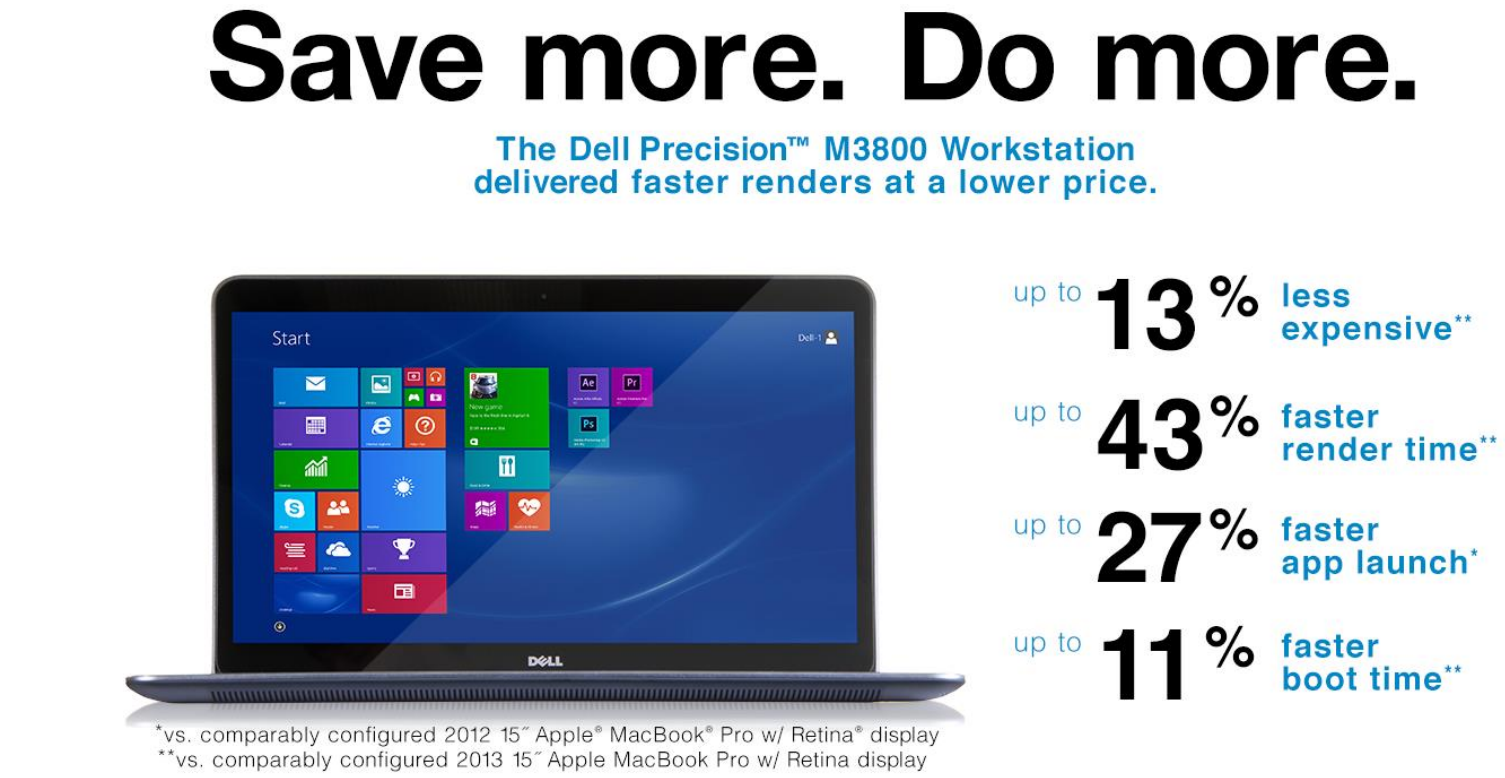
HIGH-END NOTEBOOK PERFORMANCE COMPARISON: DELL PRECISION M3800 VS. 2012 AND 2013 APPLE MACBOOK PRO WITH RETINA DISPLAY



When selecting a high-end portable workstation for multimedia creation and viewing, performance counts. Large files and complex applications can slow systems with limited amounts of RAM or basic graphic cards. Those who invest in a system with a powerful 4th generation Intel® Core™ i7 processor, 16 GB of RAM, and two heavy-duty graphics cards do so because their compute-intensive workloads require such hardware.

