel 2007).

### **Note on 32-bit Excel**

Users should note the comments made above regarding 32-bit versions of Excel 2013 and 2016: they're subject to memory management limitations which are very likely to impede the application of Lertap when N exceeds 5,000. This is true even on computers with 8GB and more of memory; 32-bit Excel 2016 is constrained to operate in just 2GB of memory. Refer to [this webpage](#) for related comments.

### **Updates Summary**

As mentioned above, version 5.10.9 was used in these time trials. It was released in late January 2018.

This is by far the fastest version of Lertap 5 to emerge thus far, at least when it comes to Excel 2016. The running times reported above represent, by and large, a better than 50% reduction when compared to those found when using the previous version, 5.10.8. The reduction is mostly due to changes in the way Lertap gets Excel to display information – for example, the status bar at the base of the screen is now static when data records are being read – the status bar simply reports "... reading data records ..." – in version 5.10.8 the status bar said "Now reading record number ..." with a running number to indicate progress. In Excel 2010, a running display did not cause Excel to

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<sup>7</sup> Excel 2010 displayed the "not responding" notice at times when N=70,000 but all was okay.

slow down all that much, but in Excel 2016 it makes a very big difference, and things go much faster, and a bit smoother too, with static status bar messages.

Visit [this document](#) to track Lertap 5 developments. Also, see [this webpage](#).