


Client:	Adobe
Project:	Adobe Photoshop CS5 64-bit Benchmarks
Complete Benchmark Report	
 Pfeiffer Consulting 01001011	

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About the Benchmarks

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About the Benchmark Project

Aim of the benchmark project

This benchmark project was defined to measure the impact of 64-bit support on Photoshop performance, particularly when working with large and complex files and workflow situations. The benchmarks compared Photoshop CS4 running on a 32-bit system (Windows) or on a computer equipped with 4GB of RAM, the maximum amount of RAM supported by the 32-bit release of Photoshop (Mac).

Note: Windows versions of Photoshop have offered 64-bit support since the CS4 release of the software; on the Mac platform, 64-bit support has been introduced with Photoshop CS5. These benchmarks were defined to compare the 32-bit performance of Photoshop CS4 with the 64-bit performance of Photoshop CS5.

In addition, on the Mac platform, all benchmarks were conducted on 4 different memory configurations, ranging from 4GB to 32GB of RAM.

Technical Details

Computer Models Used for Benchmarking

Mac:

- **2.8GHz Mac Pro (8-core)**
- **System software and configuration**
 - The benchmark systems were completely re-initialized prior to the benchmarks, using a standard installation of Mac OS X Snow Leopard 10.6.3.
- **Memory**
 - All Mac computers were equipped with 4 to 32GB of RAM.

Windows:

- **Two identical 2.8GHz Dell Precision Windows 7 workstations**

Benchmarks were conducted on two identical Dell Precision T7400 workstations equipped with 2.83GHz quad-core Intel Xeon processors and with 4 to 32 GB of RAM.
- **System software and configuration**

The workstations were factory-configured respectively for 32-bit and 64-bit Windows operating systems.
- **Memory**
 - The 64-bit workstation was equipped with 32GB of RAM.
 - The 32-bit workstation was equipped with 4GB of RAM

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All systems:

- **Configuration**

- All benchmarks were conducted on **standard configuration** workstations completely re-initialized for the benchmarks.
- No external hard drives or other peripherals were connected during benchmarking.
- System functions accessing the network were disabled unless required.

Application Software

The benchmarks were conducted using a **default installation of the Adobe Creative Suite 5** Master Collection.

Default settings were used for memory allocation and other settings unless otherwise stated.

Benchmark Methodology

The Pfeiffer Consulting Methodology for Productivity Benchmarks

The *Pfeiffer Consulting Methodology for Productivity Benchmarks* is based on **real world tasks and assignments executed by operators**, rather than relying on computer scripting. These highly perfected measures provide a reliable way to document the impact of technology on productivity in a way no simple performance benchmark can. More importantly, these productivity measures document the impact of user interface efficiency as well as hardware performance.

The basic aim of the methodology is simple: to emulate **the real-world productivity achieved by an experienced operator**. Benchmarks are defined and executed in such a way that only the actual time necessary to achieve a given result is measured.

The *Pfeiffer Consulting Methodology for Productivity Benchmarks* is extremely flexible, and has been used over the last decade to measure aspects as diverse as workflow productivity of creative software; the impact of screen-size on operator efficiency; real-world productivity increases linked to different computing platforms; or hard to quantify aspects such as menu latency and user interface friction. Please visit www.pfeifferreport.com for more information and a wide variety of benchmark reports.

Benchmark Definition and Execution

All benchmarks conducted **were specifically defined for this project by experienced professionals** with a deep understanding of the workflows in question.

In order to assess productivity gains that a new release or a different product may (or may not) bring, **we start by analyzing the minimum number of steps necessary to achieve a given result in each of the applications** that have to be compared.

Once this list of actions has been clearly established, we start to execute the operation or workflow in each program, with the help of seasoned professionals who have long-standing experience in the field and with the programs that are tested.

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In order to be certain that no lag or operator-induced delays are included in the productivity measures, **each benchmarked example is cut down into small segments of three or four steps each.**

After an initial training phase, **each segment is executed 3 times, and the average time is used as a result.** The cumulative times for all segments that form a complete workflow example are then used as benchmark results.

No scripting was used for the execution of the benchmarks.

The use of **common keyboard shortcuts and contextual menus** was authorized.

Complete List of Benchmarks

Introduction

The benchmark project combined **three types of performance measures:** basic performance benchmarks, workflow efficiency measures, and raw processing benchmarks.

All benchmarks were executed on Mac and Windows, with 4GB of memory for Photoshop CS4, and 16GB of memory for Photoshop CS5.

► Impact of memory on Photoshop performance:

To assess the impact of increased memory on Photoshop performance with a variety of memory configurations, all benchmarks were executed on the Mac platform with 4GB, 8GB, 16GB and 32GB of memory.

Basic Performance Benchmarks

These benchmarks measured the time necessary to execute one of several common image processing operation with image files of varying sizes.

► File sizes covered by basic performance benchmarks:

- 300MB
- 600MB
- 1GB
- 2GB

► Imaging operations covered by basic performance benchmarks:

- Open
- Save
- Change Image Size
- Rotate Canvas (arbitrary - 13°)
- Apply Gaussian Blur (50 pixels)
- Convert color space from RGB to LAB
- Apply Unsharp Mask

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Workflow Efficiency Measures

These benchmarks measured the time necessary to execute a complete set of common operations, and to save the resulting file.

► **File types and sizes covered by workflow efficiency measures:**

- Flat image files: 750MB, 1.5GB
- Complex multi-layered files: 150MB, 800MB

► **Imaging operations included in workflow efficiency measures (flat image files):**

- Open
- Rotate Canvas
- Resample
- Add Adjustments Layer, flatten
- Apply sharpening
- Save

► **Imaging operations included in workflow efficiency measures (complex multi-layered files):**

- Open
- Rotate Canvas
- Resample
- Save

Raw Processing Performance Benchmarks

Raw processing performance benchmarks measured the time necessary to open and/or convert a batch of raw camera files

► **Files used for raw processing performance benchmarks:**

- Raw processing performance was measured using a batch of 15MP images from a popular DSLR camera.

► **Operations benchmarked for raw processing performance benchmarks:**

- Open 10 raw files in Photoshop
- Batch convert 10 raw files images to .psd format

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Complete Results: Tables

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Complete Results – Mac

	Photoshop CS5 (Mac Pro, 16GB)	Photoshop CS4 (Mac Pro, 4GB)
Photoshop Performance — 300MB Image		
▶ Open	4.09	4.34
▶ Save	3.79	3.82
▶ Image Size	4.69	5.23
▶ Rotate Canvas	2.73	3.51
▶ Gaussian Blur	2.76	3.98
▶ Convert color space from RGB to LAB	2.27	2.36
▶ Apply Unsharp Mask	2.63	3.99
Photoshop Performance — 600MB Image		
▶ Open	4.87	8.43
▶ Save	6.88	6.96
▶ Image Size	8.90	19.12
▶ Rotate Canvas	6.28	11.61
▶ Apply Gaussian Blur	4.85	11.01
▶ Convert color space from RGB to LAB	3.79	5.95
▶ Apply Unsharp Mask	4.80	9.38
Photoshop Performance — 1GB Image		
▶ Open	8.27	16.44
▶ Save	12.24	11.64
▶ Image Size	13.91	38.81
▶ Rotate Canvas	9.40	32.04
▶ Gaussian Blur	7.67	39.63
▶ Convert color space from RGB to LAB	5.91	18.37
▶ Apply Unsharp Mask	8.02	31.62
Photoshop Performance — 2GB Image		
▶ Open	24.98	54.71
▶ Save file	23.18	44.82
▶ Image Size	37.59	164.94
▶ Rotate Canvas	16.65	69.72
▶ Gaussian Blur	15.47	102.63
▶ Convert color space from RGB to LAB	10.38	64.00
▶ Apply Unsharp Mask	13.92	100.04

Time in seconds. Lower is better.

Complete Results: Tables	
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	Photoshop CS5 (Mac Pro, 16GB)	Photoshop CS4 (Mac Pro, 4GB)
Photoshop Workflow Benchmarks — Flat Image Files (750MB file)		
▶ Open	12.19	9.15
▶ Rotate Canvas	7.09	10.67
▶ Resample	6.50	30.98
▶ Add Adjustments Layer, flatten	9.51	79.59
▶ Apply sharpening	11.67	53.06
▶ Save	8.86	9.61
▶ Total Photoshop workflow (flat image file, 750MB)	55.81	193.06
Photoshop Workflow Benchmarks — Flat Image Files (1.5GB file)		
▶ Open	17.74	23.00
▶ Rotate Canvas	13.63	49.58
▶ Resample	12.34	108.23
▶ Add Adjustments Layer, flatten	106.06	269.33
▶ Apply sharpening	48.92	116.60
▶ Save	19.07	46.14
▶ Total Photoshop workflow (flat image file, 1.5GB)	217.77	612.88
Photoshop Workflow — Complex Multi-layered Files (150 MB file)		
▶ Open	21.71	21.94
▶ Rotate Canvas	18.99	32.98
▶ Resample	16.38	62.07
▶ Save	100.97	156.45
▶ Total Photoshop workflow (multi-layered file, 150MB)	158.05	273.45
Photoshop Workflow — Complex Multi-layered Files (800MB file)		
▶ Open	36.64	37.33
▶ Rotate Canvas	28.60	62.03
▶ Image Size	26.20	94.22
▶ Save	183.80	380.41
▶ Total Photoshop workflow (multi-layered file, 800MB)	275.24	573.99
Photoshop Performance — RAW Processing		
▶ Open 10 raw files in Photoshop	22.70	33.51
▶ Batch convert 10 images	32.02	32.29

Time in seconds. Lower is better.

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Complete Results – Windows

	Photoshop CS5 (Windows 7, 64-bit, 16GB)	Photoshop CS4 (Windows 7, 32-bit, 4GB)
Photoshop Performance — 300MB Image		
▶ Open	4.59	6.74
▶ Save	2.12	2.09
▶ Image Size	3.68	5.12
▶ Rotate Canvas	3.50	3.82
▶ Gaussian Blur	3.66	4.14
▶ Convert color space from RGB to LAB	2.92	2.83
▶ Apply Unsharp Mask	3.45	3.95
Photoshop Performance — 600MB Image		
▶ Open	5.69	9.66
▶ Save	2.63	8.56
▶ Image Size	6.74	20.91
▶ Rotate Canvas	6.16	25.18
▶ Apply Gaussian Blur	6.17	23.15
▶ Convert color space from RGB to LAB	4.05	32.99
▶ Apply Unsharp Mask	6.18	27.19
Photoshop Performance — 1GB Image		
▶ Open	10.75	19.27
▶ Save	3.93	22.60
▶ Image Size	10.05	50.95
▶ Rotate Canvas	10.05	36.33
▶ Gaussian Blur	10.22	37.28
▶ Convert color space from RGB to LAB	7.22	60.08
▶ Apply Unsharp Mask	10.20	38.00
Photoshop Performance — 2GB Image		
▶ Open	19.31	56.35
▶ Save file	7.94	57.70
▶ Image Size	19.56	284.01
▶ Rotate Canvas	19.01	70.50
▶ Gaussian Blur	18.89	66.45
▶ Convert color space from RGB to LAB	12.71	86.81
▶ Apply Unsharp Mask	18.39	81.92

Time in seconds. Lower is better.

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	Photoshop CS5 (Windows 7, 64-bit, 16GB)	Photoshop CS4 (Windows 7, 32-bit, 4GB)
Photoshop Workflow Benchmarks — Flat Image Files (750MB file)		
▶ Open	6.14	11.17
▶ Rotate Canvas	7.54	14.97
▶ Resample	5.65	14.96
▶ Add Adjustments Layer, flatten	5.64	50.46
▶ Apply sharpening	11.59	38.42
▶ Save	6.20	38.25
▶ Total Photoshop workflow (flat image file, 750MB)	42.77	168.23
Photoshop Workflow Benchmarks — Flat Image Files (1.5GB file)		
▶ Open	10.62	31.63
▶ Rotate Canvas	15.22	43.76
▶ Resample	10.82	81.40
▶ Add Adjustments Layer, flatten	13.52	252.55
▶ Apply sharpening	50.95	79.78
▶ Save	12.11	63.90
▶ Total Photoshop workflow (flat image file, 1.5GB)	113.24	553.02
Photoshop Workflow — Complex Multi-layered Files (150 MB file)		
▶ Open	15.98	18.11
▶ Rotate Canvas	11.69	25.00
▶ Resample	12.39	17.01
▶ Save	91.91	133.02
▶ Total Photoshop workflow (multi-layered file, 150MB)	131.97	193.14
Photoshop Workflow — Complex Multi-layered Files (800MB file)		
▶ Open	23.72	25.25
▶ Rotate Canvas	21.11	39.54
▶ Resample	22.65	91.12
▶ Save	177.05	352.59
▶ Total Photoshop workflow (multi-layered file, 800MB)	244.53	508.51
Photoshop Performance — RAW Processing		
▶ Open 10 raw files in Photoshop	29.98	31.03
▶ Batch convert 10 images	25.77	34.69

Time in seconds. Lower is better.

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Complete Results – Memory Comparison

	Photoshop CS5 (Mac Pro, 32GB)	Photoshop CS5 (Mac Pro, 16GB)	Photoshop CS5 (Mac Pro, 8GB)	Photoshop CS4 (Mac Pro, 4GB)
Photoshop Performance — 300MB Image				
▶ Open	3.60	4.09	4.14	4.34
▶ Save	3.70	3.79	3.71	3.82
▶ Image Size	4.97	4.69	4.92	5.23
▶ Rotate Canvas	3.44	2.73	3.02	3.51
▶ Gaussian Blur	3.83	2.76	3.02	3.98
▶ Convert color space from RGB to LAB	2.53	2.27	2.45	2.36
▶ Apply Unsharp Mask	2.44	2.63	3.12	3.99
Photoshop Performance — 600MB Image				
▶ Open	4.81	4.87	5.23	8.43
▶ Save	6.94	6.88	7.32	6.96
▶ Image Size	7.07	8.90	10.15	19.12
▶ Rotate Canvas	5.63	6.28	5.82	11.61
▶ Apply Gaussian Blur	4.23	4.85	5.27	11.01
▶ Convert color space from RGB to LAB	3.86	3.79	3.97	5.95
▶ Apply Unsharp Mask	4.06	4.80	5.79	9.38
Photoshop Performance — 1GB Image				
▶ Open	9.94	8.27	10.50	16.44
▶ Save	10.91	12.24	13.50	11.64
▶ Image Size	13.47	13.91	13.87	38.81
▶ Rotate Canvas	8.51	9.40	9.64	32.04
▶ Gaussian Blur	6.07	7.67	8.66	39.63
▶ Convert color space from RGB to LAB	5.09	5.91	5.97	18.37
▶ Apply Unsharp Mask	5.73	8.02	8.94	31.62
Photoshop Performance — 2GB Image				
▶ Open	20.03	24.98	24.60	54.71
▶ Save file	23.84	23.18	23.22	44.82
▶ Image Size	37.09	37.59	58.31	164.94
▶ Rotate Canvas	16.33	16.65	25.33	69.72
▶ Gaussian Blur	11.55	15.47	16.98	102.63
▶ Convert color space from RGB to LAB	10.66	10.38	11.45	64.00
▶ Apply Unsharp Mask	11.34	13.92	15.79	100.04

Time in seconds. Lower is better.