In our labs, we tested three current high-end portable systems, a 4th generation Intel Core processor-based Dell Precision M3800 with QHD+ touchscreen display, a similarly configured 2013 Apple MacBook Pro with Retina display, and a 2012 Apple MacBook Pro with Retina display, to see how well they performed. While the systems were comparably configured, the Dell Precision M3800 has a touch screen and runs Windows 8.1, allowing users to select, zoom, and edit their work right on the screen. It also has three times the storage capacity of the 2012 MacBook Pro and 33 percent more than the 2013 MacBook Pro, which is very useful for storing large multimedia files.

The Dell Precision M3800 outperformed both MacBook Pro systems on several tests. Along with its $2,249 purchase price, which is 13.5 percent lower than that of the 2013 MacBook Pro, these advantages make the Dell Precision M3800 an excellent choice for those who work with multimedia content and need an extremely powerful system they can use at the office and on the go.

NOVEMBER 2013
A PRINCIPLED TECHNOLOGIES TEST REPORT
Commissioned by Dell Inc.

SUPERIOR PERFORMANCE SAVES TIME AND BOOSTS PRODUCTIVITY

Those who rely on portable workstations, from freelancers to CEOs, know that productivity depends on how quickly their systems can do work.

We tested the current Dell Precision M3800 with QHD+ touchscreen, the current 2013 Apple MacBook Pro with Retina display, and the 2012 Apple MacBook Pro with Retina display.[1] We completed a range of tests to measure the performance of the systems. As we show below, the Precision M3800 outperformed the MacBook Pro notebooks on a number of activities, despite the fact that it is a less costly system.

Figure 1 presents the basic configuration information for the systems along with pricing and warranty details. We attempted to configure the systems as similarly as possible, but they vary in some key ways—most notably the processors. While the Dell Precision M3800 and the 2013 MacBook Pro have 4th generation Intel Core i7 processors, the Core i7 4850HQ in the 2013 MacBook Pro is slightly faster but consumes more power. The 2012 MacBook Pro has a 3rd generation Intel Core i7. Another important difference is that while all three systems include flash storage, the Dell Precision M3800 has an additional 500GB hard disk drive on top of the 256GB mSATA drive that contains the operating system. This means that it provides more storage space than both of the MacBook Pro systems. Appendix A provides more detailed configuration information for the three systems.

	Dell Precision M3800	2012 Apple MacBook Pro with Retina display	2013 Apple MacBook Pro with Retina display
Processor	Intel Core i7 4702HQ (2.2GHz 4th gen Core i7)	Intel Core i7 3630QM (2.4GHz 3rd gen Core i7)	Intel Core i7 4850HQ (2.3GHz 4th gen Core i7)
RAM	16 GB Hyundai Electronics HMT41GS6AFR8A-PB	16 GB Integrated onboard RAM	16 GB Integrated onboard RAM
SSD storage	LiteOnIt LMT-256M6M (256 GB)	Apple SSD SD256E (256 GB)	Apple SSD SM0512F (512 GB)
HDD storage	Seagate ST500LM000-1EJ162 (500 GB)	N/A	N/A
Graphics card make and model	Intel HD Graphics 4600 NVIDIA® Quadro® K1100M	Intel HD Graphics 4000 NVIDIA GeForce® GT 650M	Intel Iris Pro Graphics 5200 NVIDIA GeForce GT 750M
Graphics card resolution	3,200 x 1,800	2,880 x 1,800	2,880 x 1,800
LCD type	QHD+ Touch	Retina display: LED-backlit display with IPS technology	Retina display: LED-backlit display with IPS technology
Display size	15.6"	15.4"	15.4"
Brightness	Default: 360 nits Max: 360 nits	Default: 55 nits Max: 286 nits	Default: 66 nits Max: 295 nits
Touch screen	Yes	No	No
Price	$2,249 (11/25/13)	$2,399 (10/9/13)	$2,599 (11/25/13)

Figure 1: Configuration, pricing, and warranty information for the systems we tested. Prices came from www.dell.com and www.apple.com and do not include tax or shipping costs.

[1] Note: The 2012 MacBook Pro became unavailable for purchase shortly after we acquired ours.

OUR FINDINGS IN DETAIL

In this section, we present detailed test results and in Appendix B, we provide the specifics of our testing.

Pricing advantages of the Dell Precision M3800

The Dell Precision 3800 is less expensive than both the 2012 and 2013 MacBook Pro. Figure 2 presents a price comparison among the systems. By selecting the Dell Precision 3800, you could save as much as 13.5 percent for a system that provides excellent performance and additional storage capacity—a great boon to workers who handle potentially enormous multimedia files.

