LZMA vs LZMA2 vs WinRAR64

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With the weather being bad today and having some hours to kill (watching some movies) I decided to check out the new LZMA2 (64-bit) compression which will be included in the up-coming 7-ZIP v9 release. You may ask why version 9 and not 4, I think it is to reference the year it will be released. Please correct me if I am wrong :)

I also decided to compress the same files using the up-coming release of WinRAR64. It has an improved and updated compression engine to support more modern multi-core and multi-threaded CPU's, instructions and memory. It all sounds promising on paper but can this old yet updated compression algorithm really stand up against its more modern counterpart?

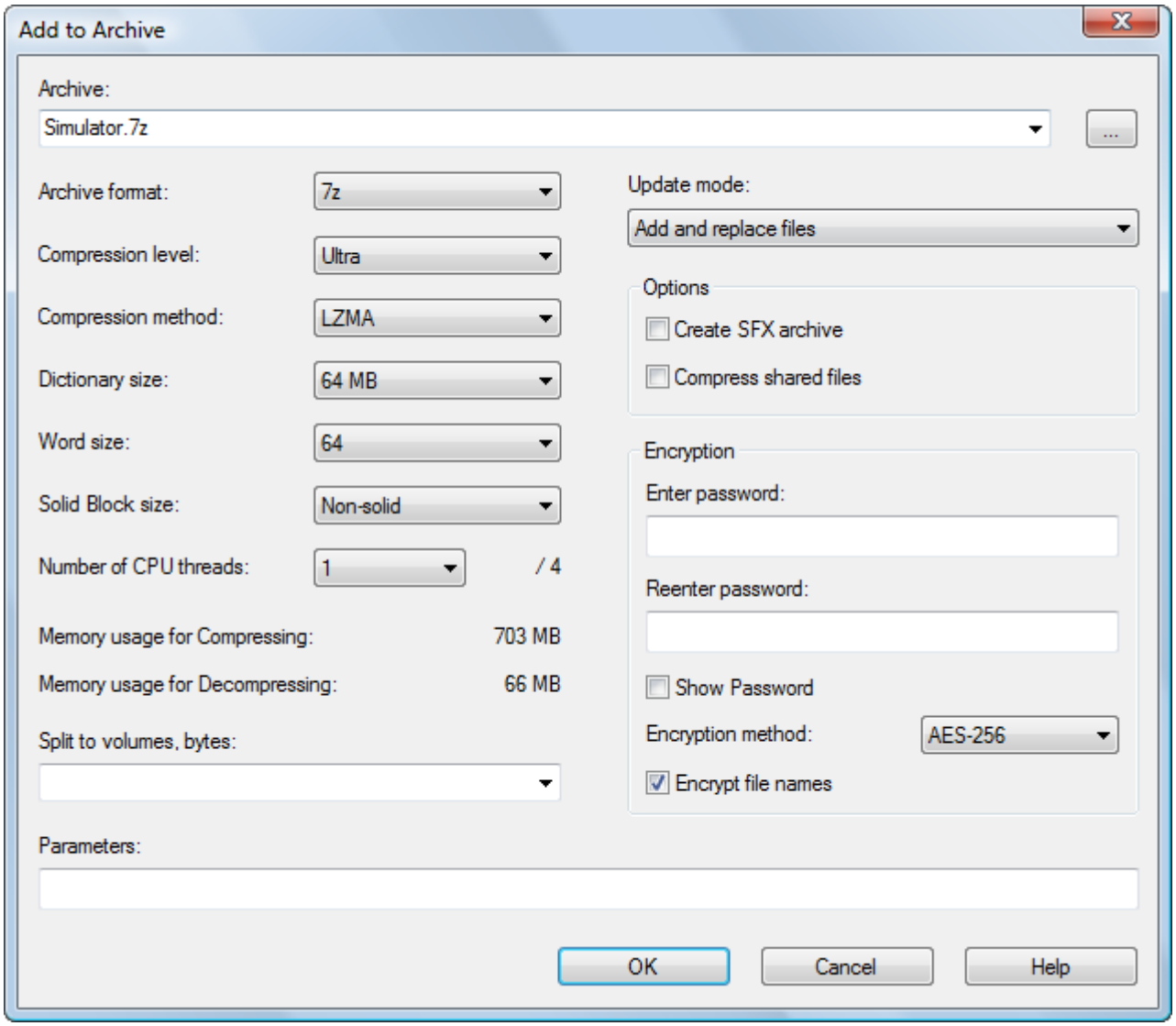
For the tests I chose a directory with nine files adding up to 4,295,228,135 (4.2GB). The larger the file(s) the better and more accurate results can be built up. All the tests were carried out on an Intel QuadCore 2 Q6600, 2400 MHz machine with 8GB of memory running under Vista64. I don't think many further details of the system need to be known since I am only comparing the compression engines on the same machine.

Okay... lets take a look at some of these tests and their results...

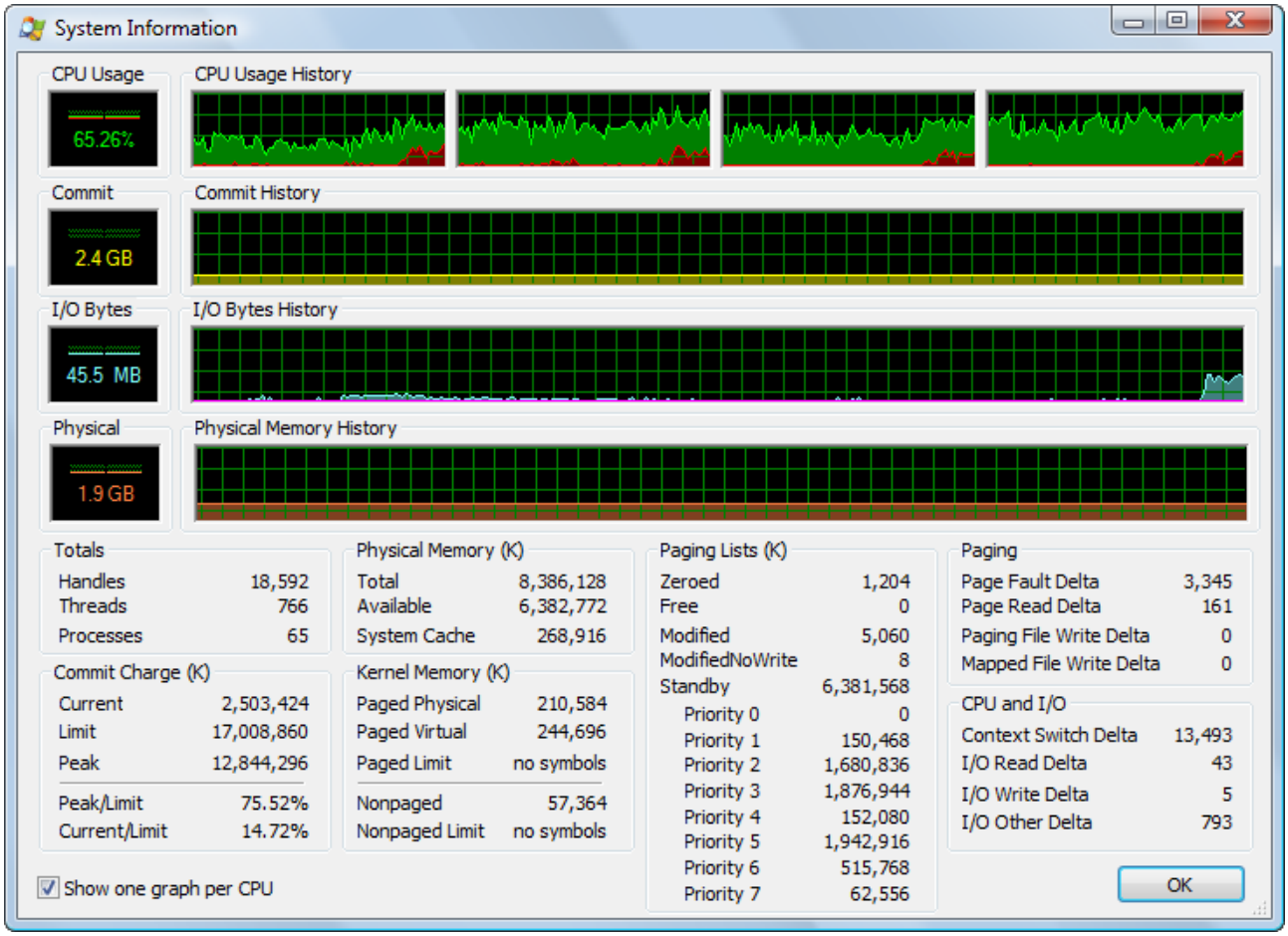
Round 1 Tests - LZMA

The first round of tests were with the older LZMA compression just so I could compare it against LZMA2.