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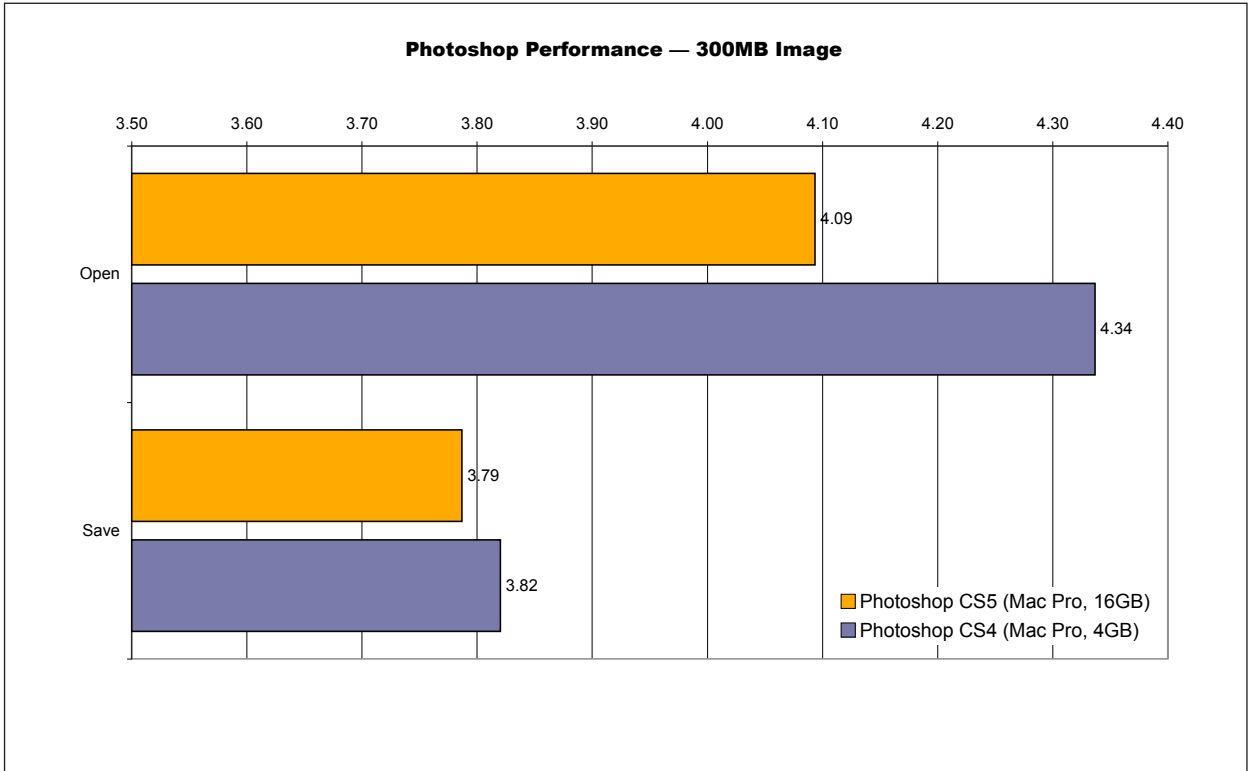
	Photoshop CS5 (Mac Pro, 32GB)	Photoshop CS5 (Mac Pro, 16GB)	Photoshop CS5 (Mac Pro, 8GB)	Photoshop CS4 (Mac Pro, 4GB)
Photoshop Workflow Benchmarks — Flat Image Files (750MB file)				
▶ Open	9.95	12.19	11.42	9.15
▶ Rotate Canvas	8.68	7.09	9.39	10.67
▶ Resample	6.93	6.50	9.49	30.98
▶ Add Adjustments Layer, flatten	6.09	9.51	16.13	79.59
▶ Apply sharpening	13.59	11.67	14.51	53.06
▶ Save	9.37	8.86	9.41	9.61
▶ Total Photoshop workflow (flat image file, 750MB)	54.60	55.81	70.34	193.06
Photoshop Workflow Benchmarks — Flat Image Files (1.5GB file)				
▶ Open	18.36	17.74	23.59	23.00
▶ Rotate Canvas	16.31	13.63	23.06	49.58
▶ Resample	11.17	12.34	26.85	108.23
▶ Add Adjustments Layer, flatten	62.84	106.06	100.77	269.33
▶ Apply sharpening	52.09	48.92	60.20	116.60
▶ Save	16.56	19.07	19.72	46.14
▶ Total Photoshop workflow (flat image file, 1.5GB)	177.32	217.77	254.18	612.88
Photoshop Workflow — Complex Multi-layered Files (150 MB file)				
▶ Open	19.61	21.71	27.99	21.94
▶ Rotate Canvas	12.76	18.99	20.94	32.98
▶ Resample	13.94	16.38	24.35	62.07
▶ Save	60.65	100.97	101.54	156.45
▶ Total Photoshop workflow (multi-layered file, 150MB)	106.97	158.05	174.82	273.45
Photoshop Workflow — Complex Multi-layered Files (800MB file)				
▶ Open	27.47	36.64	37.29	37.33
▶ Rotate Canvas	23.50	28.60	30.64	62.03
▶ Resample	25.20	26.20	31.90	94.22
▶ Save	179.20	183.80	191.93	380.41
▶ Total Photoshop workflow (multi-layered file, 800MB)	255.38	275.24	291.77	573.99
Photoshop Performance — RAW Processing				
▶ Open 10 raw files in Photoshop	21.94	22.70	25.46	33.51
▶ Batch convert 10 images	30.27	32.02	33.17	32.29

Time in seconds. Lower is better.

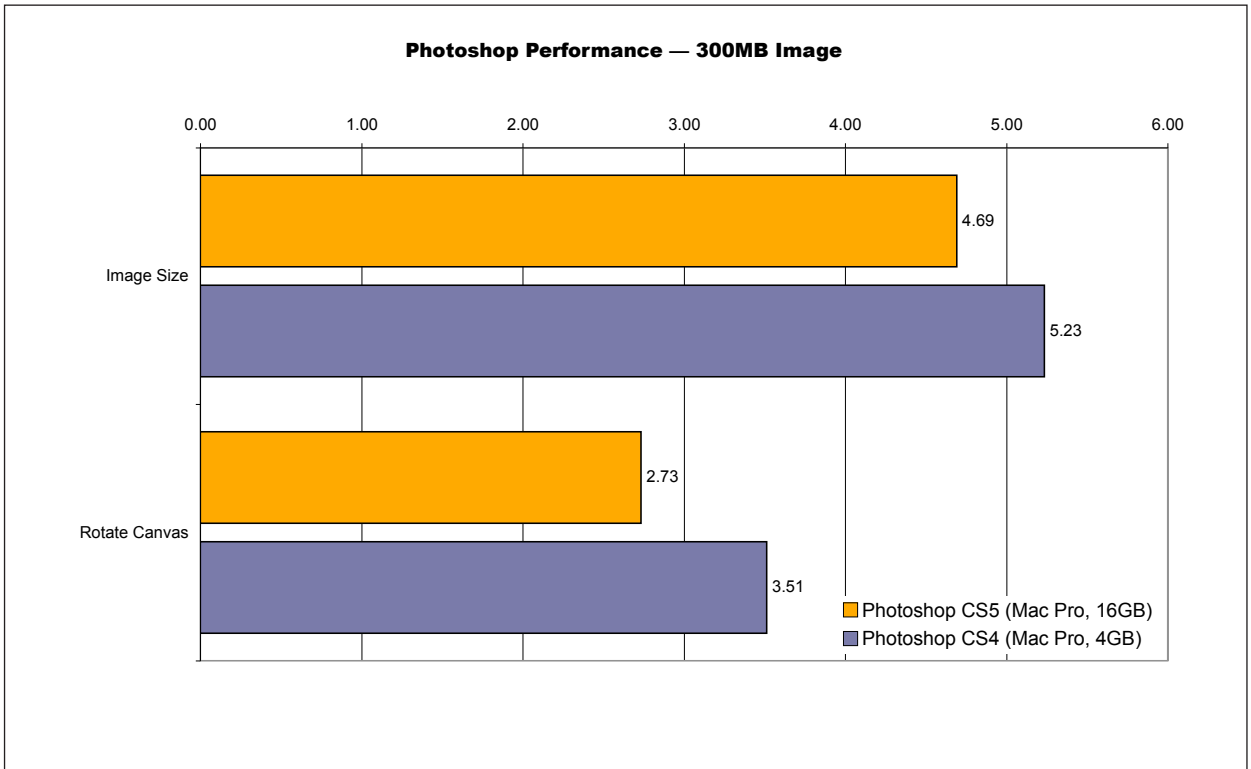
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Charts: Complete Results – Mac

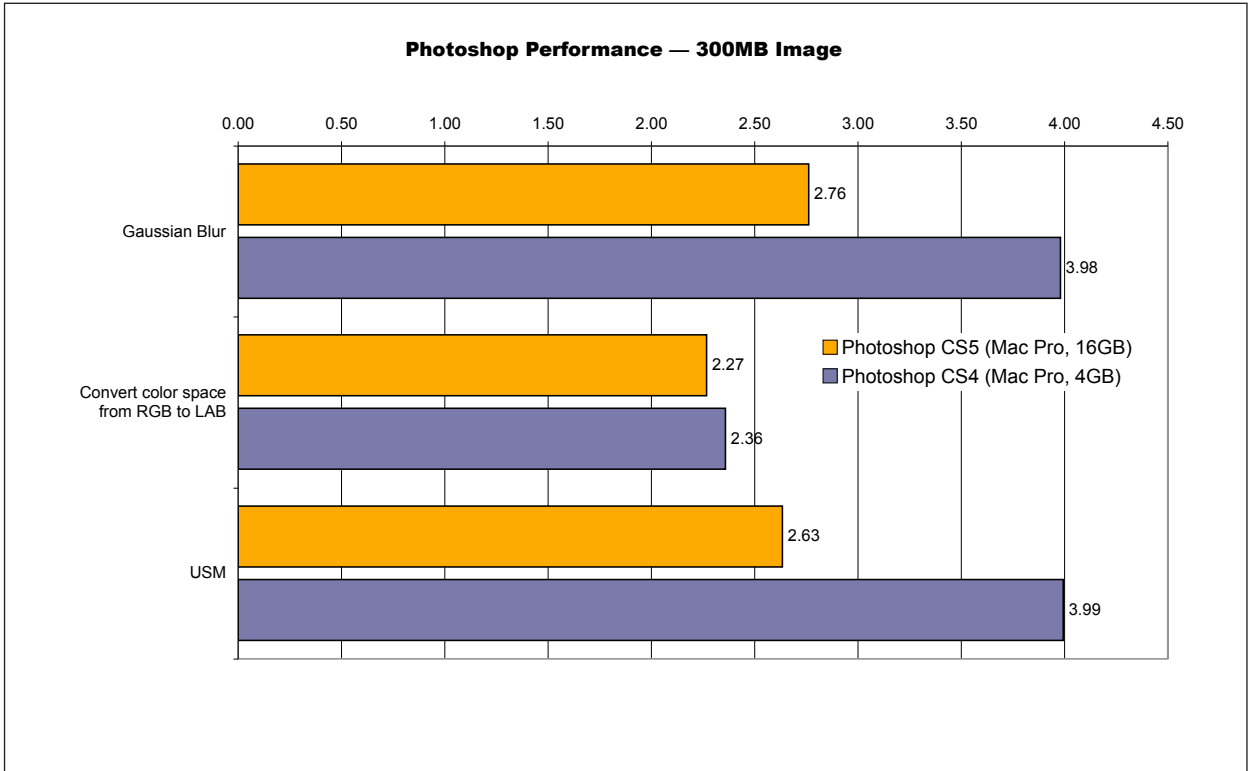


Time scale in seconds. Shorter is better.

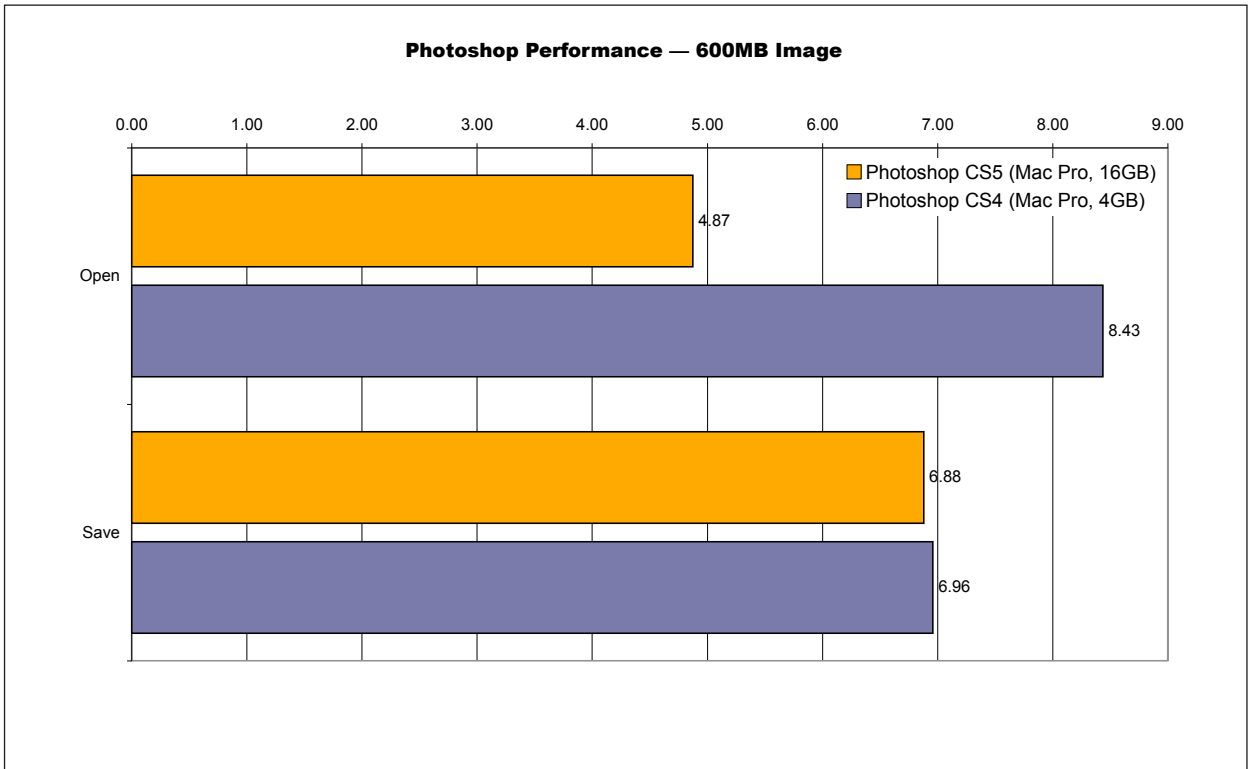


Time scale in seconds. Shorter is better.

