

Lightroom Performance Testing: 4.4 versus 5.2RC

Preamble

The SLR Lounge recently published an analysis of their tests comparing the performance of Lightroom 4 with Lightroom 5 in three areas: 1:1 Preview rendering, Exporting and Image loading in the Develop module. Although it was not clear from the article which specific "dot" versions of Lightroom were used in their testing, the conclusion reached was that Lightroom 5 was slower than Lightroom 4 in all three areas.

I found this surprising. Typically I have tested each new version in both 1:1 preview rendering and exporting, comparing the results with the previous version. Admittedly, my testing was not overly demanding, and was also complicated by a hyper-threading (HT) issue, but generally speaking my results indicated that as expected both LR4 and LR5 (both using PV2012) were slower than LR3 (using PV2010), but that **LR5 was marginally faster than LR4**.

Therefore, given the SLR Lounge report, I decided to investigate further. My goal was to either confirm (or disprove) my own intuitive feeling that - **on my own system only** - LR5 is indeed faster than LR4 in these three specific areas.

Summary

For those of you with neither the time or inclination to wade through the various charts and tables within the main body of this analysis, the main finding is that in almost every test that I ran, LR5 (specifically the 5.2 Release Candidate) did indeed outperform LR4 (version 4.4). In some cases the improvement was only marginal, although in others (notably where Luminance NR was used, or when doing exports to smaller sizes) the improvement was much more obvious.

In conducting these tests I also noted the following:

- When ACR cache entries exist, and are on the same fast local storage type as the catalog, there is no **performance** benefit when using Smart Previews. On the contrary, there was some evidence that they may in fact have a small negative impact during image loading into the Develop module (although this seems logical to me). I would expect, however, a different result in other setups such as when using DNG files with Fast Load Data on slower storage such as a NAS, or when ACR Cache entries don't exist.
- When Luminance Noise Reduction is used, LR5.2 RC would seem to process it more efficiently than LR4.4, both in 1:1 Preview Rendering, and Exports.

- There is some evidence that thread utilisation when Hyper-Threading is enabled has slightly improved in LR5.2 RC, though performance was still better with it disabled.

Testing Plan Overview

All testing was carried out using my 3+ year old Windows 7 x64 desktop, quad-core CPU (i7-930) with 12gb RAM, and 4 x internal hard drives @7200 rpm. Disk utilisation remained as initially setup when the system was built:

Disk 1: System drive

Disk 2: Lightroom Catalogs

Disk 3: ACR Cache

Disk 4: Image files

For the purposes of the majority of the testing I decided to have HT disabled....I had determined from previous testing that prior to LR4.3 there was a marginal performance benefit with HT enabled, but this changed with the 4.3 release and since then it has been marginally beneficial to run with HT disabled. However, some of the 1:1 Preview rendering was run on both modes, so the data is supplied where it exists.

Also, as the main focus of this activity was a comparison of LR4 with LR5, I did not feel the need to rerun all of my earlier LR3 tests. I thought I had good data from my previous LR3 1:1 Preview rendering, so did not retest. I did, however, rerun the LR3 Export tests as my previous sample size was not as large as I now wanted it to be.

For the purposes of the more detailed LR4 versus LR5 comparison, I used versions 4.4 and the current 5.2 Release Candidate.

Finally, it should be noted that my attempts at timing the image loading into Develop are fairly simplistic (using a stopwatch and pressing the right arrow key when I determined that the correct image loading point had been reached). I used my best endeavours to provide accurate results, even running some of the tests multiple times where necessary. However, I have no means to automate this process, so please treat the findings of this particular series of tests with some caution.

1:1 Preview Rendering

The first stage was to update my previous preview testing, which I had run at various points since LR3.6. The test data has been a set of 100 raw files from my Canon 5DII, 1:1 previews rendered with no edits, and with the LR5.2 data added the resulting table is as follows:

1:1 Previews	HT Enabled?	Total Time
LR3.6	No	358 Seconds
LR3.6	Yes	343 Seconds
LR4.2	No	391 Seconds
LR4.2	Yes	380 Seconds
LR4.3	No	386 Seconds
LR4.3	Yes	409 Seconds
LR4.4	No	380 Seconds
LR4.4	Yes	410 Seconds
LR5Beta	No	380 Seconds
LR5Beta	Yes	408 Seconds
LR5.2RC	No	365 Seconds
LR5.2RC	Yes	373 Seconds

Nothing startling here. The slowdown using HT in 4.3 onwards can clearly be seen, though it's interesting to note that there seems to have been an improvement in LR5.2 RC, so it will be interesting to see if that improvement continues in later releases to the point where it becomes beneficial to re-enable HT.