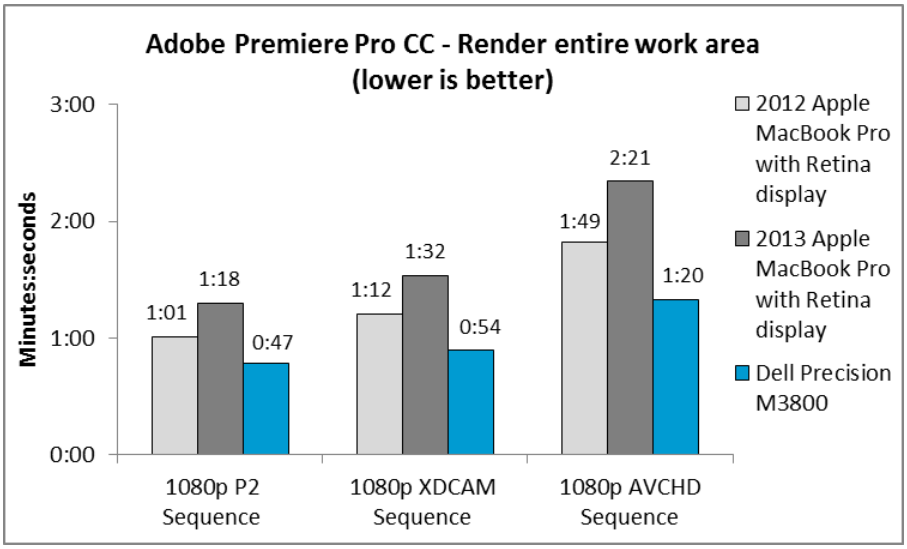
	Apple MacBook Pro with Retina display	Dell Precision M3800	Dell savings
2013 MacBook Pro	$2,599	$2,249	13.5%
2012 MacBook Pro	$2,399	$2,249	6.3%

Figure 2: Price comparison for the three systems we tested.

Benchmark performance

Adobe Premiere Pro CC is high-end video-editing software. In our testing, the Dell Precision M3800 workstation performed Adobe Premiere Pro video-rendering tasks considerably more quickly than both the Apple MacBook Pro systems did. It completed these tasks from 22.9 percent to 26.6 percent faster than the old MacBook Pro, and from 39.8 percent to 43.1 percent faster than the new MacBook Pro. (See Figure 3.)

Figure 3: The time the three systems took to render the entire work area with Adobe Premiere Pro. Lower numbers are better.



Adobe Photoshop CC is high-end graphics editing software. As Figure 4 shows, the Dell Precision M3800 workstation performed Adobe Photoshop CC tasks at roughly the same rate that the 2012 Apple MacBook Pro did. Compared to the 2013 model, the Precision M3800 performed the file-opening task 9.3 percent more slowly and the filter-applying task 6.7 percent more quickly.

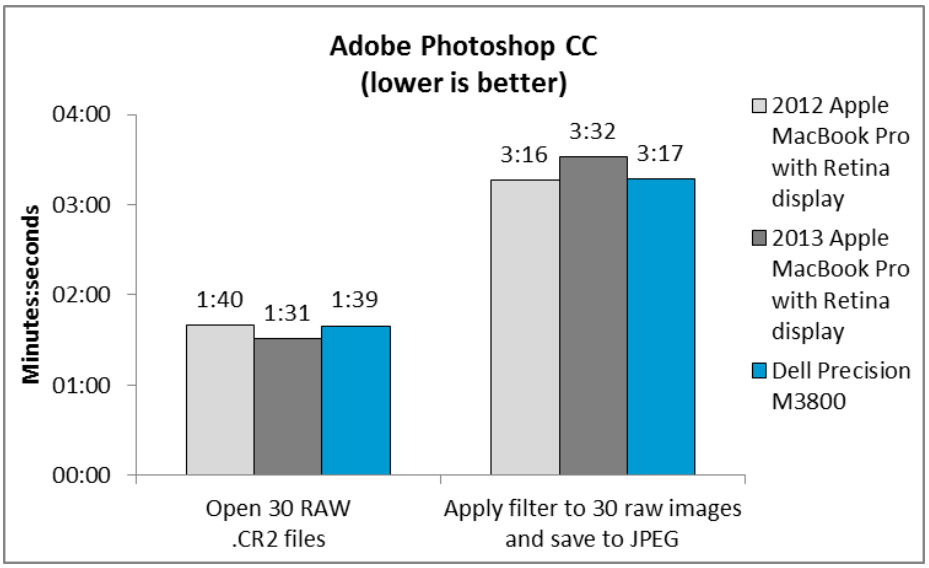


Figure 4: The time the three systems took to open and apply a filter to 30 raw images. Lower numbers are better.