Charts: Complete Results — Mac

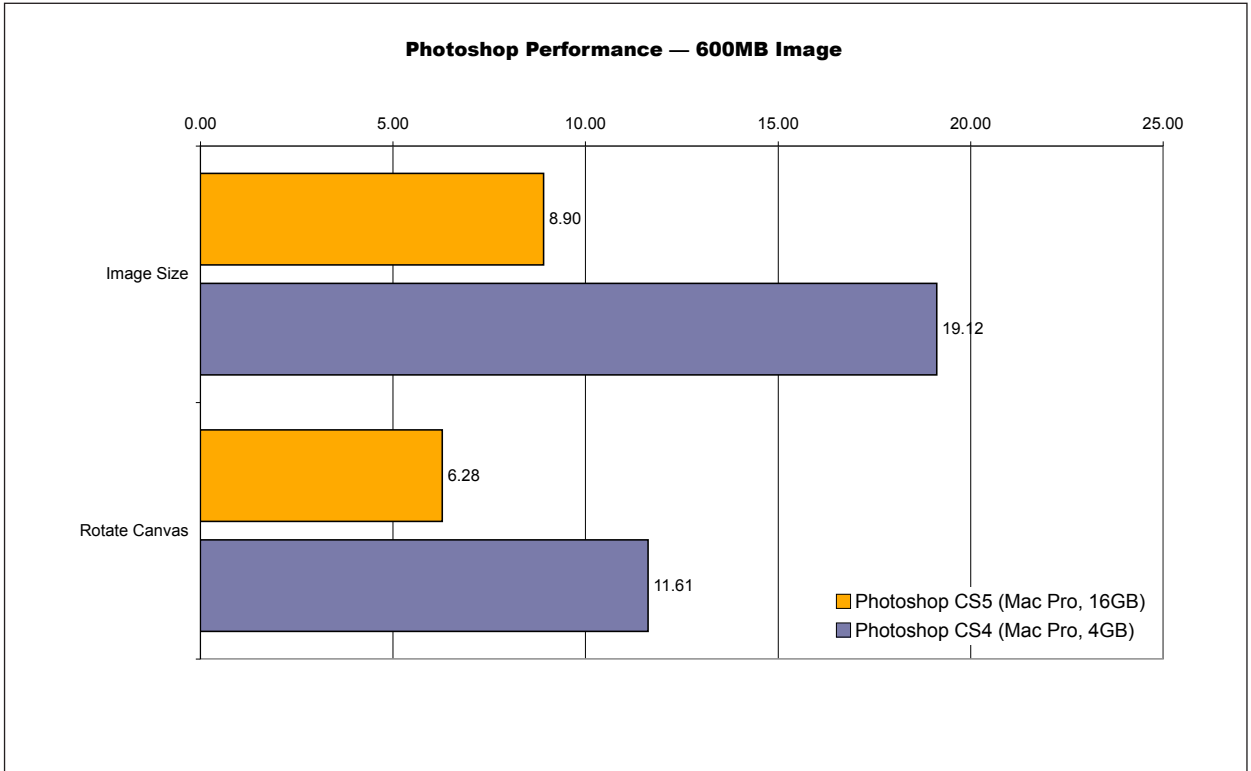


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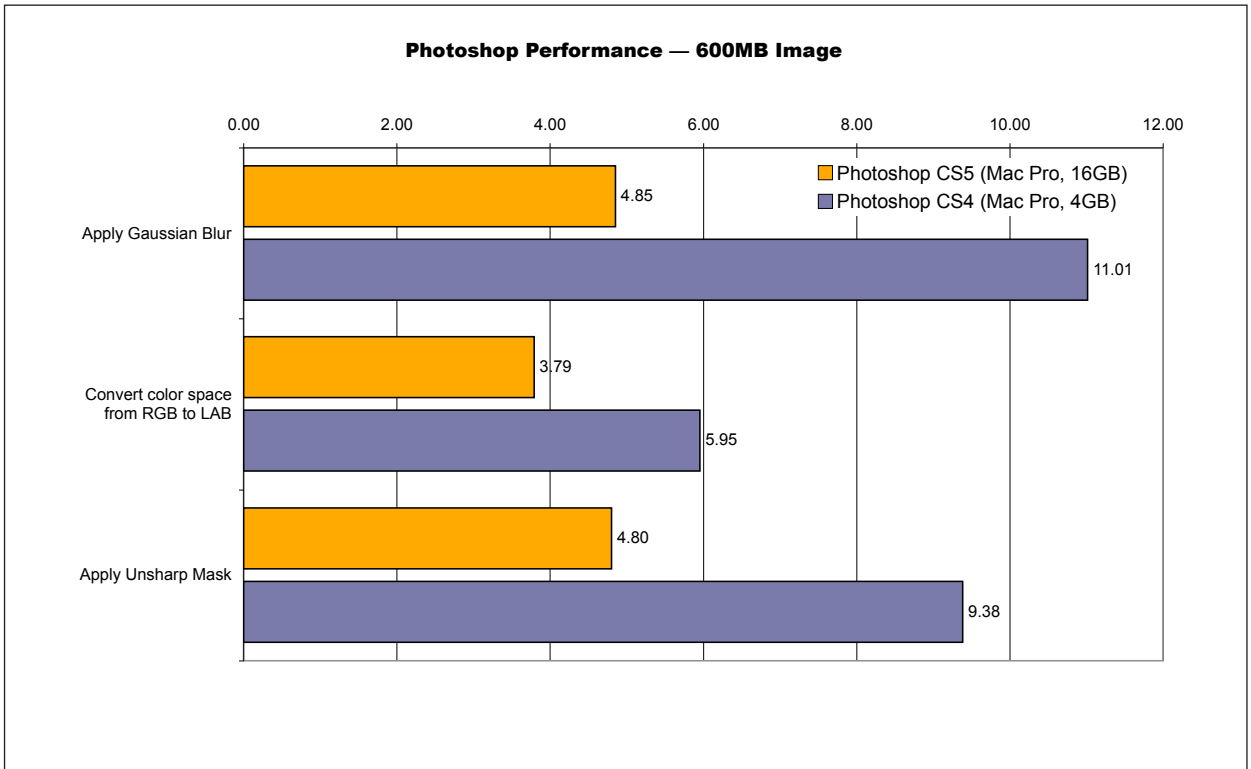


Time scale in seconds. Shorter is better.

Charts: Complete Results — Mac

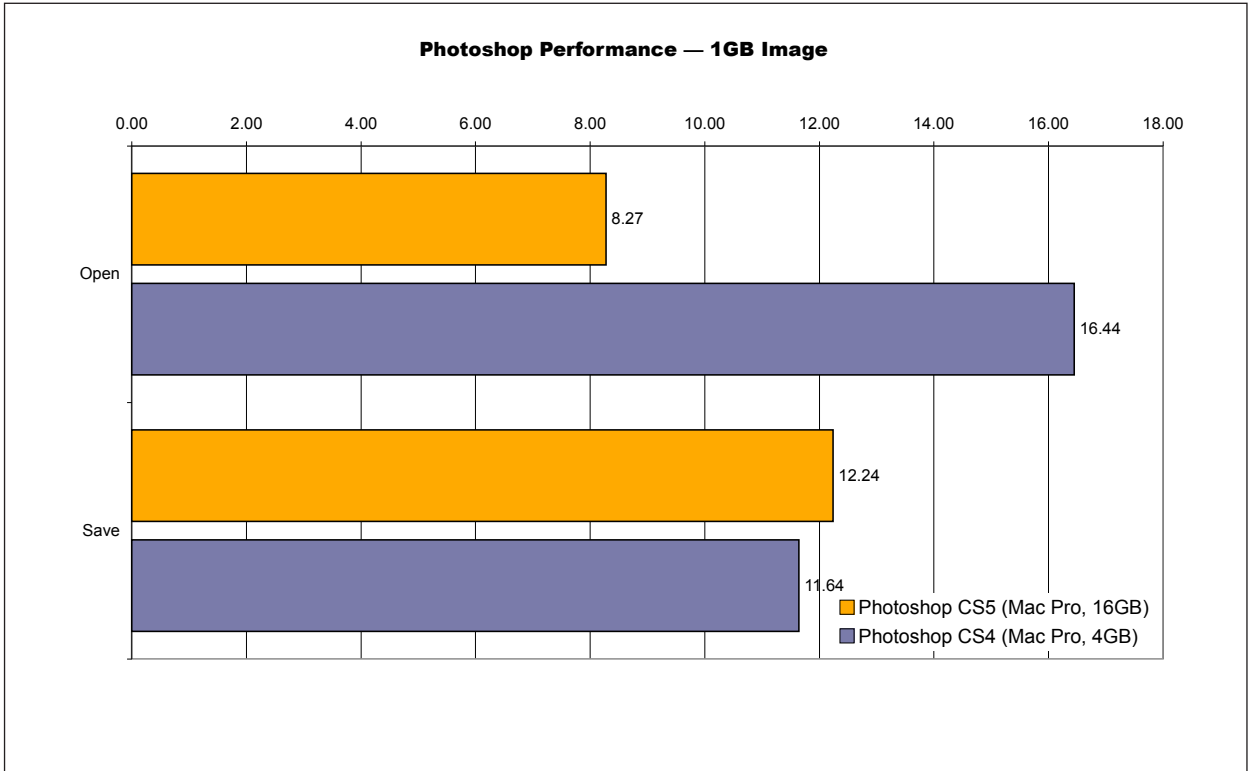


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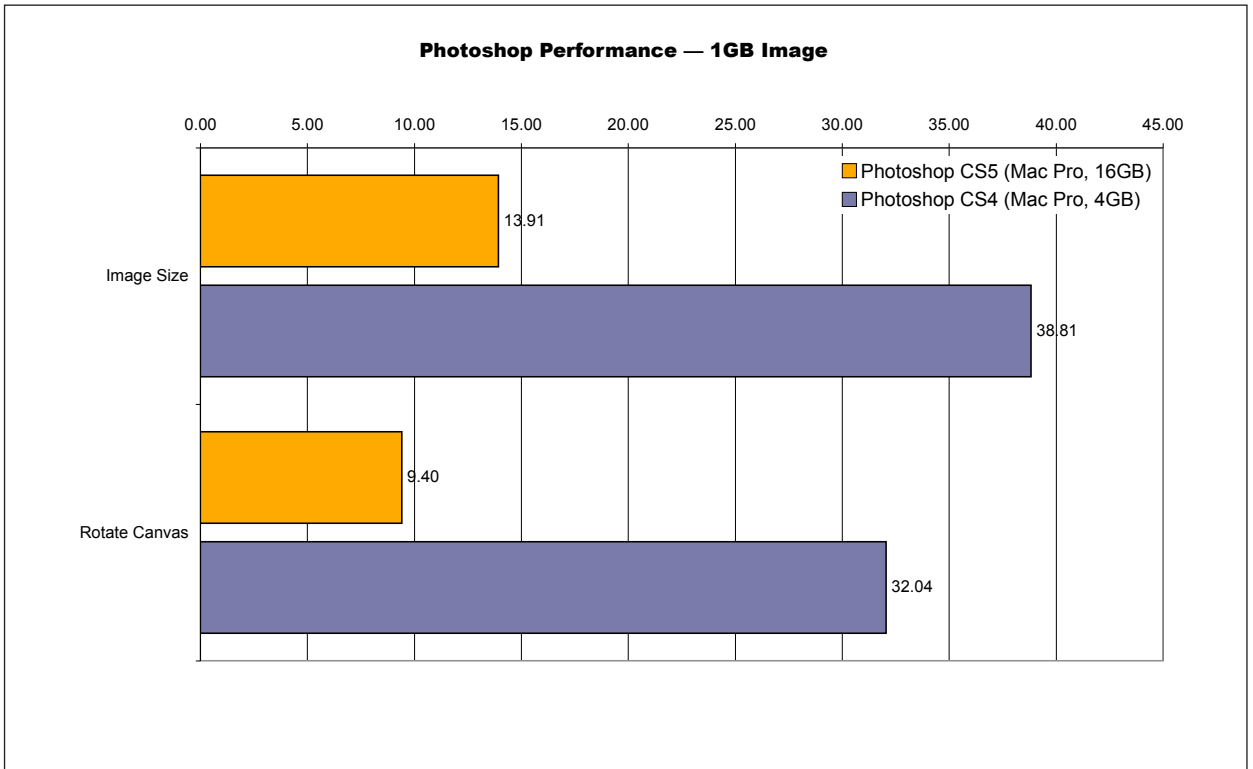


Time scale in seconds. Shorter is better.