But it should be noted that LR5.2 is marginally faster than all the tested versions of LR4, and interestingly is very close to the LR3 performance with HT disabled.

For the second stage of the testing I decided to run more comprehensive tests comparing LR4.4 with the LR5.2 RC, in particular looking at the effects of develop edits on preview rendering performance. I know from previous testing that certain edits can affect export timings, so it's logical to expect that they would have a similar effect on preview rendering. For this phase of the testing I setup a new catalog for each version, populated with the same

100 raw files from my Canon 5D Mark III. 50 of these were low-ISO images (200 or less), the other 50 were high-ISO images (1600).

All tests were run with HT disabled.

The first test was to compare the 1:1 preview rendering time of all 100 files on each version, with no develop edits applied.

Then I setup two Develop Presets:

- Low ISO Preset: Most of the Basic panel sliders adjusted, including Clarity and Vibrance. Detail panel left at defaults (i.e. Sharpening at 25, Luminance NR at 0, Colour NR at 25). Lens Profile Corrections enabled, plus Remove CA enabled.
- High ISO Preset: Same adjustments as the Low ISO Preset, except Luminance NR which was set at 25.

The Low ISO Preset was applied to the 50 low ISO images in each catalog, and the High ISO Preset was applied to the 50 high ISO images.

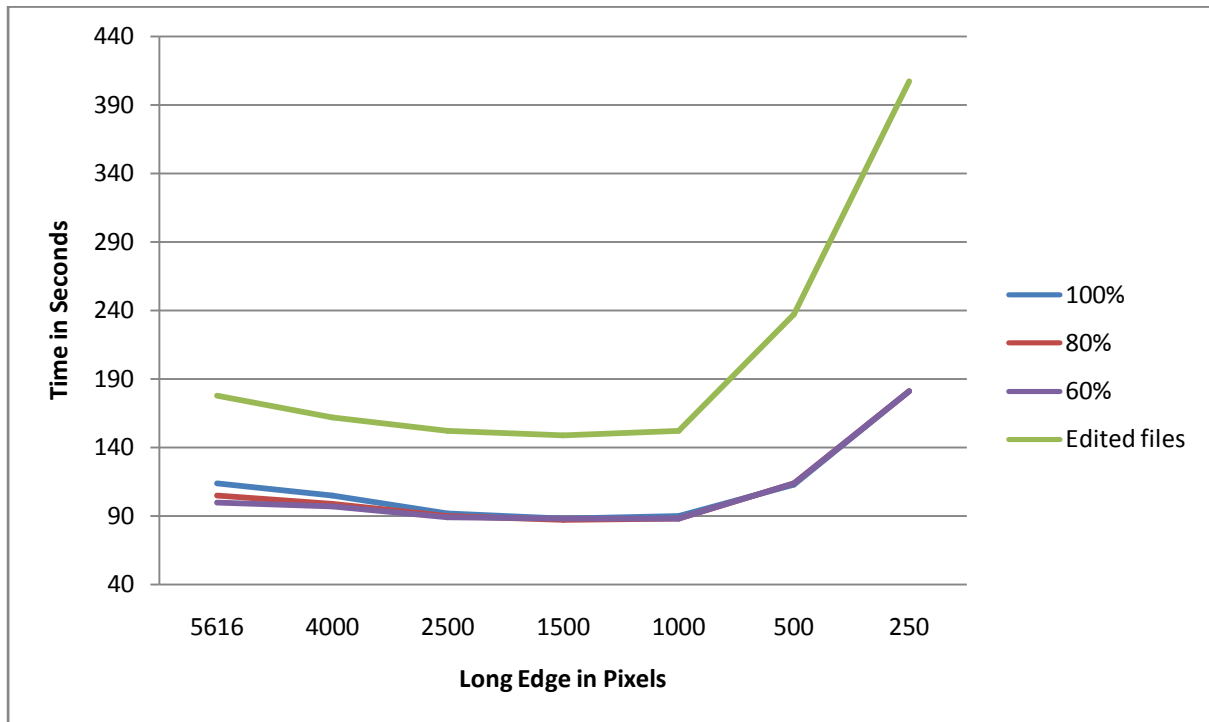
1:1 Previews were then rendered in each catalog for each set of 50 images. The results of these tests were as follows:

Version	Number/Edit Type	Total Time	Per Image Time
LR4.4	100/No Edits	397 Seconds	3.97 Seconds
LR5.2 RC	100/No Edits	376 Seconds	3.76 Seconds
LR4.4	50/Low ISO Preset	370 Seconds	7.40 Seconds
LR5.2 RC	50/Low ISO Preset	356 Seconds	7.12 Seconds
LR4.4	50/High ISO Preset	560 Seconds	11.20 Seconds
LR5.2 RC	50/High ISO Preset	468 Seconds	9.36 Seconds

As can be seen, the small advantage of LR5.2 RC over LR4.4 is maintained during the "no edits" and "Low ISO" preview rendering, although this advantage clearly widens when Luminance NR is added to the mix. As this difference also persists when running the Export tests (see later), it seems logical to assume that LR5.2 processes Luminance NR rather more efficiently than does LR4.4.

Exports

This was interesting, and also a little embarrassing! I had several years previously run some export timing tests for Victoria's forum (www.lightroomforums.net) using LR3, although only on a relatively small sample size of 35 raw files from the Canon 5DII. The tests were run to try to assess the impact of changes to the export quality setting, and changes to the pixel dimensions of the exported files. The results were charted as follows:

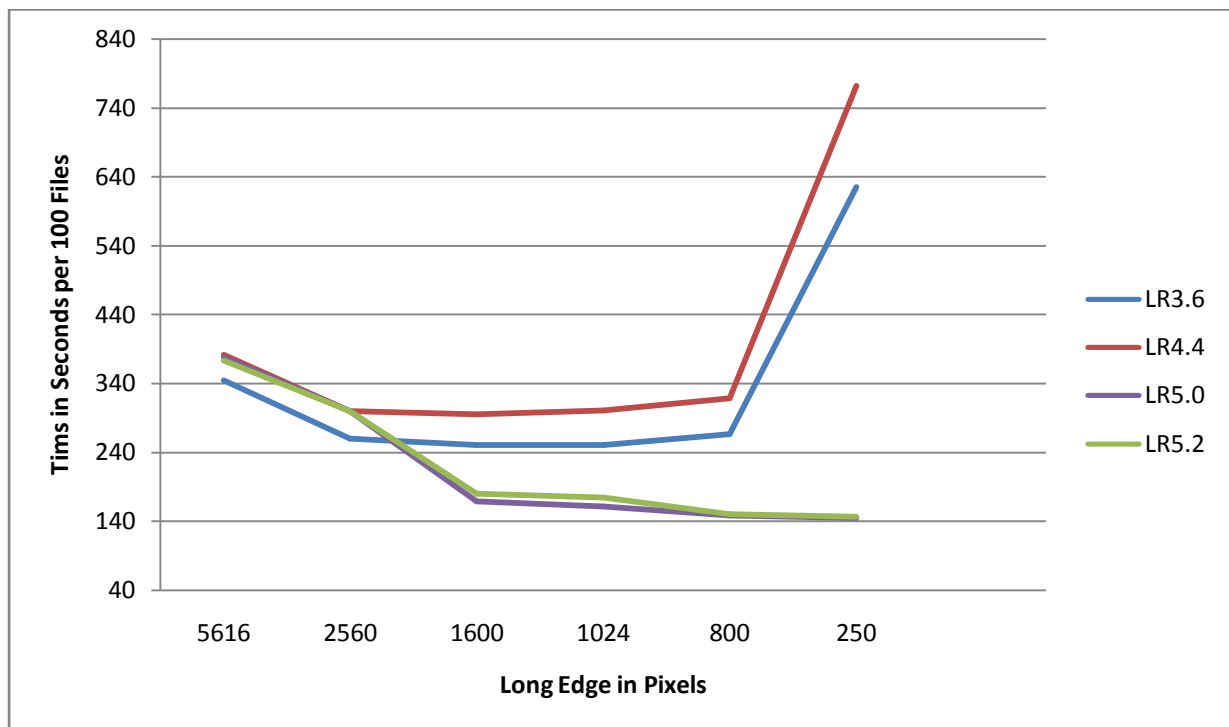


Long Edge	Time at 100% Quality	80% Quality	60% Quality	Edited Files at 100%
5616	114	105	100	178
4000	105	99	97	162
2500	92	90	89	152
1500	88	87	88	149
1000	90	88	88	152
500	113	114	114	237
250	181	181	181	407

At that time a couple of conclusions were drawn, the first being that quality setting would seem to have very little effect on the export speed. Secondly, the shape of the curve was noted, i.e. there seemed to be a point as the export long edge was reduced whereby the export time started to dramatically increase. But other than wondering why that was so, no

further action was taken. Turns out it may have been a bug! Ian Lyons pointed out to me a bug report that he had raised during the LR4 cycle, concerning very slow exports at small sizes using his Canon 5DIII. This was reported to be fixed in LR5, and worked on exports whose long edge (pixel dimension) was less than one third of the original file. As will be seen, the results of that fix are dramatic!