CINEBENCH uses a complex 3D scene of a car chase to measure the performance of a system's graphics card in OpenGL mode. The graphics card must display an enormous amount of geometry, many different textures, and a variety of effects to evaluate performance. The result is measured in frames per second, so higher numbers are better. Figure 5 shows that the Dell Precision M3800 workstation achieved a CINEBENCH score of 51.6 FPS, 5.2 percent better than the 2012 Apple MacBook Pro score of 48.9 FPS and 4.6 percent worse than the 2013 Apple MacBook Pro score of 54.0 FPS.

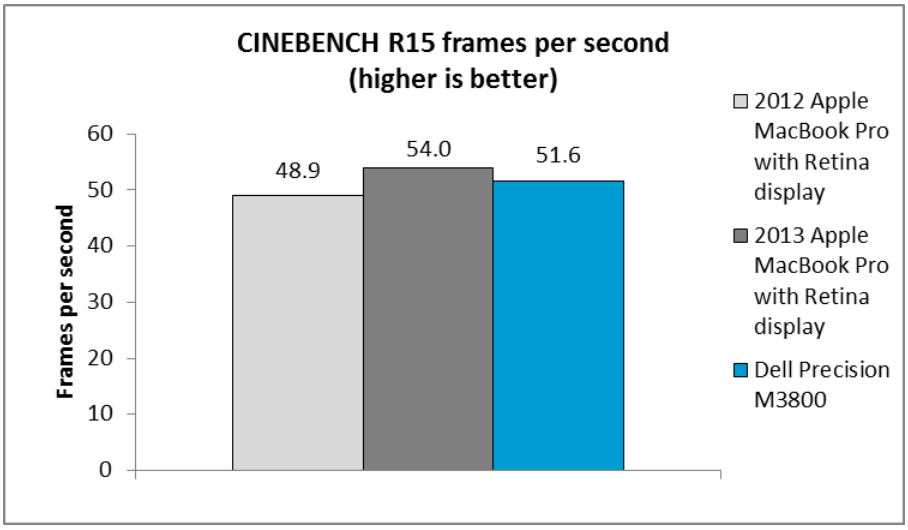


Figure 5: The frames per second score the three systems achieved in CINEBENCH R15. Higher numbers are better.

Geekbench is a tool that measures the power of a processor. It delivers an overall score, with greater numbers being better. As Figure 6 shows, the Dell Precision M3800 workstation achieved a Geekbench score of 13,891, 11.1 percent better than the 2012 Apple MacBook Pro score of 12,353 and 2.9 percent worse than the 2013 Apple MacBook Pro score of 14,294. These findings are as we would expect given the different processors in the systems:

- Dell Precision M3800 - 2.2GHz 4th gen Core i7
- 2012 MacBook Pro - 2.4GHz 3rd gen Core i7
- 2013 MacBook Pro - 2.3GHz 4th gen Core i7

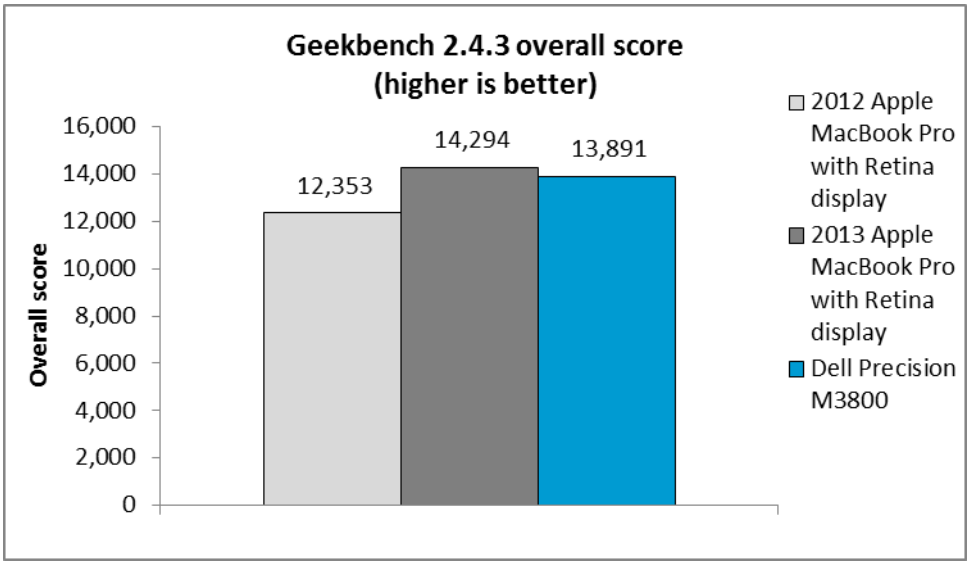


Figure 6: The overall scores the three systems achieved on the Geekbench 2.4.3 benchmark. Higher numbers are better.