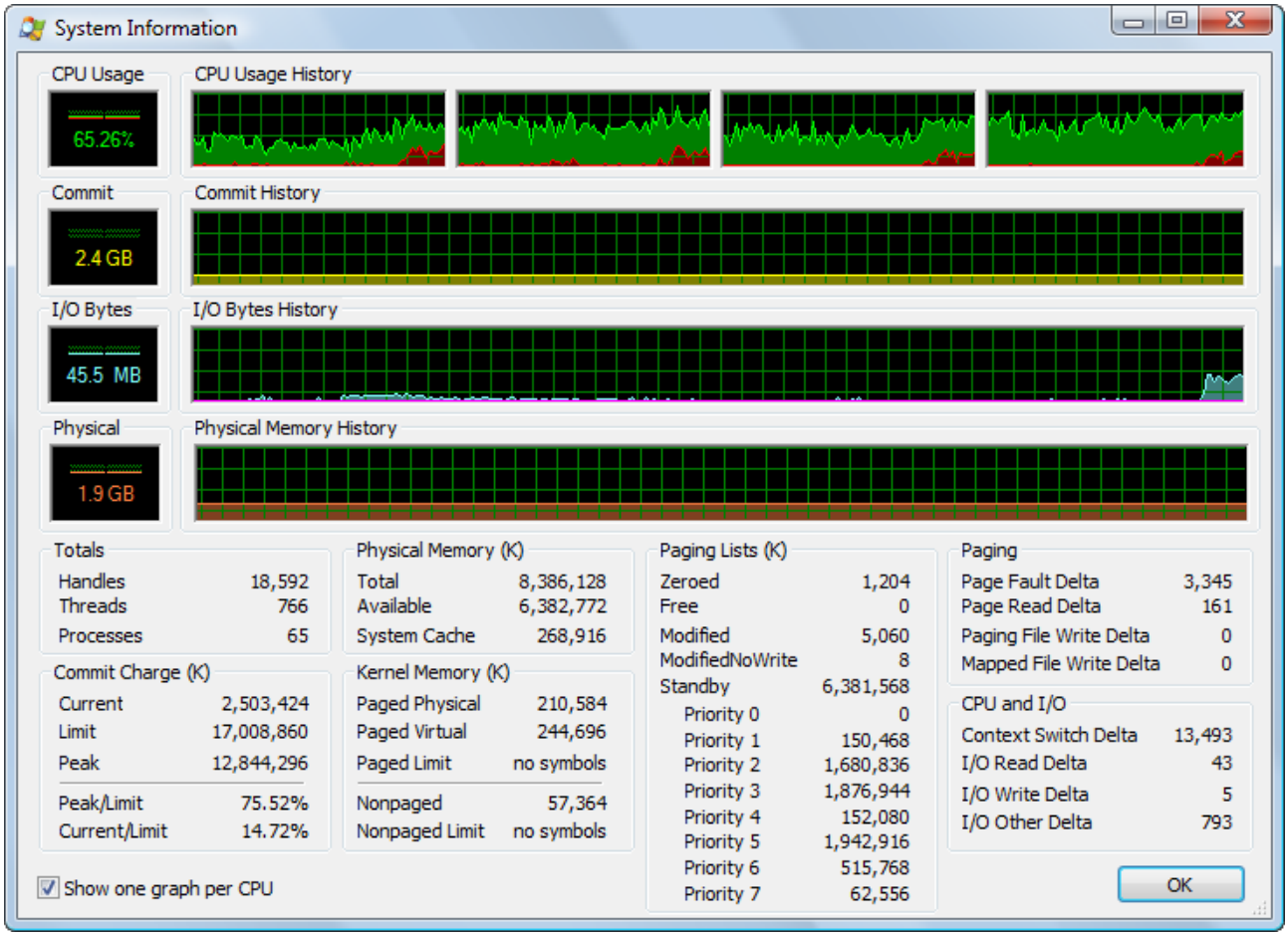
Here is a snapshot of the standard settings used:



Round 1: **Test 1**
Threads: **1**
Time: **30.01 minutes**
Compression: **988,623,489**
Archive Type: **Non-Solid**



Round 1: **Test 2**
Threads: **2**
Time: **17.58 minutes**
Compression: **988,618,805**
Archive: **Non-Solid**