First, however, I wanted to run a series of exports from each of LR3.6, LR4.4, LR5.0 and LR5.2RC, using several different long edge sizes, 100% quality. Based on the set of 100 unedited Canon 5DII files as used in the initial preview tests, the results are as follows:



Long Edge	LR3.6	LR4.4	LR5.0	LR5.2
5616	345	382	378	373
2560	260	300	300	300
1600	251	295	169	179
1024	251	301	162	175
800	267	319	149	150
250	625	772	145	147

The conclusions from this test:

As expected, the exports at the first two sizes (full-size 5616, then 2560) show LR3.6 to be faster. LR5.0 and LR5.2 are marginally faster than LR4.4 at full-size, but there is no difference at 2560.

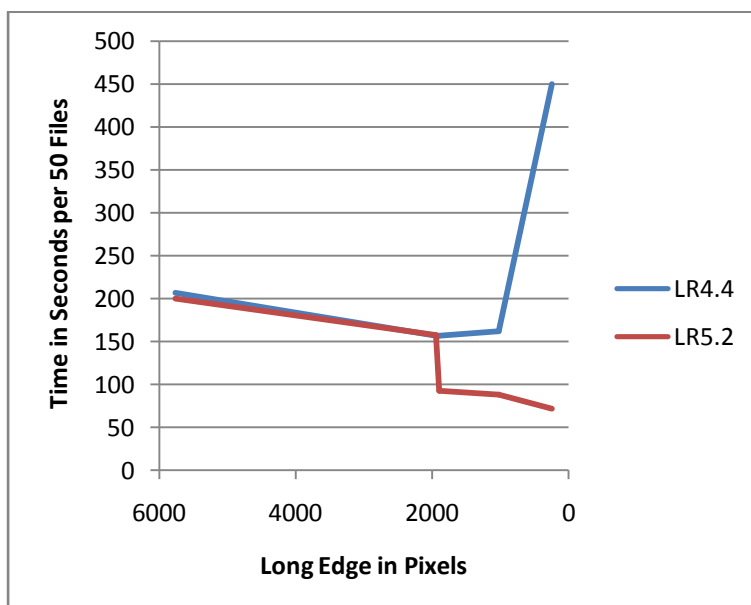
After that, however, things change significantly. LR3 continues to remain faster than LR4.4, but both now exhibit the same upwards curve on the graph as per my testing several years ago, with exports at 250 pixel output size being ridiculously slow.

LR5.0 and LR5.2, however, show the effects of the bug fix mentioned above. As the export at 1600 has now crossed the one-third output size (1872 pixels), there is a very sharp initial reduction in export speed following by a continued gradual decrease. **At the 250 export size, LR5/5.2 is more than 5 times faster than Lr4.4.**

For the next set of tests, I used the same set of catalogs and files as in the final 1:1 Preview testing, i.e. 100 x Canon 5DIII raw files, split 50/50 between low and high ISO. I first ran a "zero edits" test at the same 5 export sizes using all 100 files, then divided the result by 2 to get the same "per 50 files" result as in the following two tests.

For the next two tests I changed the output sizes slightly....2560 was reduced to 1940, and 1600 was increased to 1900. The idea was to concentrate either side of the "one-third" figure, for the Canon 5DIII files that would be 1920 pixels. I also eliminated the final 250 pixel export, simply because I would have run out of patience waiting for the LR4.4 test to end!