Charts: Complete Results — Mac

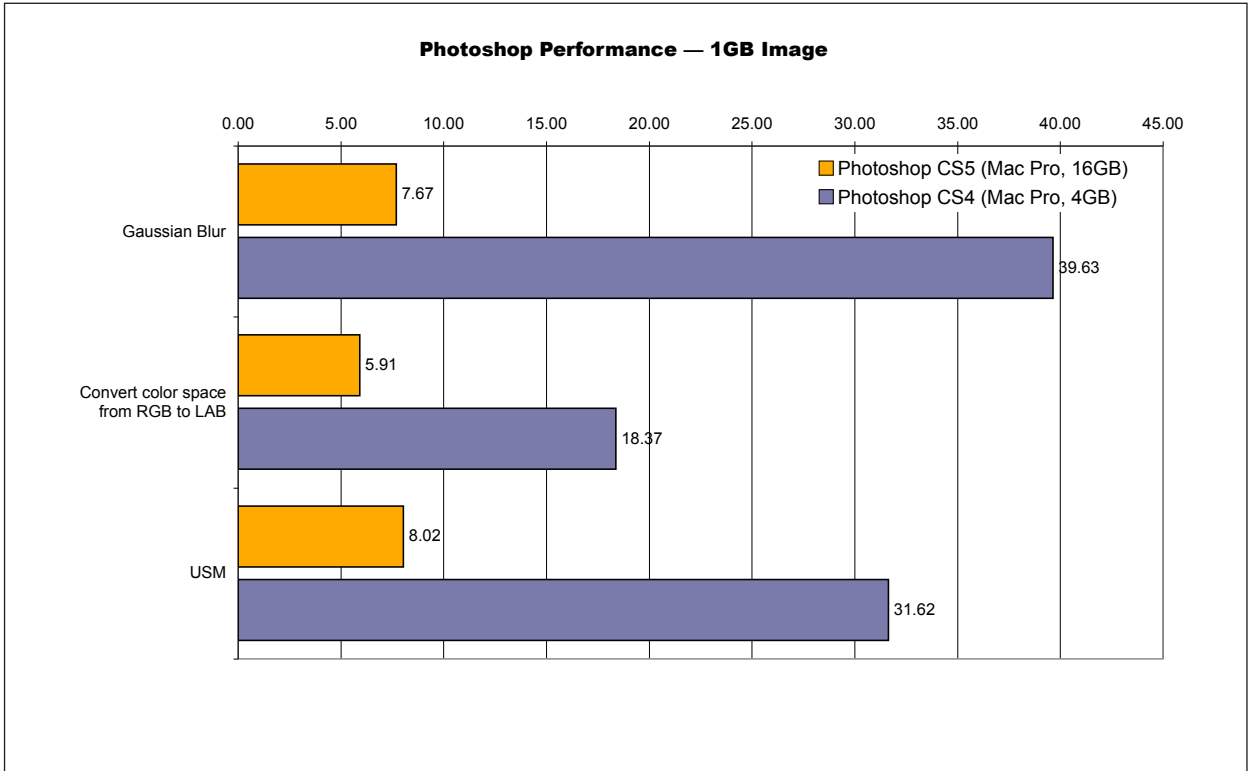


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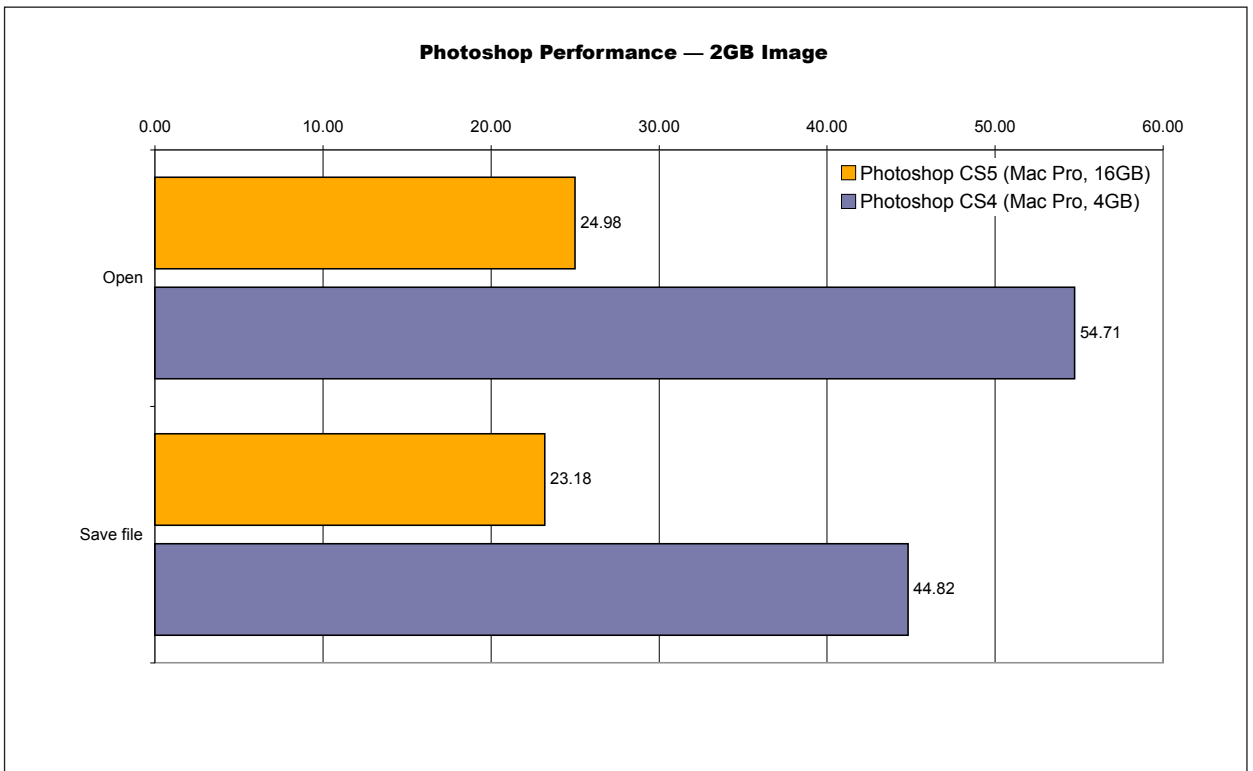


Time scale in seconds. Shorter is better.

Charts: Complete Results — Mac

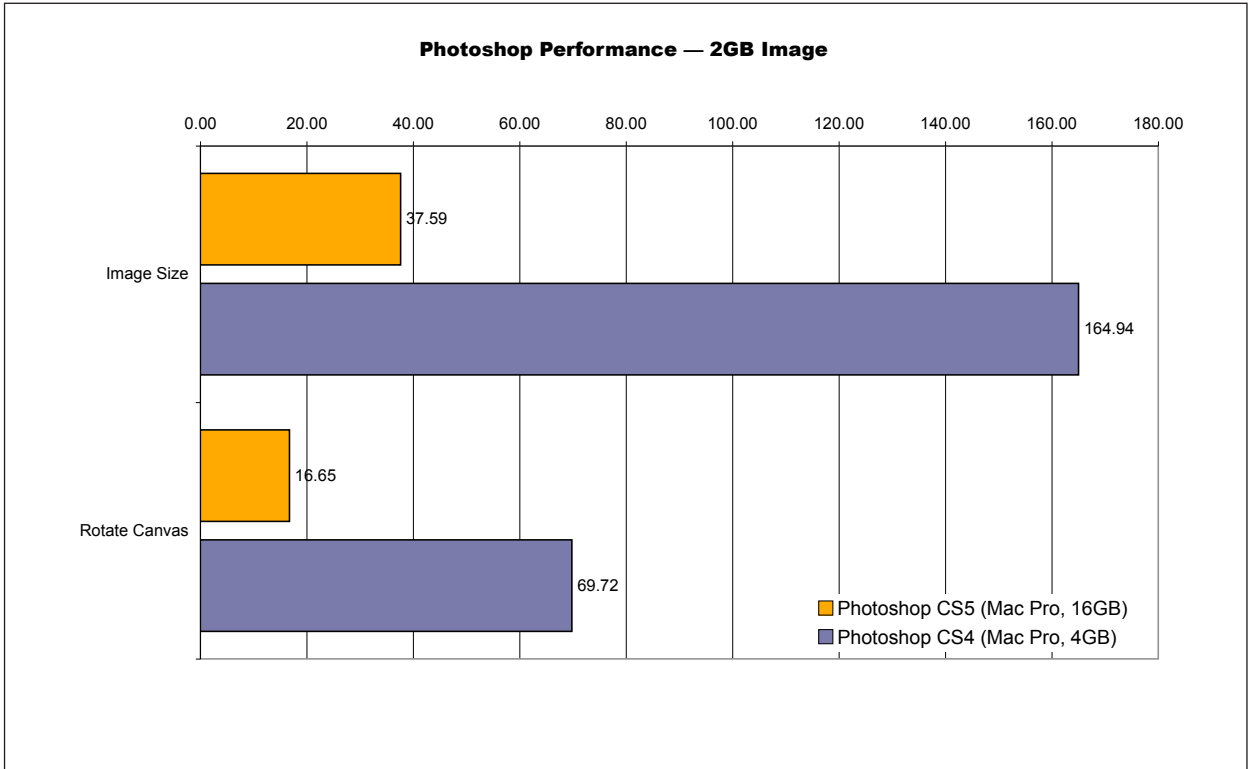


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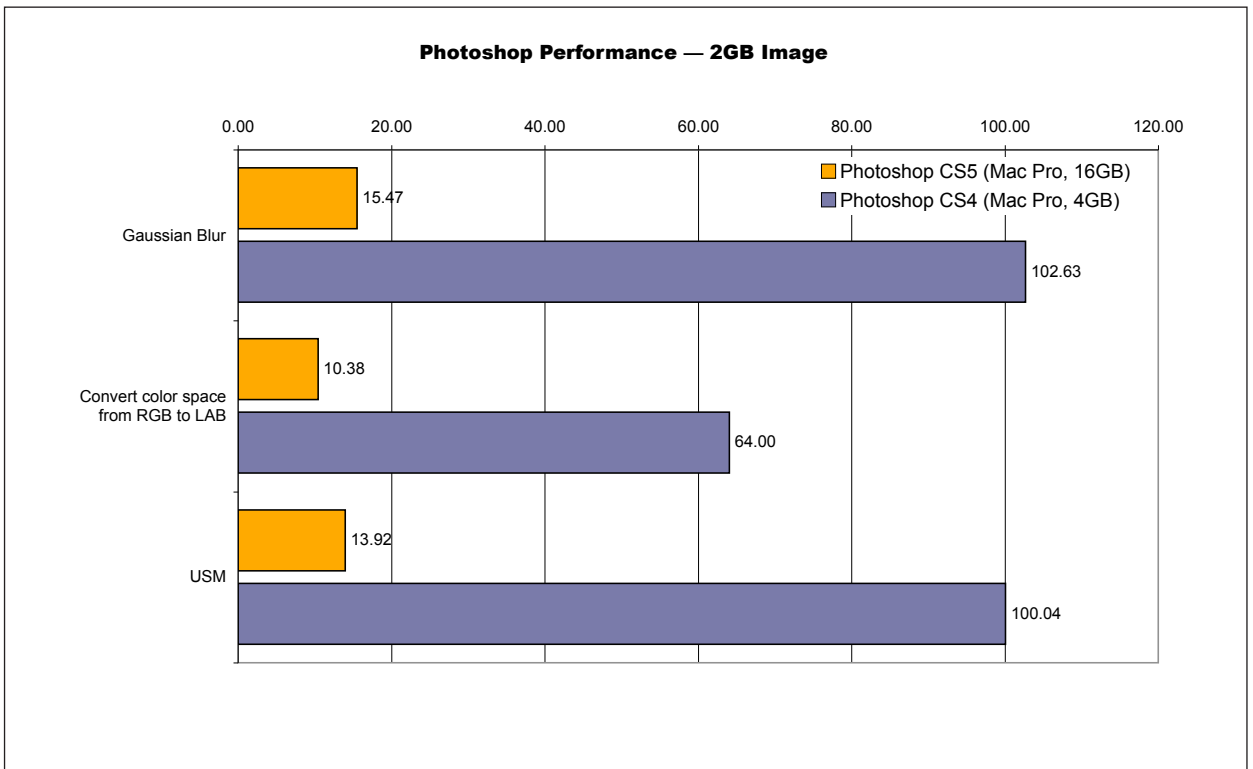


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Charts: Complete Results — Mac