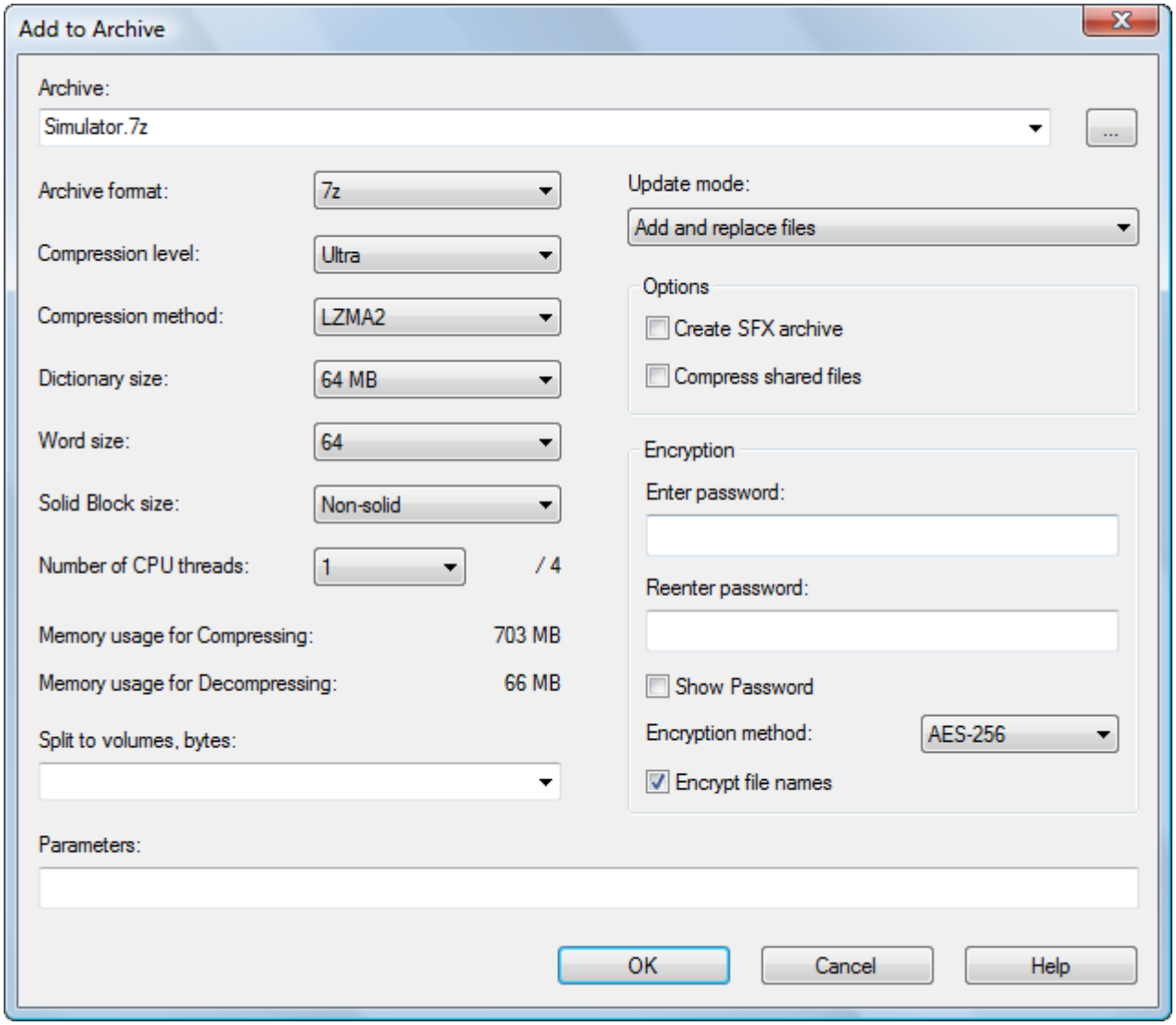


Round 2 Tests - LZMA2

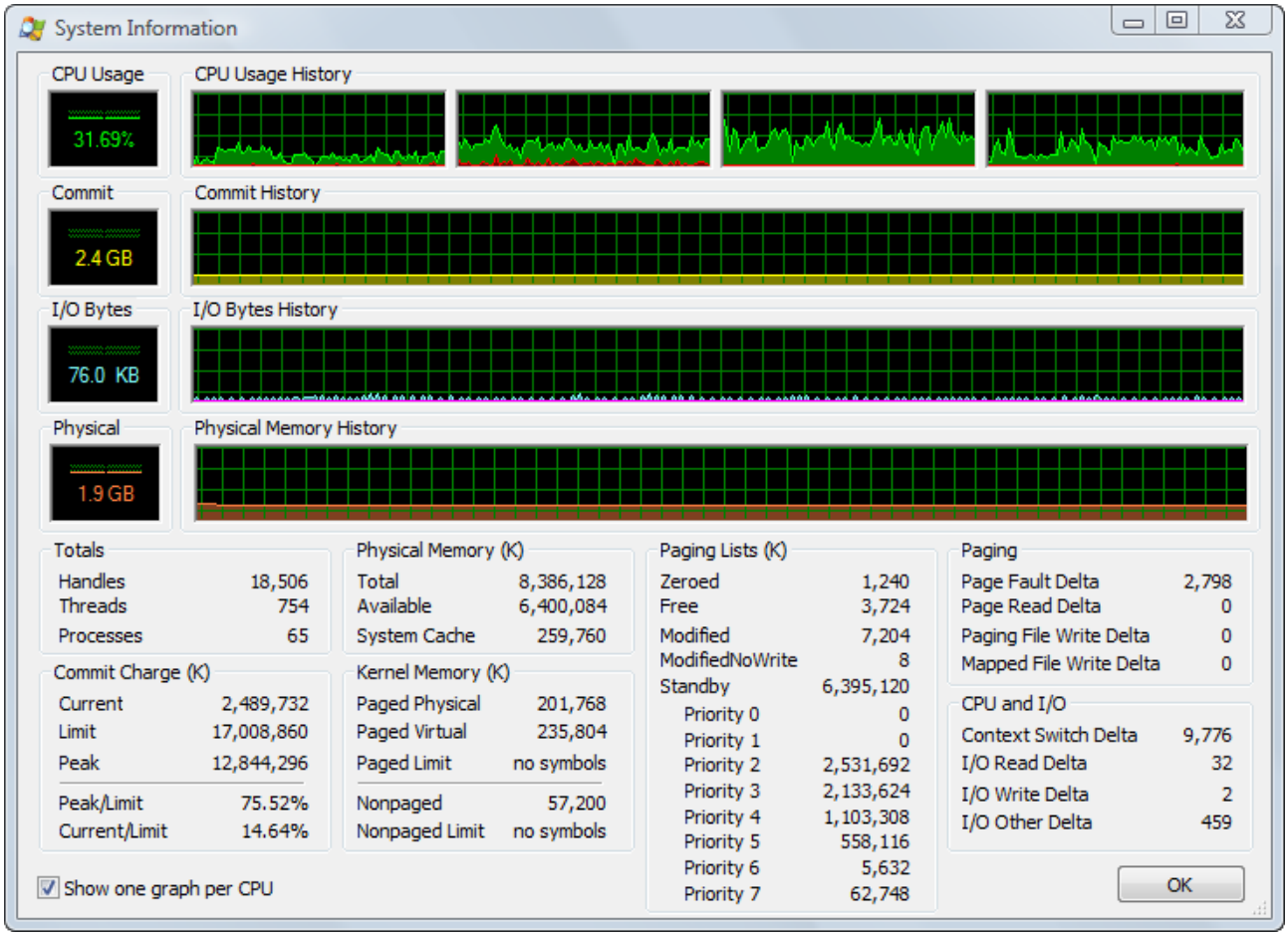
These are the results of the tests I did using LZMA2. I carried out both solid and non-solid archives tests because I wanted to see how much of an effect using more CPU threads effected solid archive sizes – not much in the end!

As you will see in the following results once you start using 4 or more CPU threads LZMA2 archive sizes are effected (but consistant). In these tests the archive size increased by around 25MB. However this is made up for in compression speed.

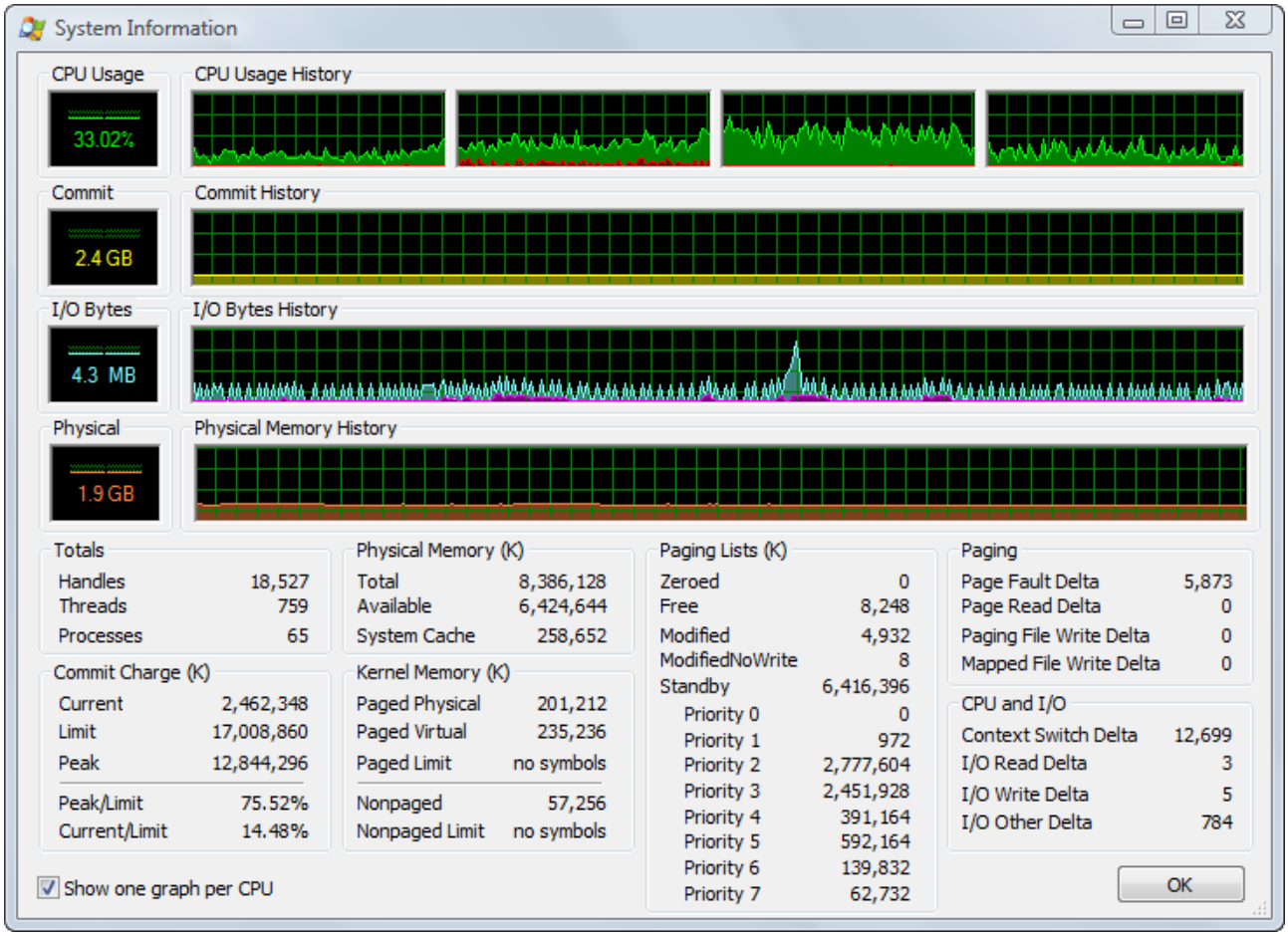
Here is a snapshot of the standard settings used throughout the tests:



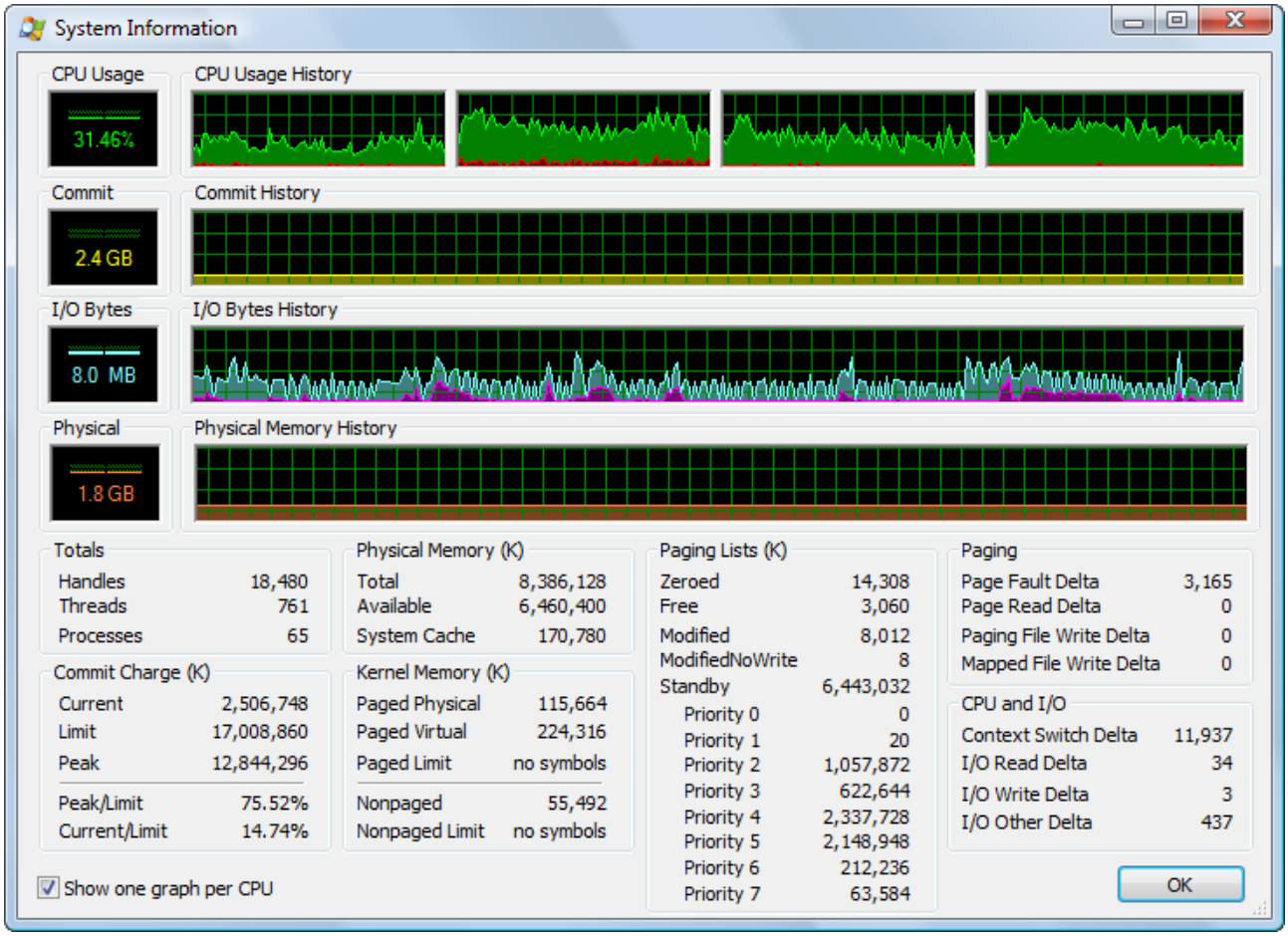
Round 2: **Test 1**
Threads: **1**
Time: **28.45 minutes**
Compression: **985,709,457**
Archive Type: **Non-Solid**



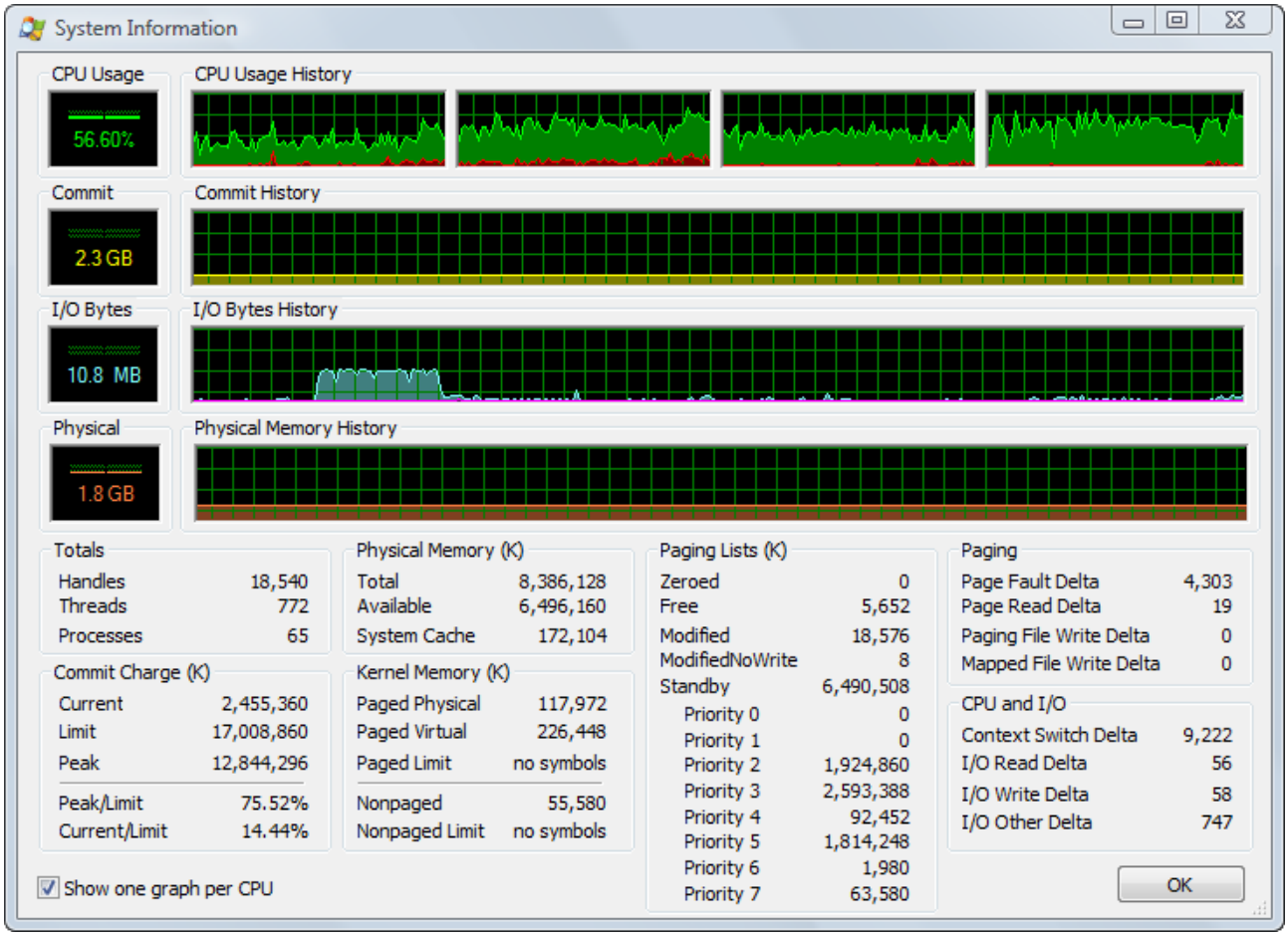
Round 2: **Test 2**
Threads: **1**
Time: **30.04 minutes**
Compression: **985,695,005**
Archive Type: **Solid**