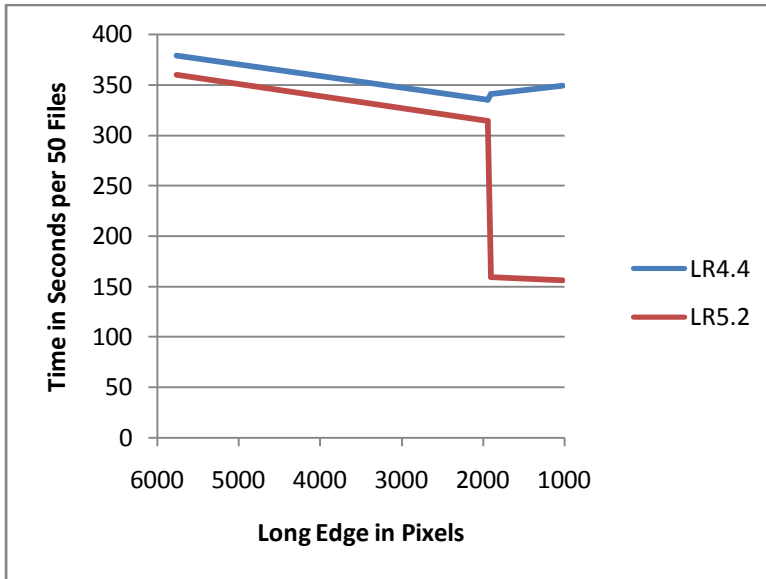
Test 1: "Zero edits", 100 files exported, time divided by 2:



	Unedited	Unedited
Long Edge	LR4.4	LR5.2
5760	207	200
1940	158	158
1900	157	93
1024	162	88
250	450	72

Lightroom 5.2 slightly faster at full-size, parity at 1940, but then LR5.2 times fall dramatically while the LR4.4 times go in the opposite direction. At 250 pixels, LR4.4 is 6 times slower than LR5.2.

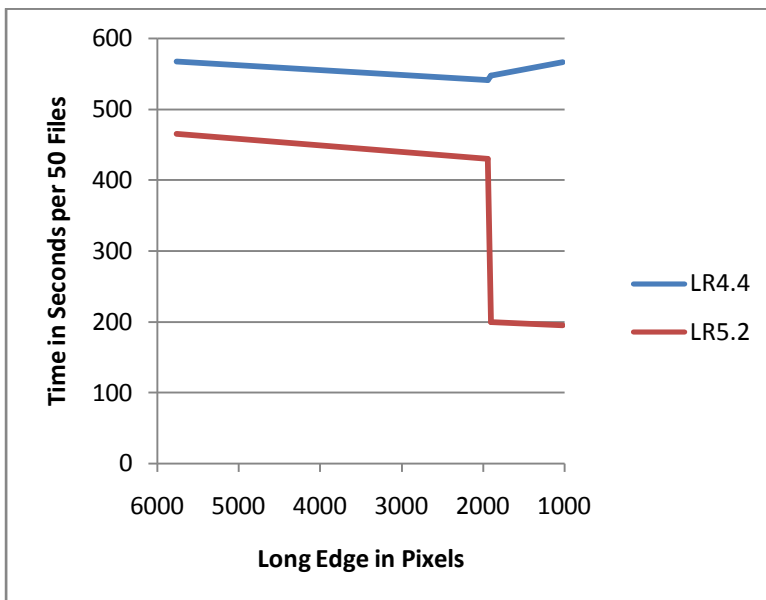
Test 2: 50 files with the "Low ISO" Preset applied:



	Basic + LC	Basic + LC
Long Edge	LR4.4	LR5.2
5760	379	360
1940	335	314
1900	341	159
1024	349	156

In this test, LR5.2 is more clearly faster (but not massively) at the full-size and 1940 exports, but then the same dramatic "falling off a cliff" effect is seen with LR5.2 at 1900 pixels, whilst LR4.4 export times start to rise.

Test 3: 50 files with the "High ISO" Preset applied:



	Basic, LC, NR	Basic, LC, NR
Long Edge	LR4.4	LR5.2
5760	567	465
1940	541	430
1900	547	200
1024	566	195

Same as test 2, but now the difference between the two Lightroom versions is more marked at full-size and 1940 following the application of Luminance NR, the same as happened with the "High ISO" 1:1 Preview rendering.

I then ran one further series of tests, using the 100 "zero edits" files in the LR5.2 catalog only. I was curious to see if the "one-third" tipping point kicked in at "one third or less" of original size, or "less than one third" of original size. The answer would seem to be the latter:

100 files @ 1921 export size took 322 seconds.

100 files @ 1920 export size took 324 seconds.

100 files @ 1919 export size took 144 seconds.

I'm sure somebody will be asking Adobe why reducing the export long edge by one pixel can more than halve the export time!