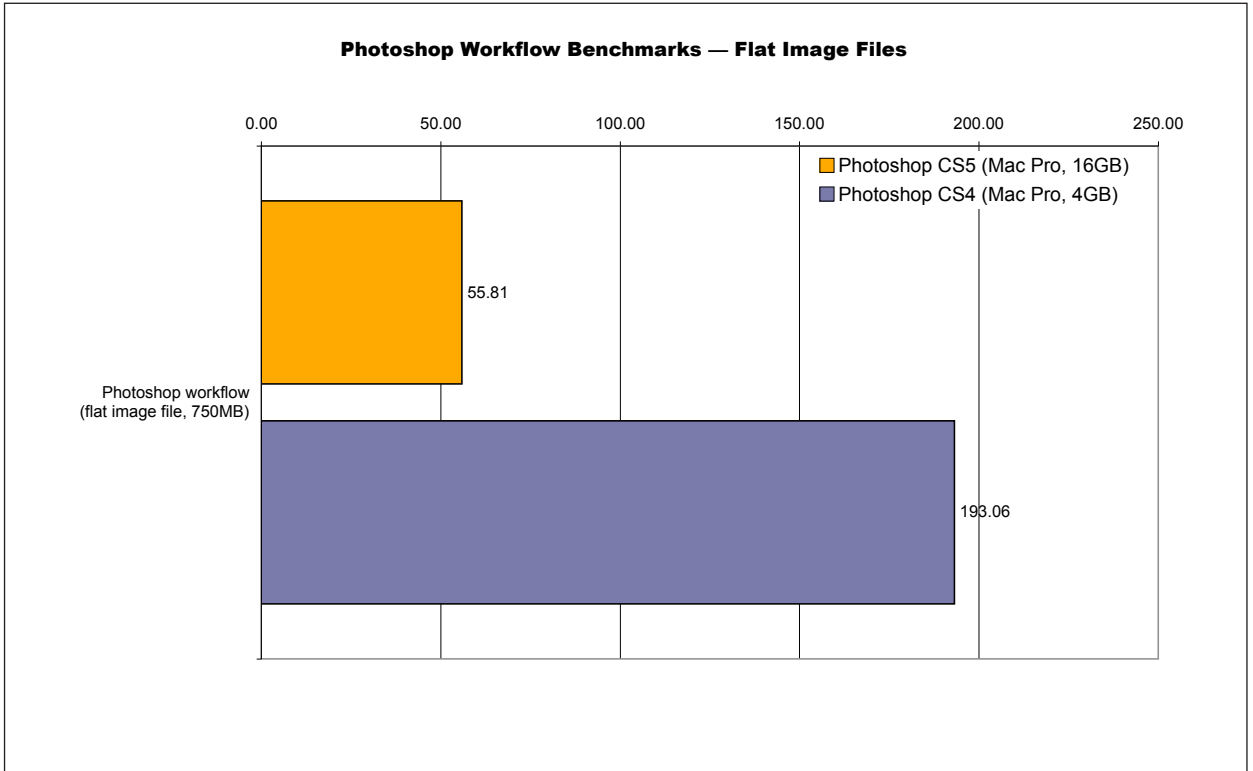


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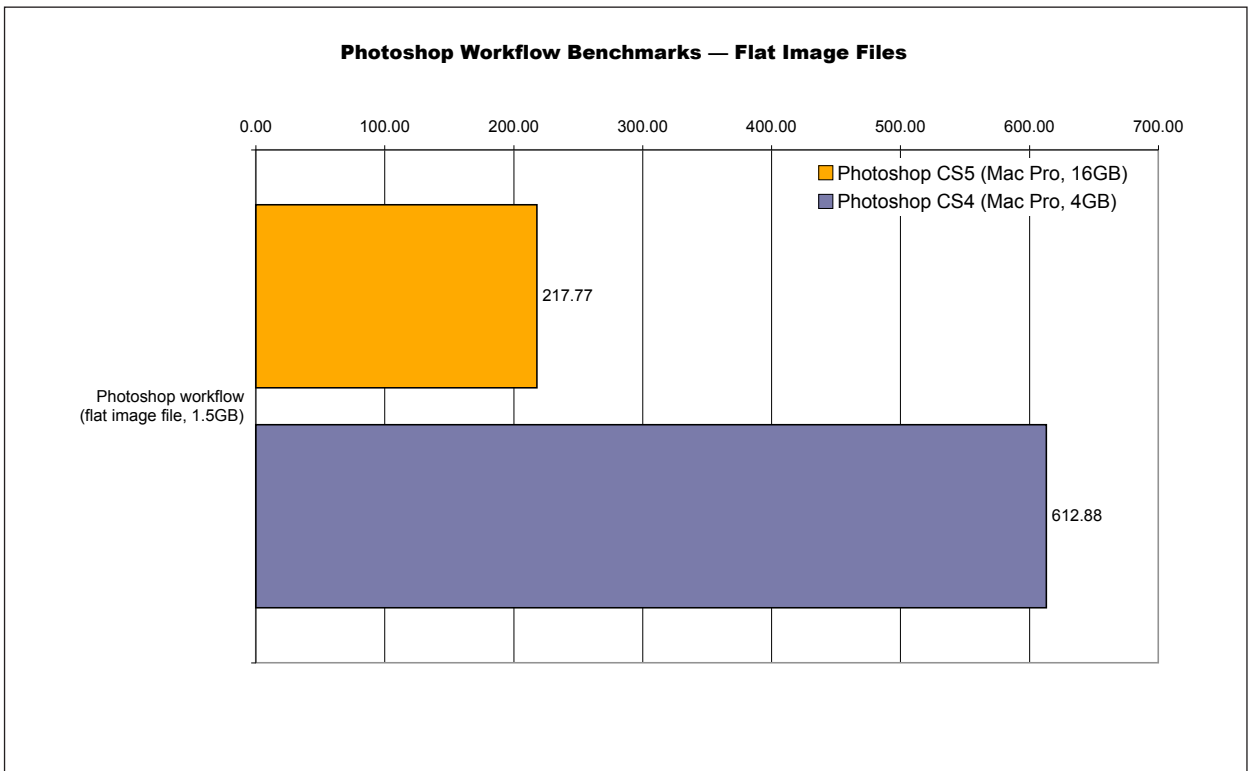


Time scale in seconds. Shorter is better.

Charts: Complete Results — Mac

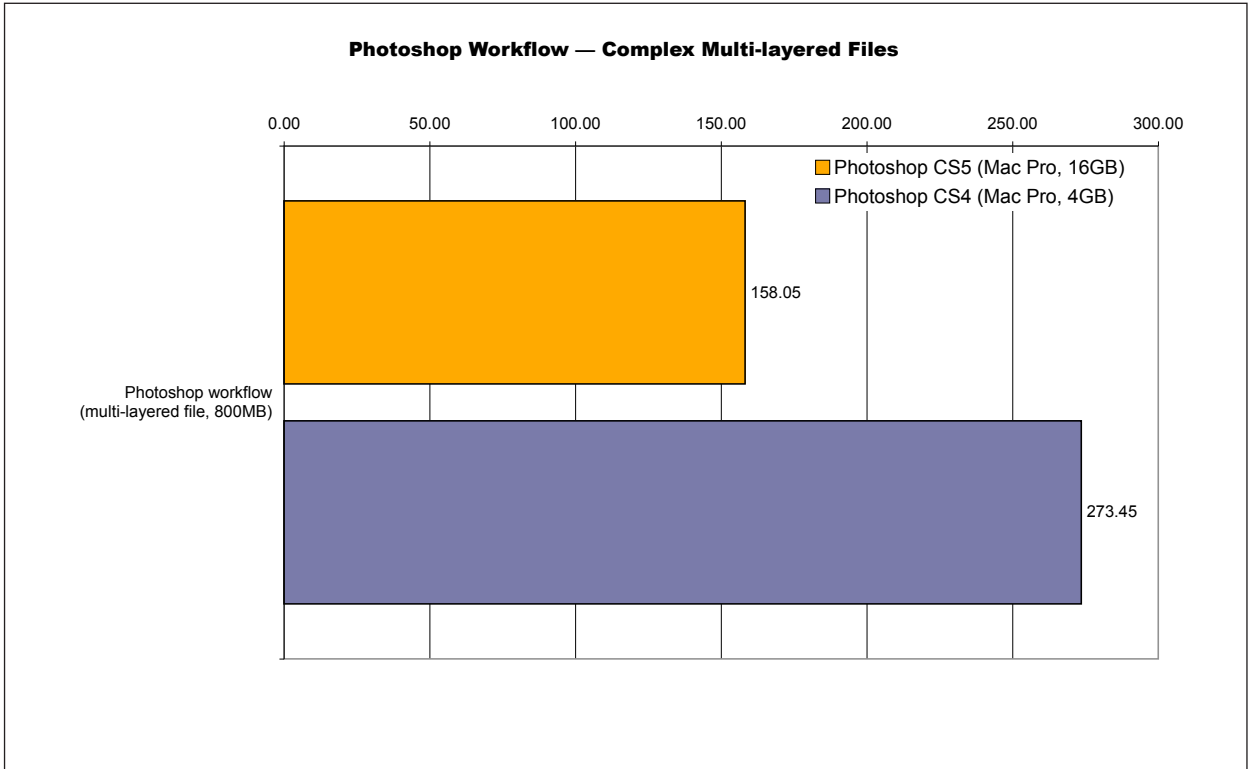


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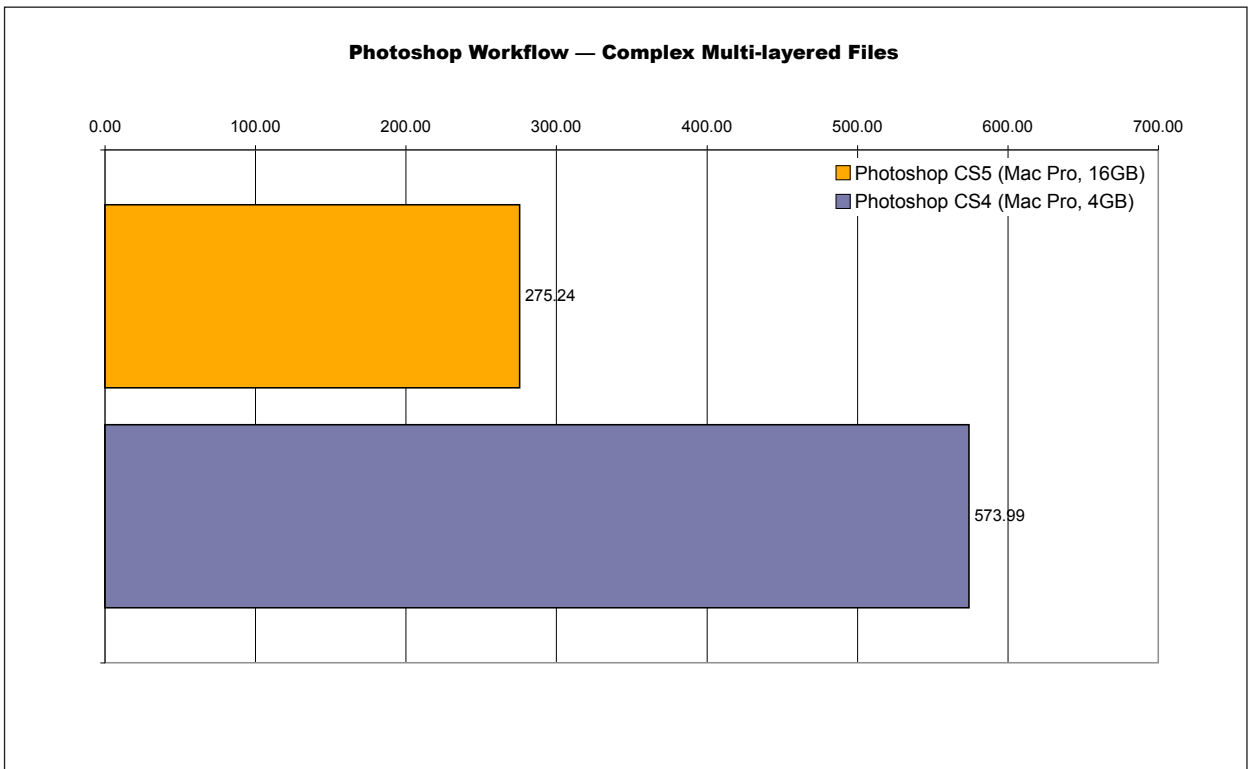


Time scale in seconds. Shorter is better.

Charts: Complete Results — Mac

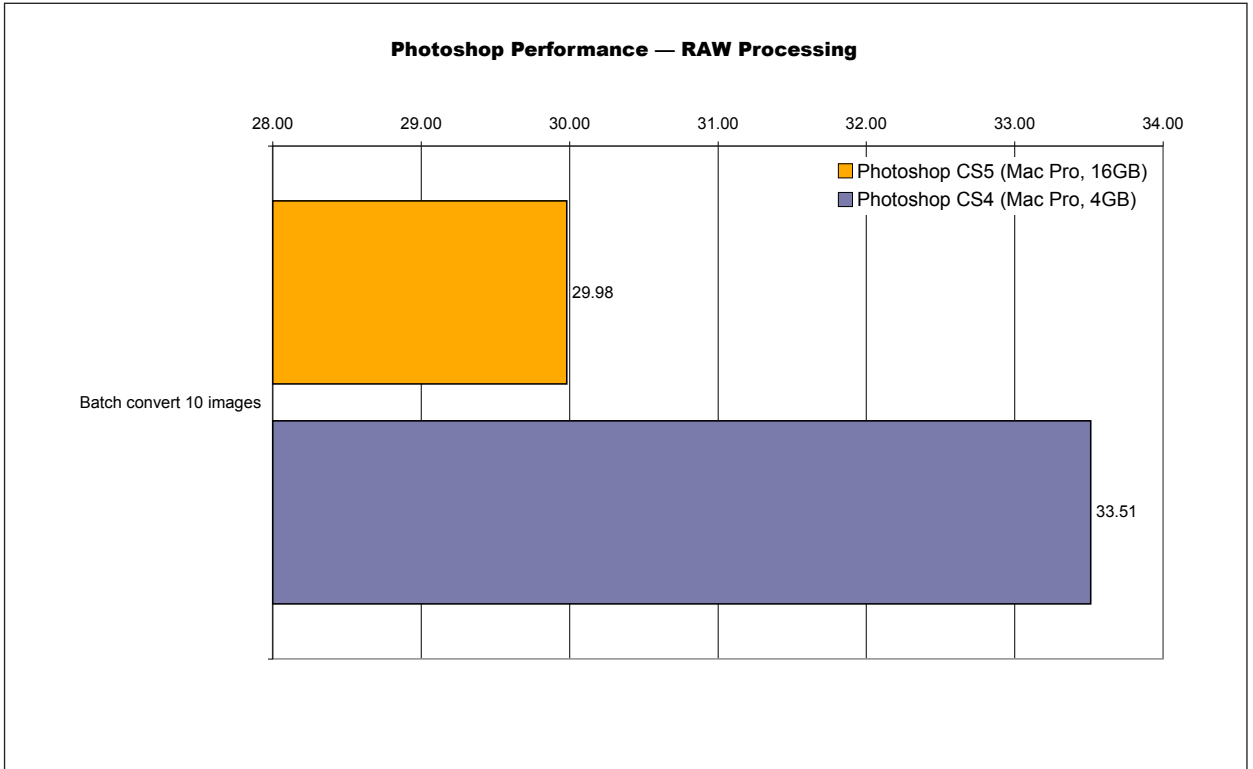


Time scale in seconds. Shorter is better.