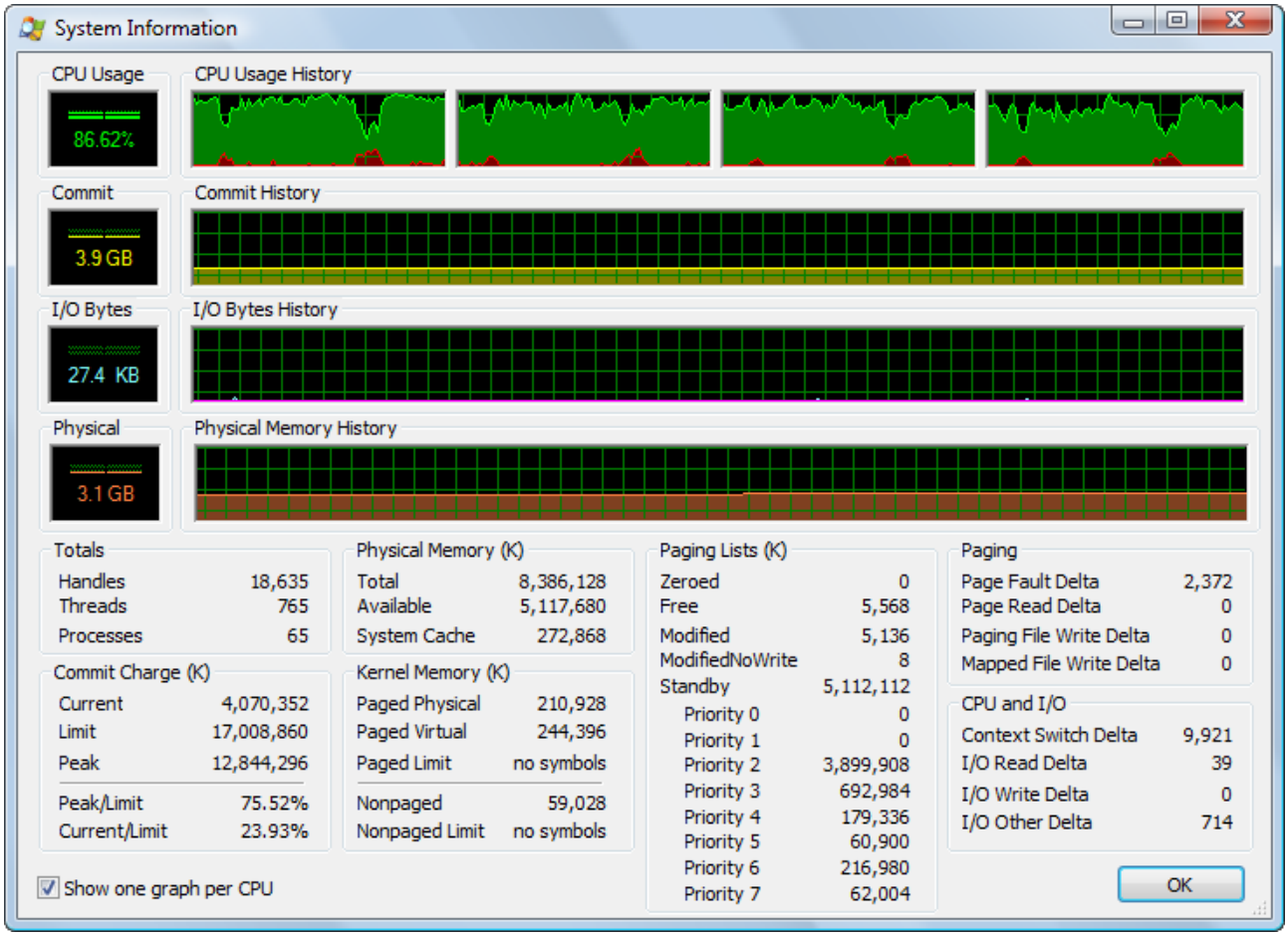
Round 2: **Test 3**
Threads: **2**
Time: **17.55 minutes**
Compression: **985,697,055**
Archive Type: **Non-Solid**



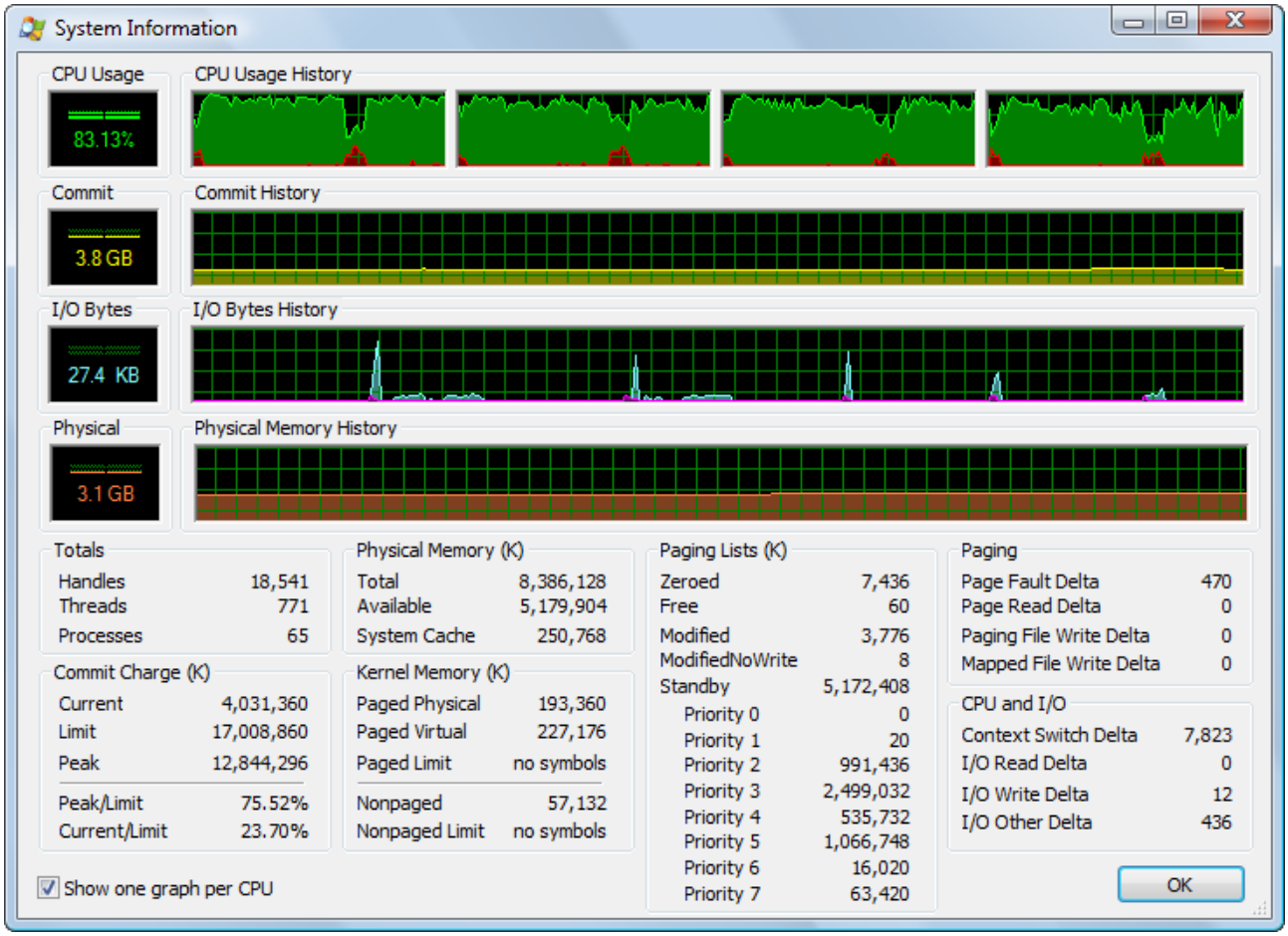
Round 2: **Test 4**
Threads: **2**
Time: **18.01 minutes**
Compression: **985,682,63**
Archive Type: **Solid**