Application launch time

If you need to wait a long time for an application to launch, not only does that mean you can't use that time to work, but you might start to wonder whether your system can handle the application. A system that launches applications quickly boosts productivity. In our labs, we measured the time that all three systems needed to launch two powerful Adobe® Creative Cloud software programs: Premier® Pro CC and Photoshop® CC.

Figure 7 shows that the Dell Precision M3800 workstation launched Adobe Premiere Pro CC 26.6 percent faster than the old MacBook Pro and 11.7 percent faster than the new MacBook Pro. When launching Photoshop, the Precision M3800 was 5.0 percent quicker than the old MacBook Pro and 15.9 percent slower than the 2103 MacBook Pro.

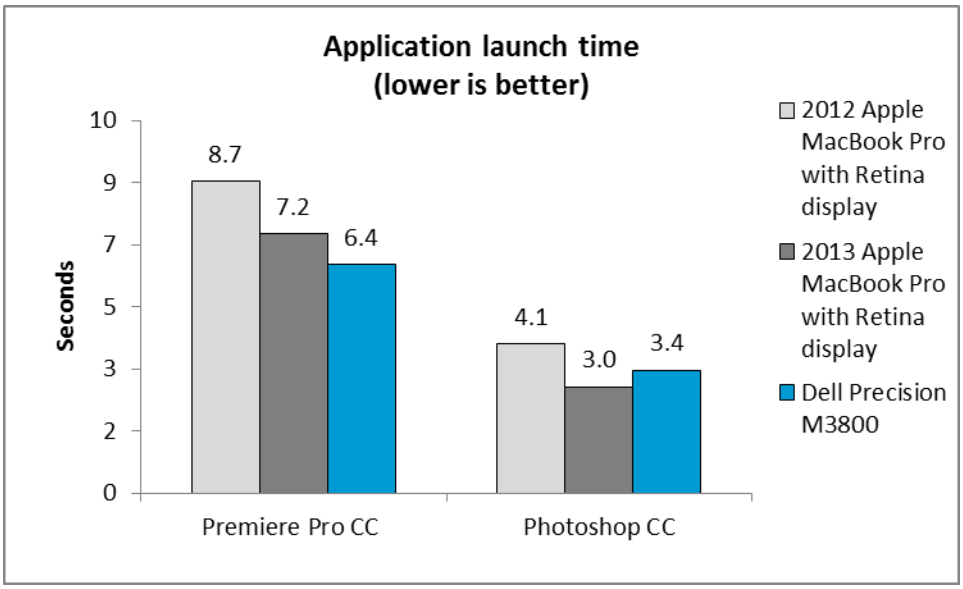


Figure 7: The time the systems took to launch two Adobe applications. Lower numbers are better.

Boot time

A system that is quick to boot can save you time day after day. In our tests, the Dell Precision M3800 workstation booted slightly more quickly than the 2012 Apple MacBook Pro did and 11.3 percent more quickly than the 2013 Apple MacBook Pro did (see Figure 8) All three systems entered and resumed from sleep extremely quickly—in under 3 seconds..