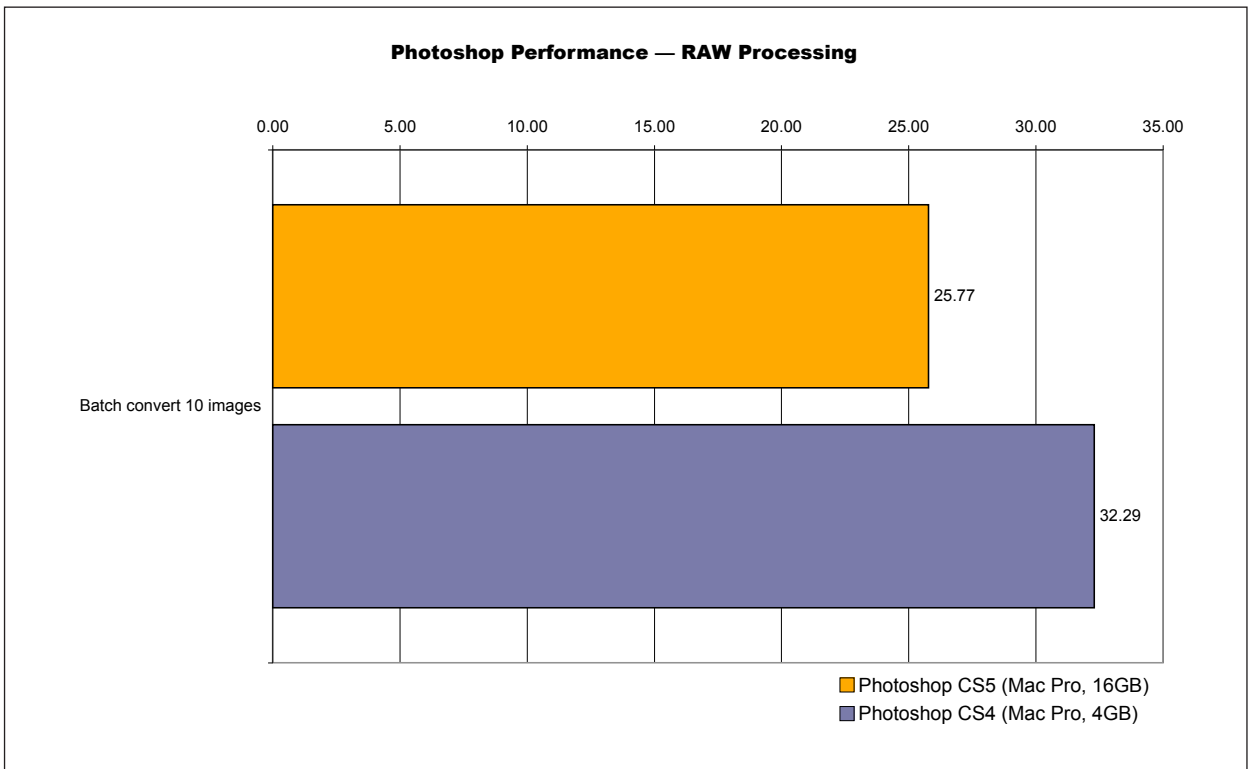


Time scale in seconds. Shorter is better.

Charts: Complete Results — Mac



Time scale in seconds. Shorter is better.



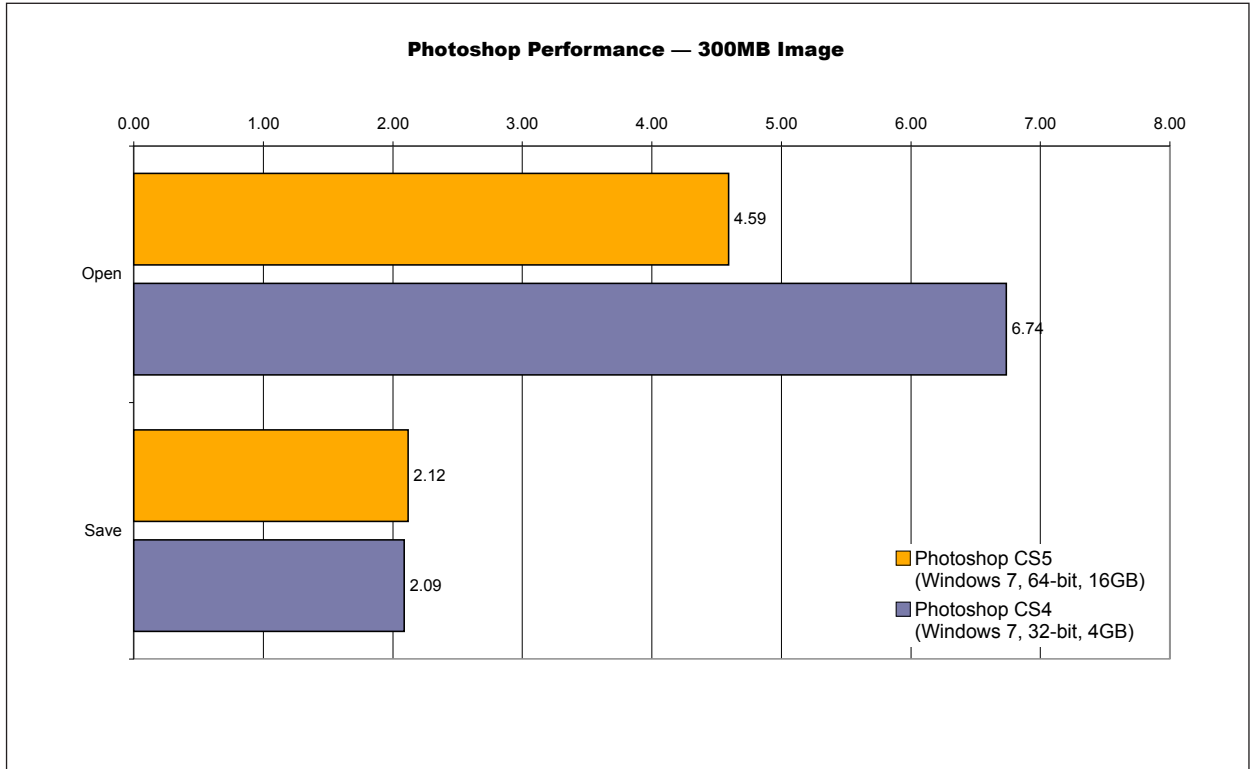
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Charts: Complete Results — Mac

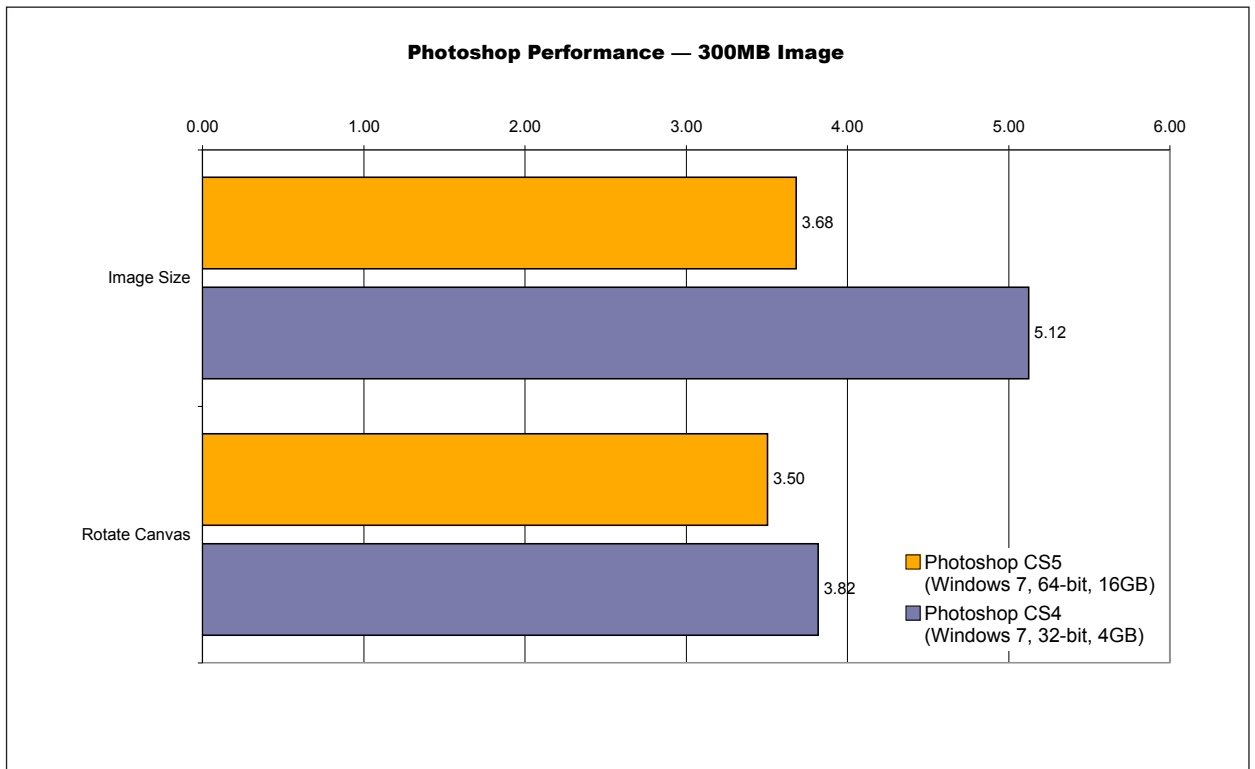
Pfeiffer Consulting 01001011	Client: Adobe	Project: Adobe Photoshop CS5 64-bit Benchmarks
	Document: Complete Benchmark Report	

Charts: Complete Results – Windows

Charts: Complete Results – Windows	
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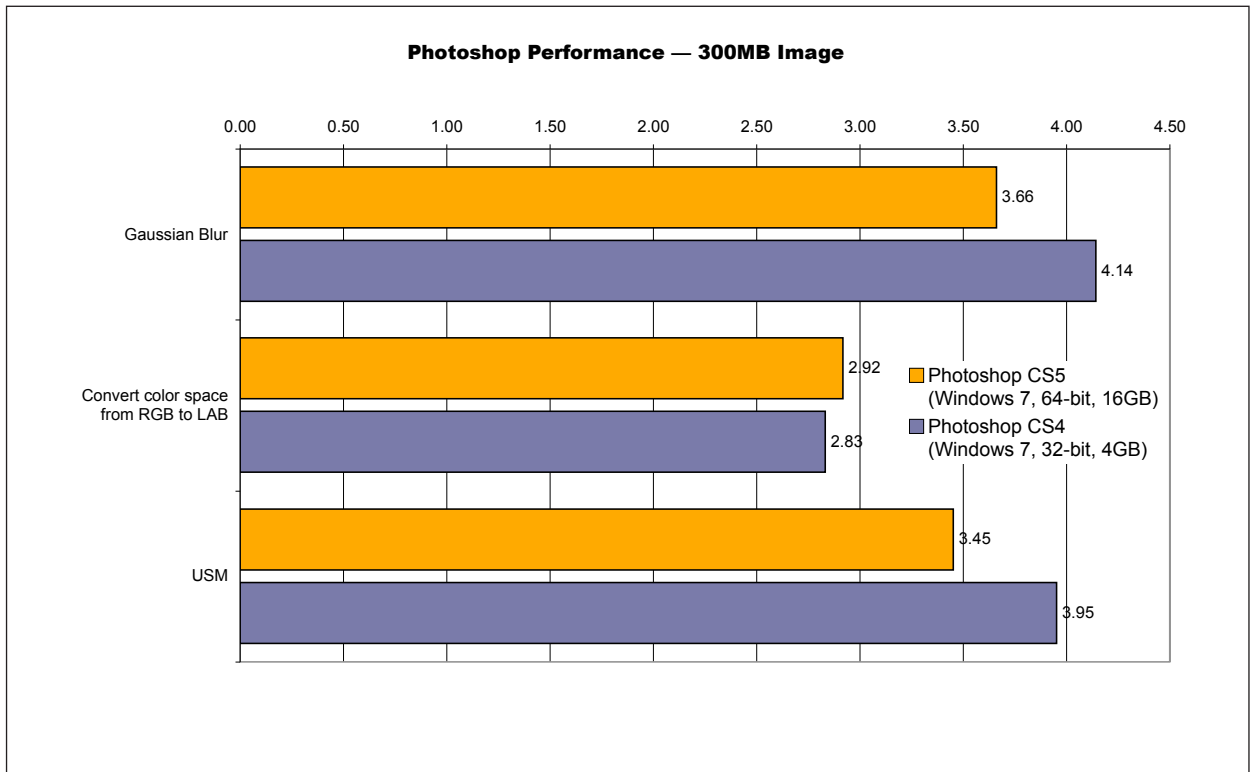


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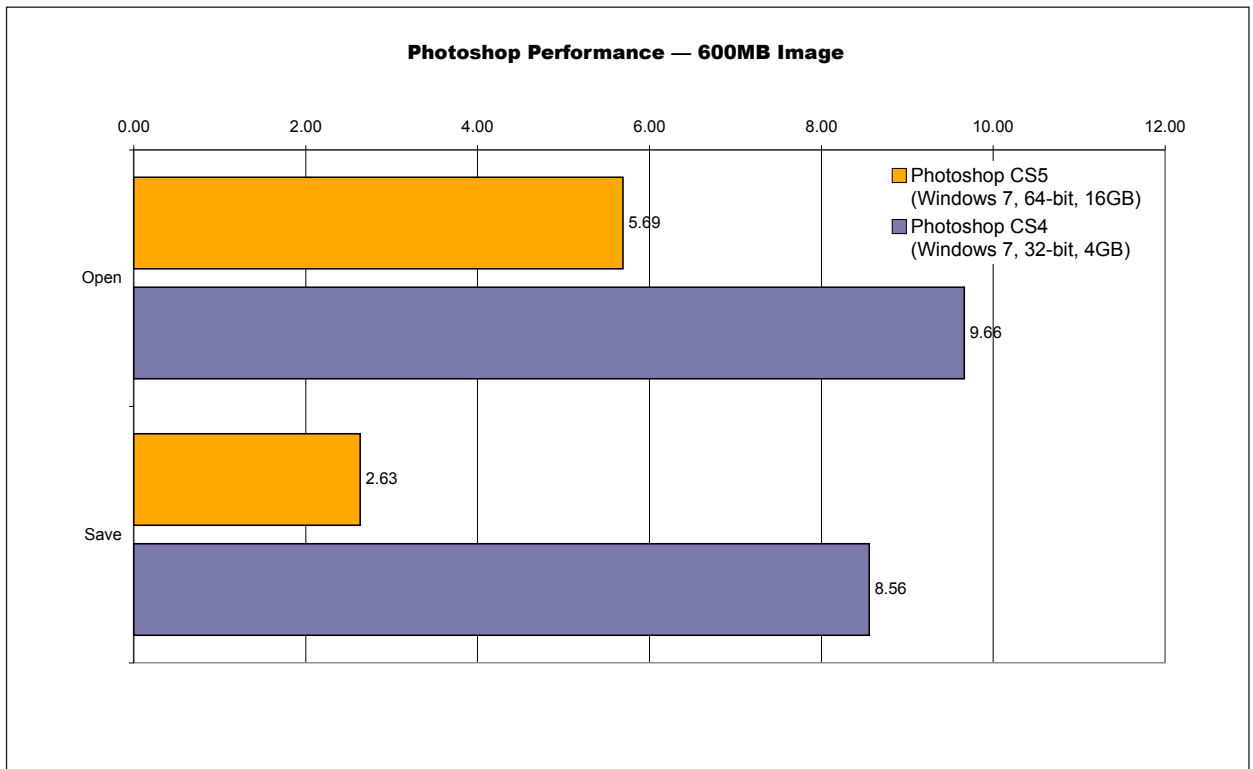