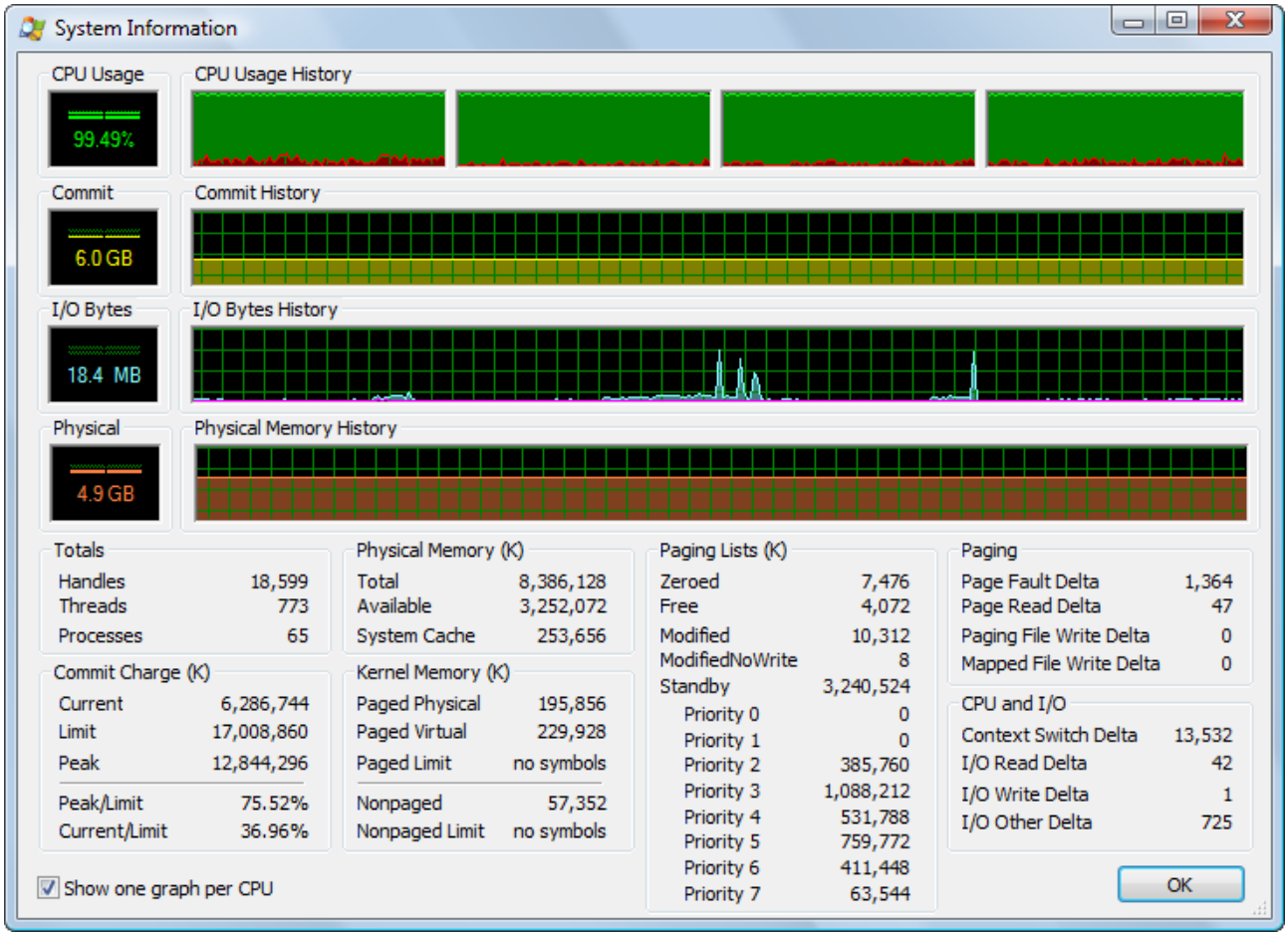
Round 2: **Test 5**
Threads: **4**
Time: **11.15 minutes**
Compression: **1,012,314,050**
Archive Type: **Non-Solid**



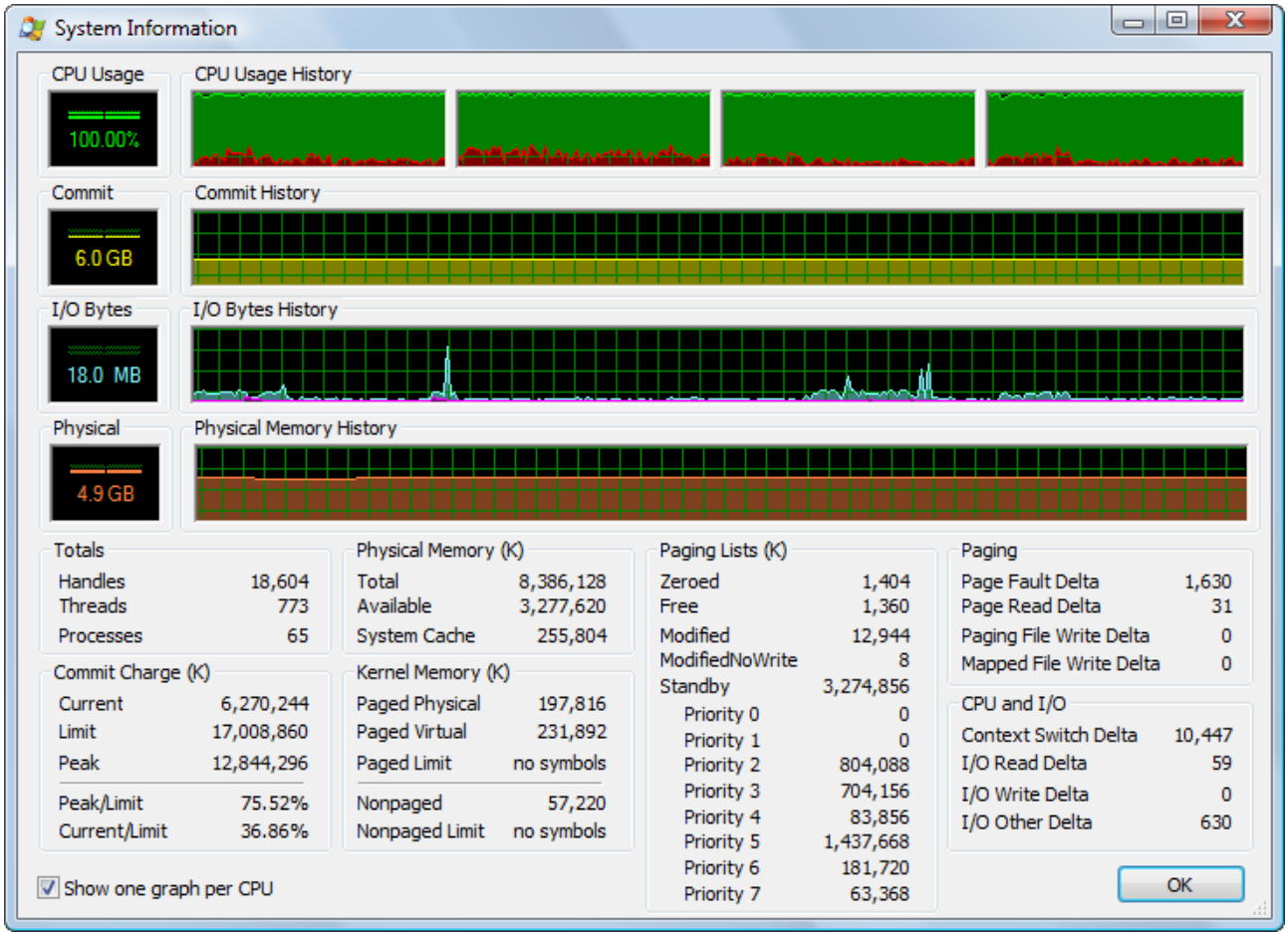
Round 2: **Test 6**
Threads: **4**
Time: **10.51 minutes**
Compression: **1,012,299,757**
Archive Type: **Solid**