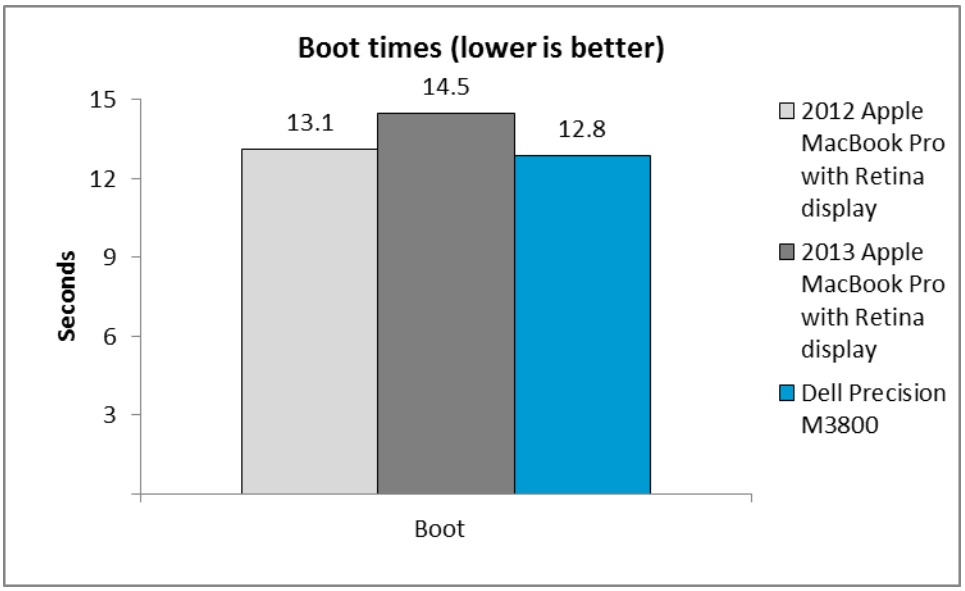


Figure 8: The time the three systems took to boot. Lower numbers are better.

CONCLUSION

Mobile workers cannot waste time with a slow or inefficient workstation. Workstation productivity must meet the user demands in terms of speed and ability, especially when dealing with multimedia content.

We found that the Dell Precision M3800 outperformed both the current and older generation Apple MacBook Pro on several key performance tests. At a cost savings of up to 13.5 percent savings over the 2013 MacBook Pro, the Dell Precision M3800 can boost the productivity of a user performing compute-intensive multimedia work and provides greater storage capacity. By harnessing the touch-screen capabilities of Windows 8, this system can further improve the experience for users.

APPENDIX A – SYSTEM CONFIGURATION INFORMATION

Figure 9 provides detailed configuration information for the test systems.

System	Dell Mobile Precision M3800	2012 Apple MacBook Pro with Retina display	2013 Apple MacBook Pro with Retina display
General			
Number of processor packages	1	1	1
Number of cores per processor	4	4	4
Number of hardware threads per core	2	2	2
Total number of threads in System	8	8	8
System power management policy	Dell	Apple default	Apple default
Processor power-saving option	Enhanced Intel SpeedStep® Technology	Enhanced Intel SpeedStep Technology	Enhanced Intel SpeedStep Technology
System dimensions (length x width x height)	14.65" x 9.92" x 0.75"	14.13" × 9.73" × 0.59"	14.13" × 9.73" × 0.59"
System weight	4.50 lbs.	4.46 lbs.	4.46 lbs.
CPU			
Vendor	Intel	Intel	Intel
Name	Core i7	Core i7	Core i7
Model number	4702HQ	3630QM	4850HQ
System Bus	Intel DMI 5 GT/s	Intel DMI 5 GT/s	Intel DMI 5 GT/s
Socket type and number of pins	FCBGA1364	FCPGA988	FCBGA1364
Core frequency (GHz)	2.2 (Turbo Boost 3.2)	2.4 (Turbo Boost 3.4)	2.3 (Turbo Boost 3.5)
L1 cache	32 KB + 32 KB (per core)	32 KB + 32 KB (per core)	32 KB + 32 KB (per core)
L2 cache	256 KB (per core)	256 KB (per core)	256 KB (per core)
L3 cache	6 MB	6 MB	6 MB
Platform			
Vendor	Dell Inc.	Apple Inc.	Apple Inc.
Motherboard model number	Dell Precision M3800	Intel 7 series chipset	Intel 8 series chipset
Motherboard chipset	Intel 8 series chipset	Intel 7 series chipset	Intel 8 series chipset
BIOS name and version	Dell X35 (9/14/2013)	Apple Inc. MBP101.00EE.B03	Apple Inc. MBP112.0138.B02
Memory module(s)			
Vendor and model number	Hyundai Electronics HMT41GS6AFR8A-PB	Integrated onboard RAM	Integrated onboard RAM
Type	PC3-12800	PC3-12800	PC3-12800
Speed (MHz)	1,600	1,600	1,600
Speed running in the system (MHz)	1,600	1,600	1,600