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Charts: Complete Results — Windows

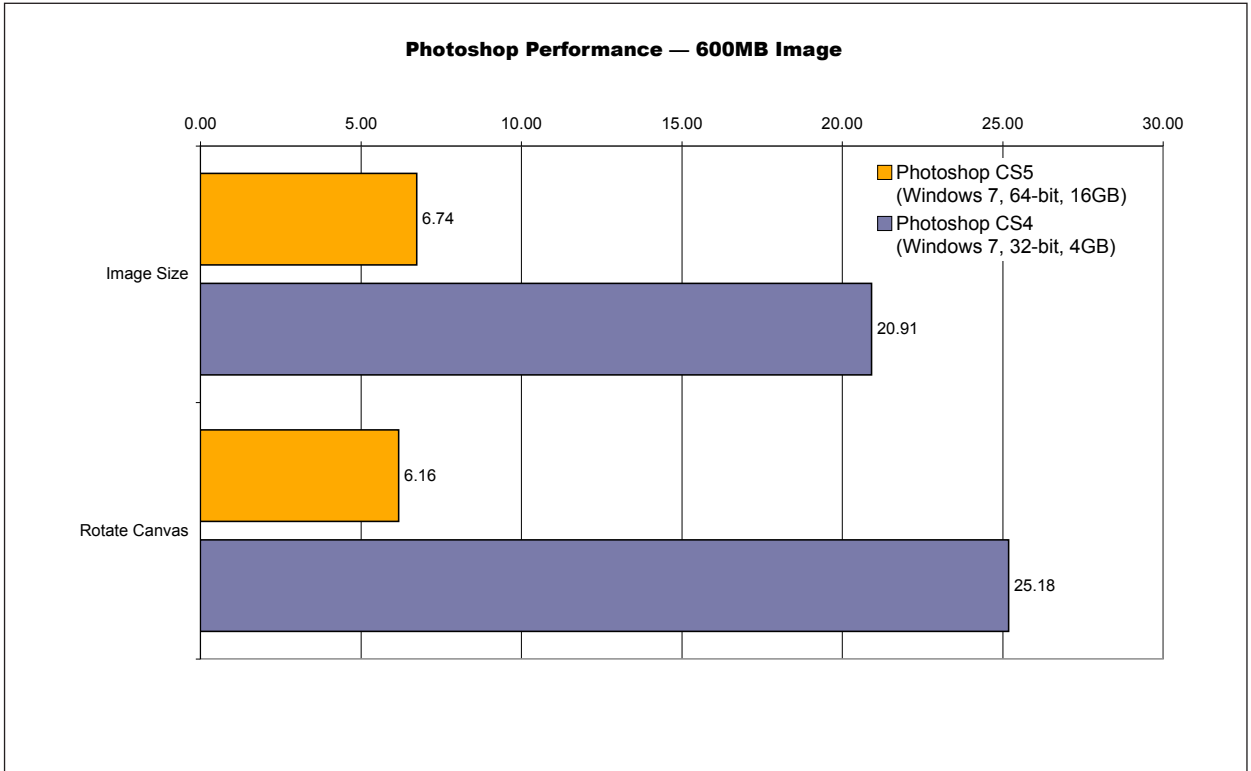


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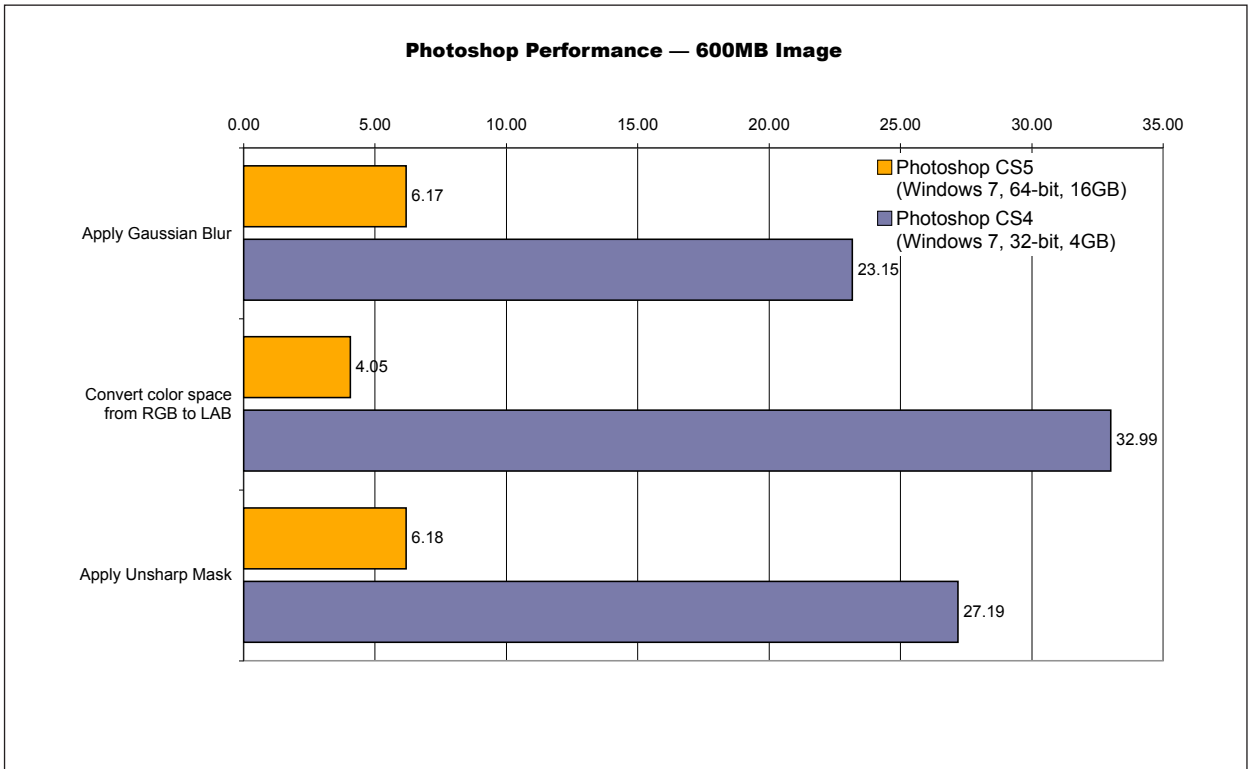


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Charts: Complete Results — Windows

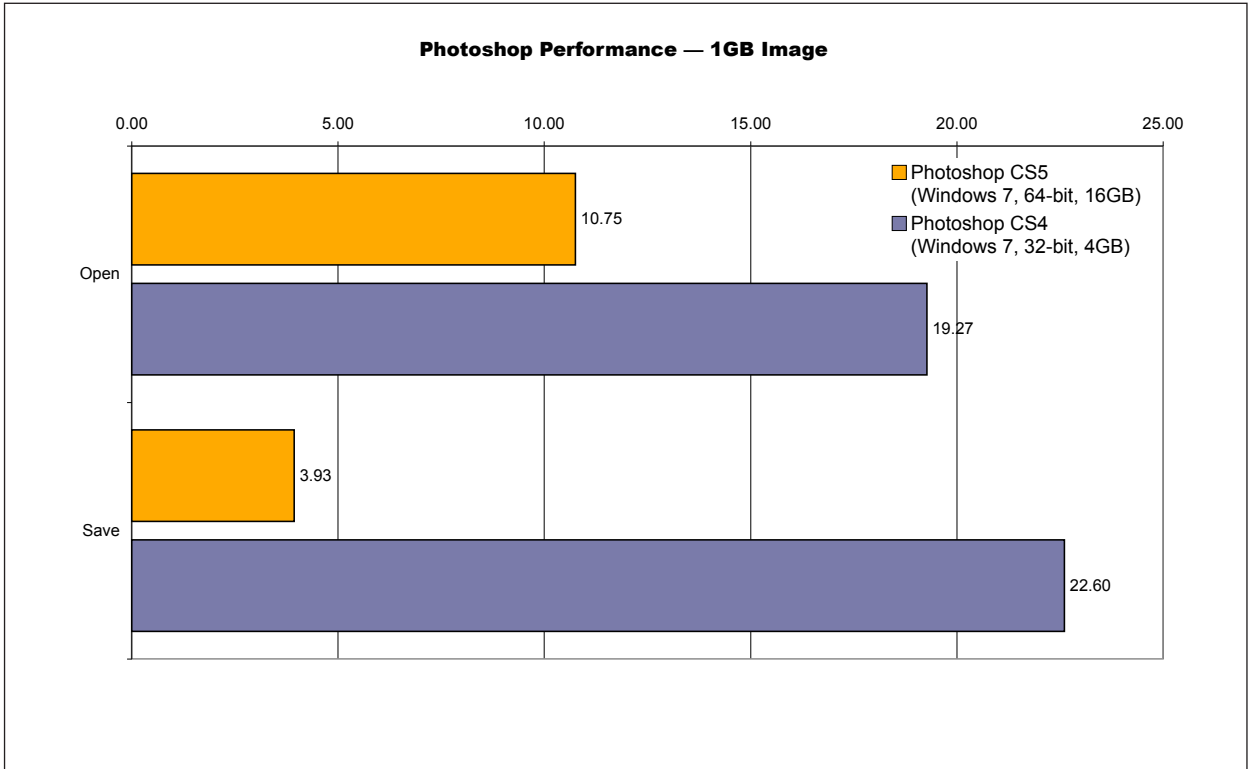


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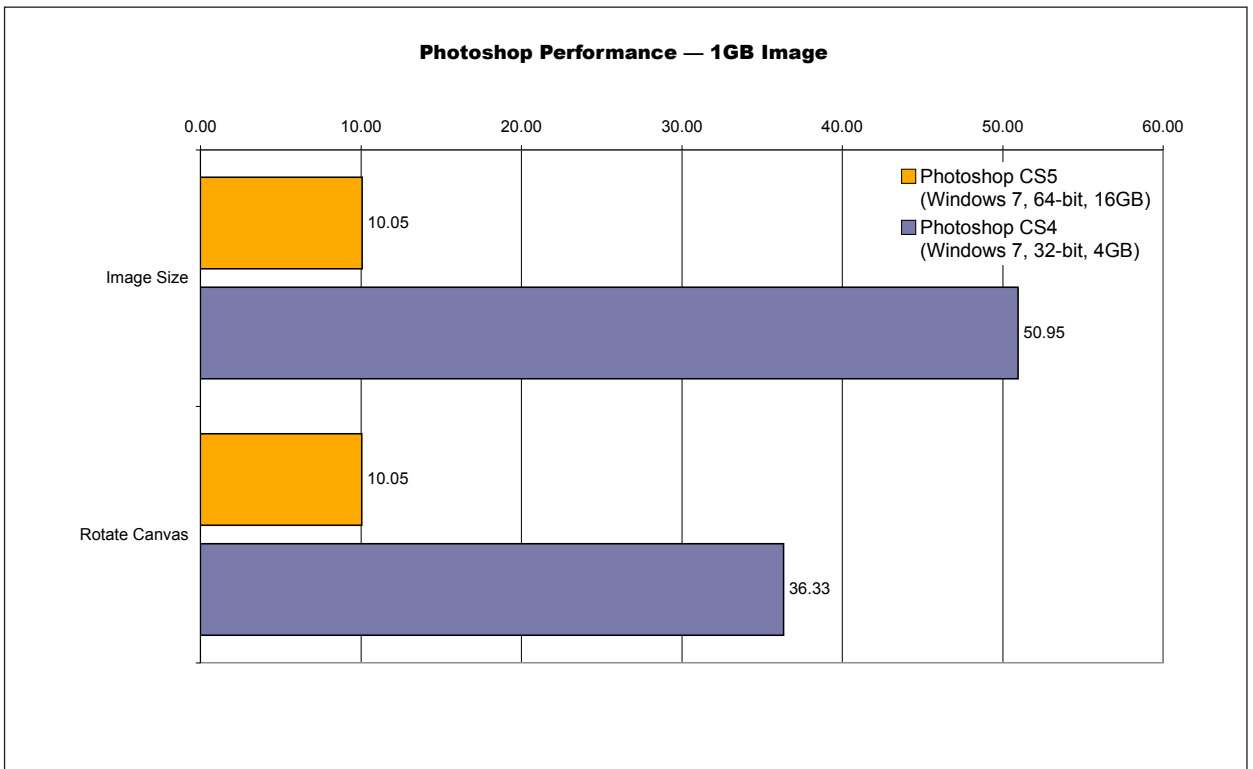


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Charts: Complete Results — Windows