Round 2: **Test 7**
Threads: **8**
Time: **10.34 minutes**
Compression: **1,012,314,050**
Archive Type: **Non-Solid**



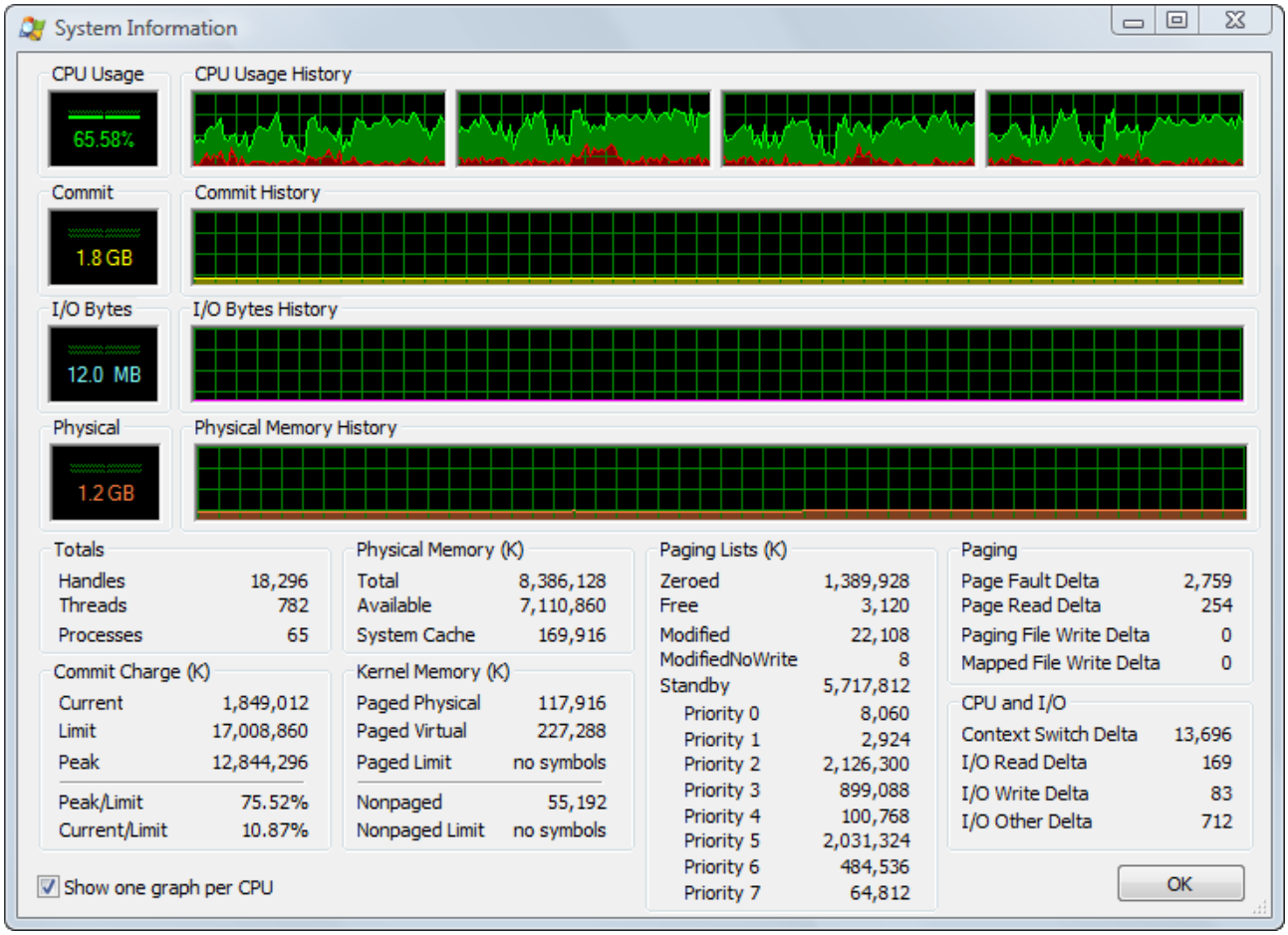
Round 2: **Test 8**
Threads: **8**
Time: **10.49 minutes**
Compression: **1,012,299,757**
Archive Type: **Solid**



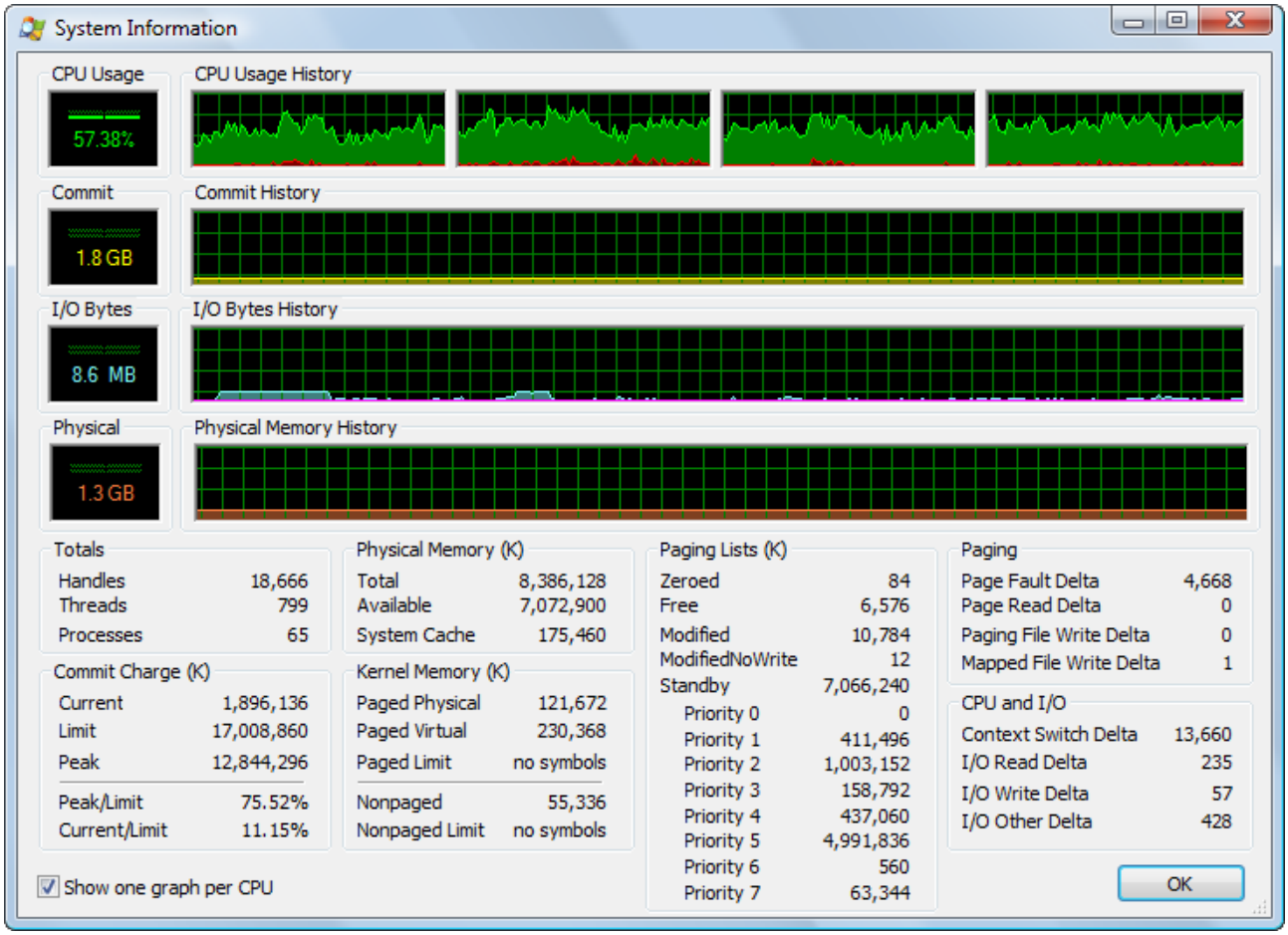
Round 3 Tests – WinRAR64

These are the results of the WinRAR64 tests. Standard settings were used with the exception of enabling **Best** compression and setting a dictionary size of **4096**. Note that even though this is WinRAR's highest dictionary setting it does automatically adjust this value during compression.