Image Loading in the Develop Module

This is by far the most difficult area to confidently assess, especially when loading images using "fit" view. In this mode, the actual full image loading time is largely hidden from the user as the initial preview shown will usually appear sharp enough to begin editing once the sliders have been activated (even though at that stage the actual full image conversion is still ongoing).

Typically, the user will first see the "Loading" indicator which will likely disappear just as, or just before, the sliders are activated. So for the tests in the "fit" mode, measuring the load times is a matter of starting a stop-watch then pressing the right-arrow key as soon as the sliders are activated on the current image. Fairly imprecise, especially as it becomes very easy to "anticipate" slider activation and thereby advance to the next image a fraction early.

However, when loading images into Develop when zoomed into 1:1, it was generally easier to see the full image loading taking place. Typically there's a three-stage effect: initially very fuzzy image, then less fuzzy but not fully sharp, finally the fully sharp image. "Loading" disappears and sliders activate somewhere in the first two stages, then there's usually a delay waiting for the full image to complete loading and the image to fully sharpen. The degree of "fuzziness" in the first two stages would seem (logically) to depend on what type of previews are available, e.g. if only minimal Library previews have been built, and no Smart Previews have been built, the fuzziness in stages 1 and 2 is more obvious....though this should have no effect on the total image loading time.

Because of this "three-stage" effect, it's likely that the manual timing of the 1:1 zoom image loading is more accurate than the "fit" view tests.

I ran six tests per catalog, three in "fit" view mode, the other three in 1:1 zoom mode. In both modes I firstly used 50 images with no edits, then the 50 with the "Low ISO" Preset applied, finally the other 50 with the "High ISO" Preset applied.

I stress again, these results need to be viewed with some uncertainty in view of the manual timing method:

Mode	LR 4.4 No Edits	LR5.2 No Edits	LR4.4 Basic + LC	LR5.2 Basic + LC	LR4.4 Basic+LC+NR	LR5.2 Basic+LC+NR
Fit	81 Secs	64 Secs	97 Secs	78 Secs	103 Secs	84 Secs
1:1	203 Secs	168 Secs	288 Secs	244 Secs	374 Secs	315 Secs

Following these tests, I then ran the "Fit" view tests again, this time using LR5.2 only and having built Smart Previews. I was trying to see if the Smart Preview helped or hindered when loading an image into Develop....given that they are roughly 4 times larger than the ACR cache entry (which LR would have defaulted to in my LR4.4 vs LR5.2 comparison tests), logic would tend to suggest that loading times would be slightly longer when they exist (as in that situation LR5 uses the Smart Preview during initial image loading in preference to the ACR cache). Sure enough, logic in this case prevails:

Using unedited files: 79 seconds (64 seconds with no SPs)

Using the "Low ISO" Preset: 89 seconds (78 seconds with no SPs)

Using the "High ISO" Preset: 104 seconds (84 seconds with no SPs)

Note, however, that in these tests I was in reality only comparing performance of Smart Previews against existing ACR Cache entries, both of which were on the same type of internal high-speed storage. Although I haven't (yet) tested this, different setups may (likely will) produce different results, e.g. when ACR Cache entries don't exist, or when using DNG files with Fast Load Data on a NAS/External drive.

Conclusion

The primary purpose of this exercise was to compare the relative performance of LR4 and LR5, and I think it can be seen from these results that - **on my particular system** - LR5 is the clear "winner". But I stress the fact this was on my system only. I have seen many users with much higher spec systems complaining of very poor performance, mostly using LR4 (earlier dot release versions mainly) but also some using LR5. Perhaps the SLR Lounge setup falls into this category. I am otherwise at a loss to understand their findings.

A few other points that I gained from this exercise:

1. Thanks to Ian Lyons, I no longer need to wonder why small-sized exports ran at snail pace using LR3 and LR4, though it would be useful to understand what "magic" lies behind that "one-third tipping point" in LR5's export speed.

2. There needs to be a better understanding within the community about Smart Previews and when it's beneficial to use them. I understand the design intent was purely for them to be used as an aid when the original files are offline, yet somehow some within the community refer to them in performance benefit terms. In my particular use scenario (ACR Cache entries existed), they seem to offer no performance benefit when the originals are online....in fact on my system they appear to negatively impact performance (though only in a very minor and probably not noticeable way). Other setups, such as when using DNG files with Fast Load Data embedded, would likely reverse that effect.

3. The interesting difference between LR4 and LR5 in terms of the impact of Luminance NR, and the apparently more efficient thread utilisation in LR5 when HT is enabled (though it's still slower than when HT is disabled).

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