System	Dell Mobile Precision M3800	2012 Apple MacBook Pro with Retina display	2013 Apple MacBook Pro with Retina display
Size (MB)	8,192	8,192	8,192
Number of memory module(s)	2 x 8,192	2 x 8,192	2 x 8,192
Total amount of RAM in system (GB)	16	16	16
Channel (single/dual)	Dual	Dual	Dual
Hard drives			
First hard drive			
Vendor and model number	LiteOnIt LMT-256M6M	Apple SSD SD256E	Apple SSD SM0512F
Size (GB)	256	256	512
Type	mSATA 6.0 Gb/s	SSD 6.0 Gb/s	mSATA 6.0 Gb/s
Controller	Intel 8 series chipset	Intel 7 series chipset	Intel 8 series chipset
Driver	Intel 12.8.0.1016 (08/01/2013)	Apple Inc.	Apple Inc.
Second hard drive			
Vendor and model number	Seagate ST500LM000-1EJ162	N/A	N/A
Size (GB)	500	N/A	N/A
Buffer size (MB)	64	N/A	N/A
RPM	7,200	N/A	N/A
Type	SSHD 6.0 Gb/s	N/A	N/A
Controller	Intel 8 series chipset	N/A	N/A
Driver	Intel 12.8.0.1016 (08/01/2013)	N/A	N/A
Operating system			
Name	Windows 8.1 Professional	Mac OS X® Mountain Lion	Mac OS X Mavericks
Build number	9600	10.8.5	10.9
Service Pack	N/A	N/A	N/A
File system	NTFS	Journaled HFS+	Journaled HFS+
Kernel	ACPI x64-based PC	Darwin 12.5	Darwin 12.5
Language	English	English	English
Microsoft DirectX version	DirectX 11	N/A	N/A
Graphics cards			
First graphics card			
Vendor and model number	Intel HD Graphics 4600	Intel HD Graphics 4000	Intel Iris Pro Graphics 5200
Type	Integrated	Integrated	Integrated
Chipset	Intel HD Graphics 4600	Intel HD Graphics 4000	Intel Iris Pro 5200
BIOS version	2171.0	N/A	N/A
Total available graphics memory (MB)	1,792	512	1,024
Shared system memory (MB)	1,792	N/A	N/A
Resolution	3,200 x 1,800	2,880 x 1,800	2,880 x 1,800

System	Dell Mobile Precision M3800	2012 Apple MacBook Pro with Retina display	2013 Apple MacBook Pro with Retina display
Driver	Intel 10.18.10.3282 (08/26/2013)	Apple Inc.	Apple Inc.
Second graphics card			
Vendor and model number	NVIDIA Quadro K1100M	NVIDIA GeForce GT 650M	NVIDIA GeForce GT 750M
Type	PCIe	PCIe	PCIe
Chipset	NVIDIA Quadro K1100M	NVIDIA GeForce GT 650M	NVIDIA GeForce GT 750M
BIOS version	80.07.B3.00.0C	N/A	N/A
Total available graphics memory (MB)	9,935	1,024	2,048
Dedicated video memory (MB)	2,048	N/A	N/A
Shared system memory (MB)	7,887	N/A	N/A
Resolution	3,200 x 1,800	2,880 x 1,800	2,880 x 1,800
Driver	NVIDIA 9.18.13.2680 (08/18/2013)	Apple Inc.	Apple Inc.
Sound card/subsystem			
Vendor and model number	Realtek High Definition Audio	Intel High Definition Audio	Intel High Definition Audio
Driver	Realtek 6.0.1.7023 (08/21/2013)	Apple Inc.	Apple Inc.
Ethernet			
Vendor and model number	Realtek USB GBE Family Controller	N/A	N/A
Driver	Realtek 8.10.1009.2013 (10/09/2013)	N/A	N/A
Wireless			
Vendor and model number	Intel Dual Band Wireless-AC 7260	AirPort Extreme® (Broadcom® BCM4331)	AirPort Extreme (Broadcom BCM4331)
Driver	Intel 16.5.1.6 (08/26/2013)	Apple Inc.	Apple Inc.
USB ports			
Number	4	2	2
Type	3 x USB 3.0, 1 x USB 2.0	3.0	3.0
Other	SD Media card reader, HDMI, DisplayPort	SDXC Media card reader, HDMI, 2 x Thunderbolt ports	SDXC Media card reader, HDMI, 2 x Thunderbolt 2 ports
Monitor			
LCD type	QHD+ Touch	Retina display: LED-backlit display with IPS technology	Retina display: LED-backlit display with IPS technology
Resolution	3,200 x 1,800	2,880 x 1,800	2,880 x 1,800
Screen size	15.6"	15.4"	15.4"

System	Dell Mobile Precision M3800	2012 Apple MacBook Pro with Retina display	2013 Apple MacBook Pro with Retina display
Battery			
Type	Integrated Lithium-ion polymer	Integrated Lithium-ion polymer	Integrated Lithium-ion polymer
Rated capacity (Wh)	61	95	95

Figure 9: Specifications for the three systems we tested.