Round 3: **Test 1**
Time: **15.40 minutes**
Compression: **1,236,340,828**
Archive Type: **Solid**

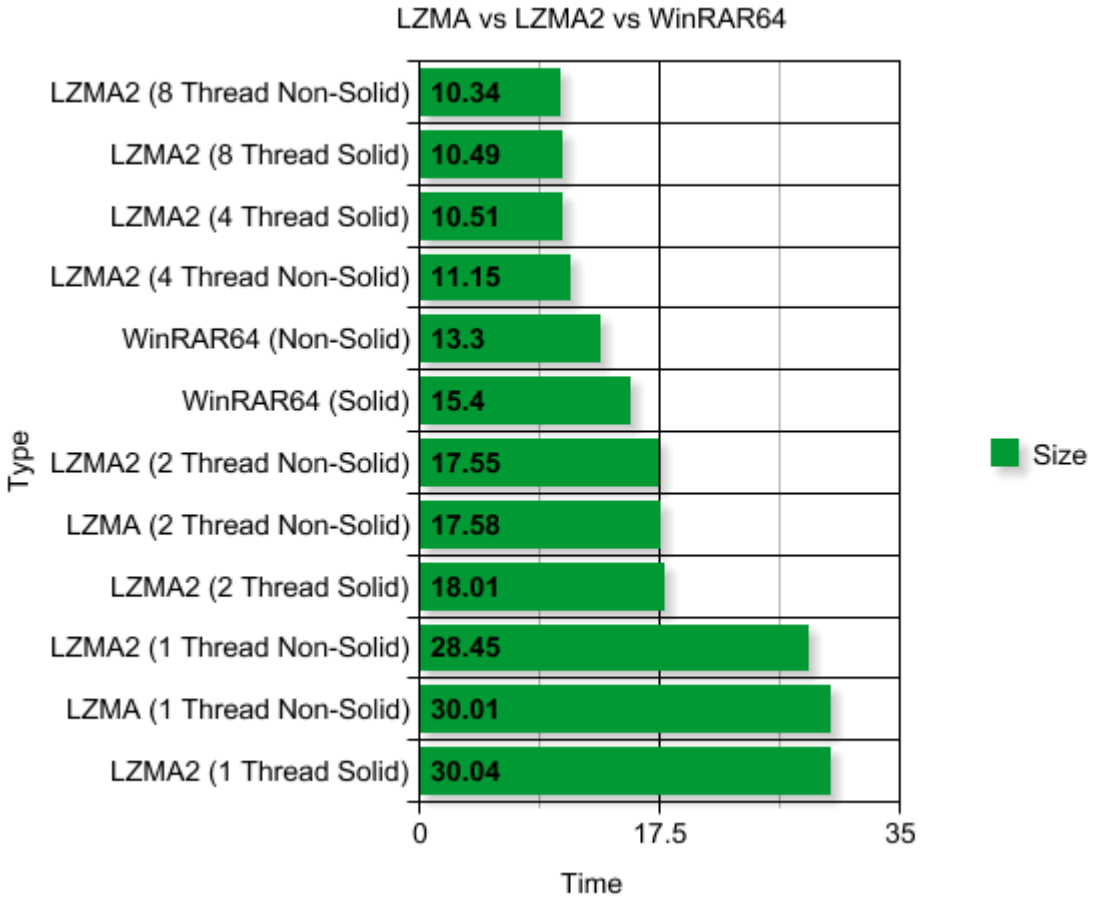


Round 3: **Test 2**
Time: **13.30 minutes**
Compression: **1,224,654,449**
Archive Type: **Non-Solid**

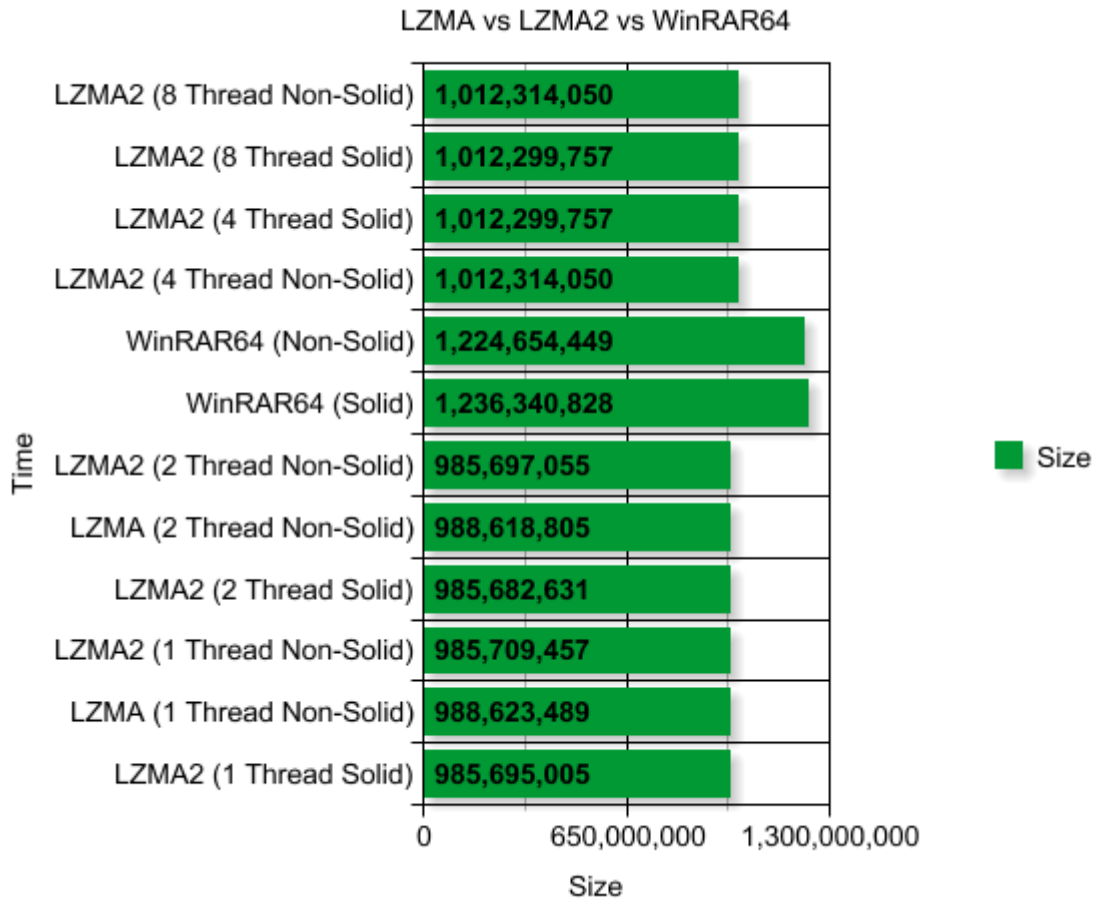


Conclusion

In the graph below I show you the best compression times:



The graph below shows the best compression ratio, it is vertically adjusted with best time at the top:



You can see from the results there is a slight improvement in compression speed between LZMA and LZMA2 when using a single thread. There is not much difference between them when using two threads. However there is a consistant difference in archive size results with LZMA2 benifiting around an extra 3MB. Maybe not much but better than nothing and does prove there has been an improvement with the compression engine.

The big difference in LZMA2 is when taking advantage of the extra CPU threads. Whilst the archive size increased by around an extra 25MB when using 4 or more threads the compression speeds increased greatly.

Using the maximum of 8 threads in the test it was possible to shave off 18 minutes over a single thread compression and around 7 minutes over 2 threads found in both LZMA and LZMA2.

The surprising (or not) result is with WinRAR. For a long time the compression engine has fallen behind LZMA and with the release of LZMA2 it falls back even further. Whilst the compression time is on par with a 3 thread LZMA2 time its compression ratio is aweful. Comparing the best result in WinRAR to the best result in LZMA2 we are looking at a difference of around 238MB. Even if you include the extra 25MB when using 4 or more threads WinRAR is still too far behind.

WinRAR64 looks to have failed even before its initial first release. I know it is still in beta and there may be a possibility for it to catch up but if these results are anything to go by it does not look promising. LZMA2 is the new King...