APPENDIX B - HOW WE TESTED

Measuring performance with Premiere Pro CC

All tests are hand-timed and require a stopwatch. We conducted the following Adobe Premiere Pro CS tests:

- Render P2 Sequence
- Render XDCAM Sequence
- Render AVCHD Sequence

Render Sequence

1. Double-click the desired sequence project file.
2. When the Scratch Disk dialog opens, click Yes.
3. Navigate to Footage→P2, and select the requested file.
4. Click Open.
5. When the project opens, prepare the stopwatch.
6. Click Sequence, and simultaneously select Render Effects In and Out from the drop-down menu and start the stopwatch.
7. Stop the stopwatch when the Rendering Progress window disappears.
8. Close Adobe Premiere and repeat steps 1 through 8 two more times.
9. Repeat the test for XDCAM and AVCHD sequences.

Measuring performance with Photoshop CC

All tests are hand-timed and require a stopwatch. We conducted the following Adobe Photoshop CC tests:

- Opening 30 RAW .CR2 images into Photoshop
- Saving the files to JPEGs

Importing and Opening 30 RAW .CR2 files into Photoshop

1. Open Photoshop CC.
2. Select File→Open.
3. Browse to the test directory containing the 30 RAW .CR2 image files, and select them all. Click Open.
4. At the Adobe Camera Raw screen, click Select All.
5. In the right column, click "Auto" to apply auto enhancements to all photos.
6. Simultaneously click Open Images and start the stopwatch.
7. Stop the stopwatch when the last photo has been opened in the Photoshop workspace.
8. Repeat steps 1 through 7 two more times.

Batch File (Fixing Lens Distortion and applying Oil Paint filter) and saving as Maximum Quality JPEG

1. Create a custom action.
   a. Select Window→Actions.
   b. Click the New Action icon, located next to the trash bin icon.
   c. Name the new action and click record, to begin recording a new custom action.
   d. From the top menu, select Filter→Lens Correction, and click OK.
   e. From the top menu, select Filter→Oil Paint, and click OK.
   f. Click the Square to stop the custom action recording.
2. With all the files open from the previous test, select File→Scripts→Image Processor.
3. In the Step 1 area, select Folder, and browse to the test image directory.
4. In the Step 2 area, select Save in Same location.
5. In the Step 3 area, check Save as JPEG with Quality 12 (Maximum).

6. In the Step 4 area, check the box next to Run action and select the custom action created in step 1. Also, check the box next to Include ICC Profile.
7. Prepare the stopwatch.
8. Simultaneously click Run and start the stopwatch.
9. Stop the stopwatch when all the images have been filtered and saved as JPEGs.
10. Repeat steps 1 through 9 two more times.

Measuring performance with MAXON CINEBENCH R15

Running the test

1. Launch CINEBENCH.
2. Click File, and check Advanced benchmark.
3. Verify that OpenGL, CPU, and CPU (Single Core) benchmarks are selected.
4. Click Start all tests.
5. When the test finishes, record the benchmark results.
6. Close CINEBENCH.
7. Repeat steps 1 through 6 two more times, and report the median of the three runs.

Measuring performance with Geekbench 2.4.3

Running the test

1. Launch Geekbench.
2. Select 64-bit benchmarks.
3. Click Run Benchmarks.
4. When the test finishes, record the benchmark results.
5. Close Geekbench.
6. Repeat steps 1 through 5 two more times, and report the median of the three runs.

Measuring time to boot

1. Simultaneously start the timer and boot the system.
2. When the desktop interface appears, stop the timer.
3. Record the result as the Boot time.
4. Shut down the system.
5. Repeat steps 1 through 4 two more times, and report the median of the three tests.

ABOUT PRINCIPLED TECHNOLOGIES

Principled Technologies, Inc.
1007 Slater Road, Suite 300
Durham, NC, 27703
www.principledtechnologies.com

We provide industry-leading technology assessment and fact-based marketing services. We bring to every assignment extensive experience with and expertise in all aspects of technology testing and analysis, from researching new technologies, to developing new methodologies, to testing with existing and new tools.

When the assessment is complete, we know how to present the results to a broad range of target audiences. We provide our clients with the materials they need, from market-focused data to use in their own collateral to custom sales aids, such as test reports, performance assessments, and white papers. Every document reflects the results of our trusted independent analysis.

We provide customized services that focus on our clients' individual requirements. Whether the technology involves hardware, software, Web sites, or services, we offer the experience, expertise, and tools to help our clients assess how it will fare against its competition, its performance, its market readiness, and its quality and reliability.

Our founders, Mark L. Van Name and Bill Catchings, have worked together in technology assessment for over 20 years. As journalists, they published over a thousand articles on a wide array of technology subjects. They created and led the Ziff-Davis Benchmark Operation, which developed such industry-standard benchmarks as Ziff Davis Media's Winstone and WebBench. They founded and led eTesting Labs, and after the acquisition of that company by Lionbridge Technologies were the head and CTO of VeriTest.