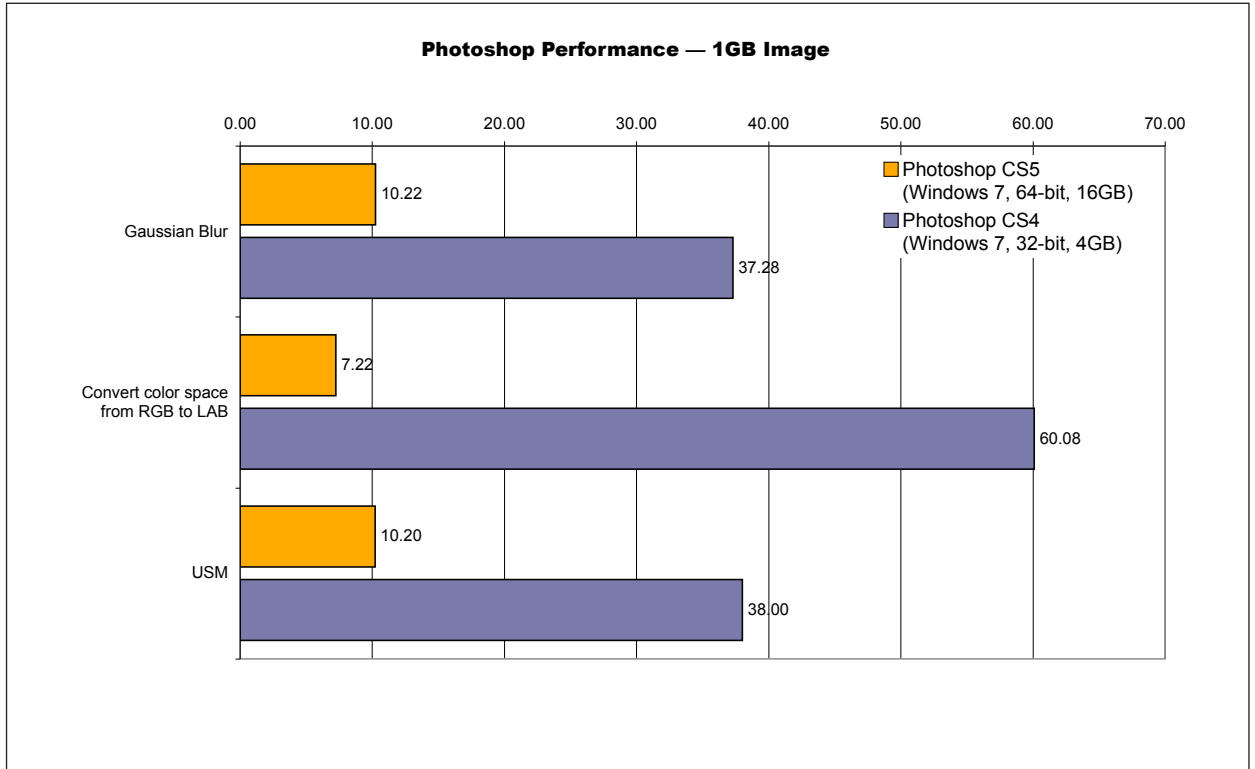


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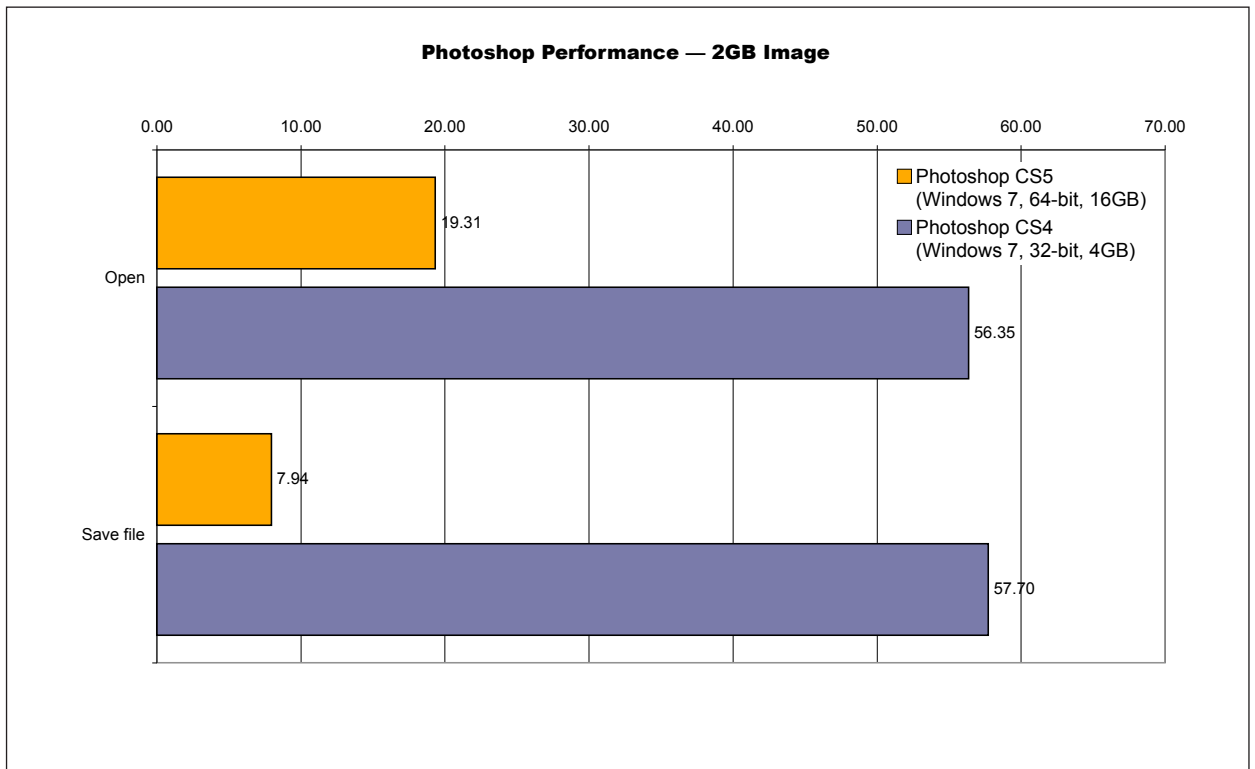


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Charts: Complete Results — Windows

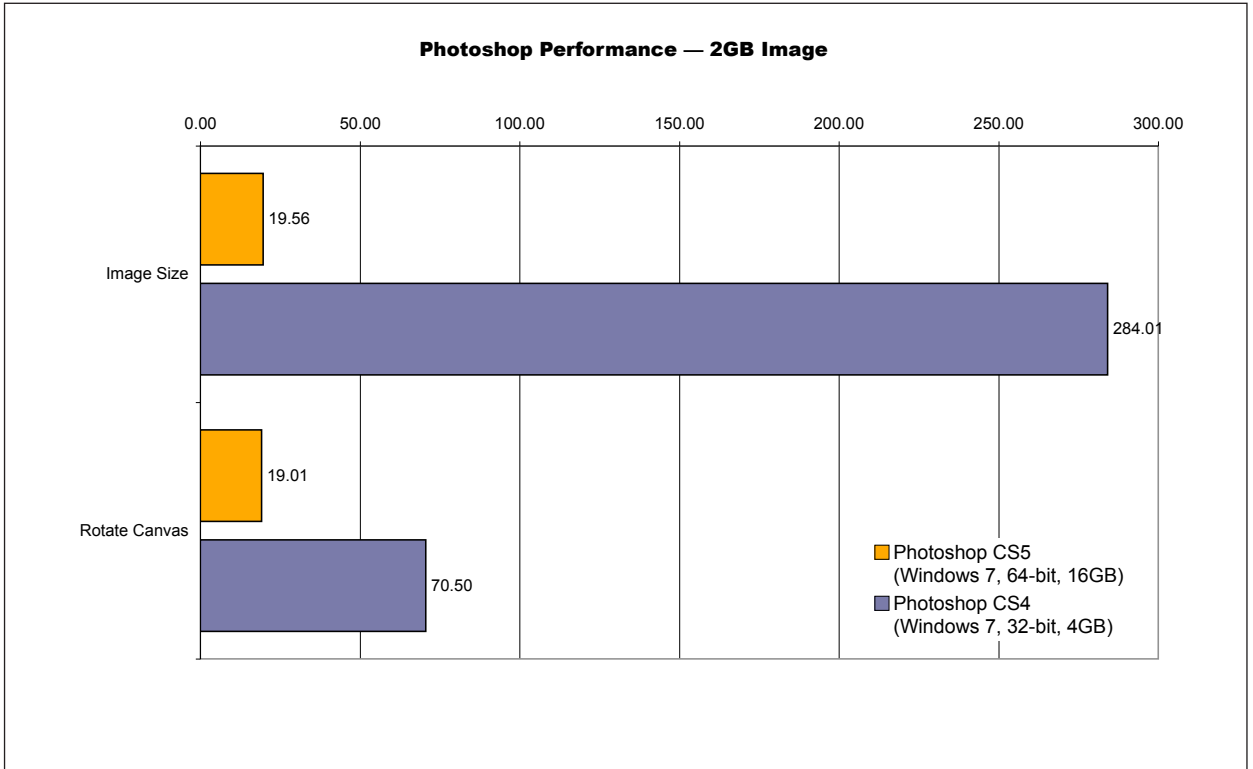


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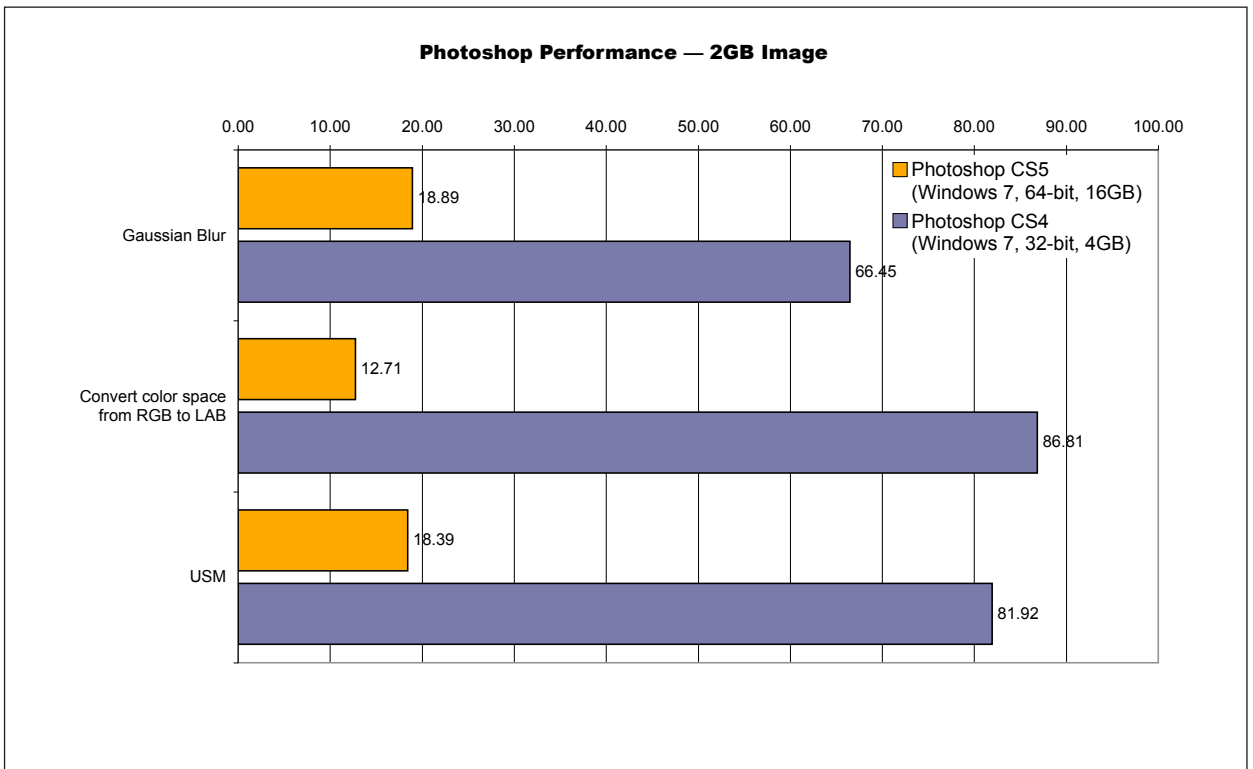


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Charts: Complete Results — Windows

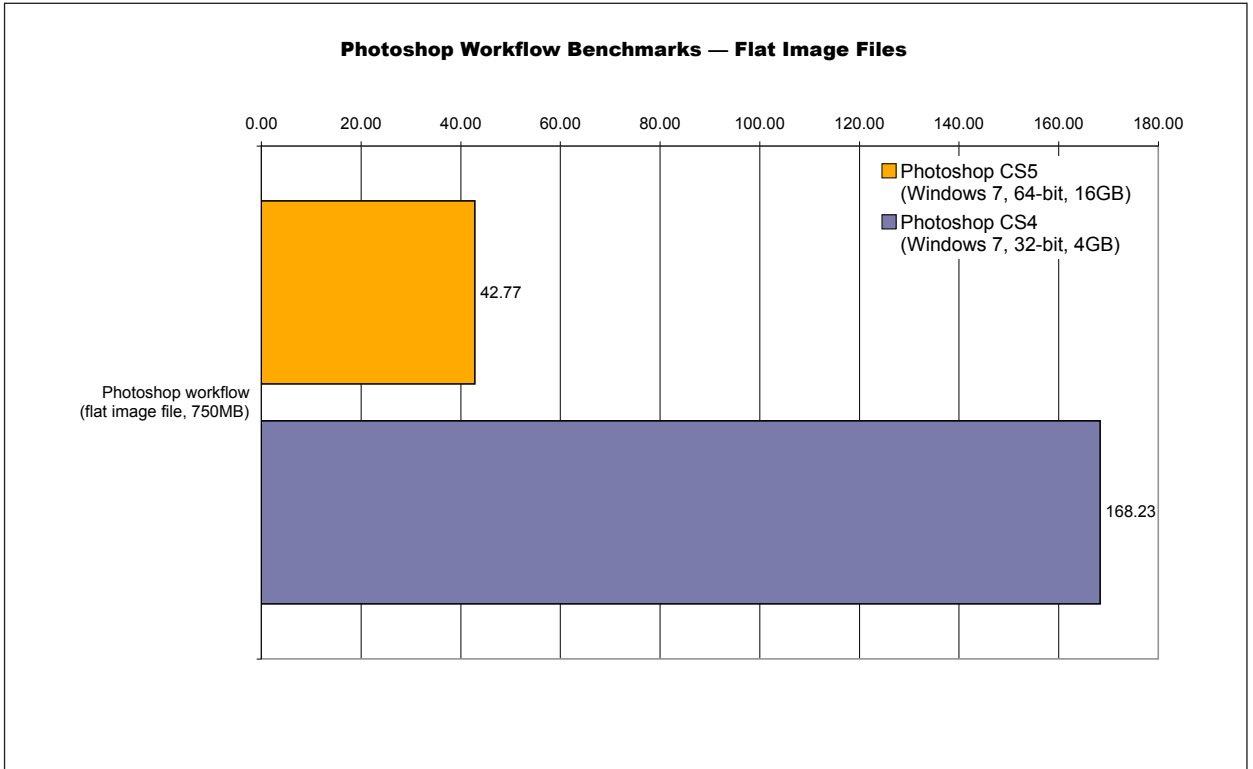


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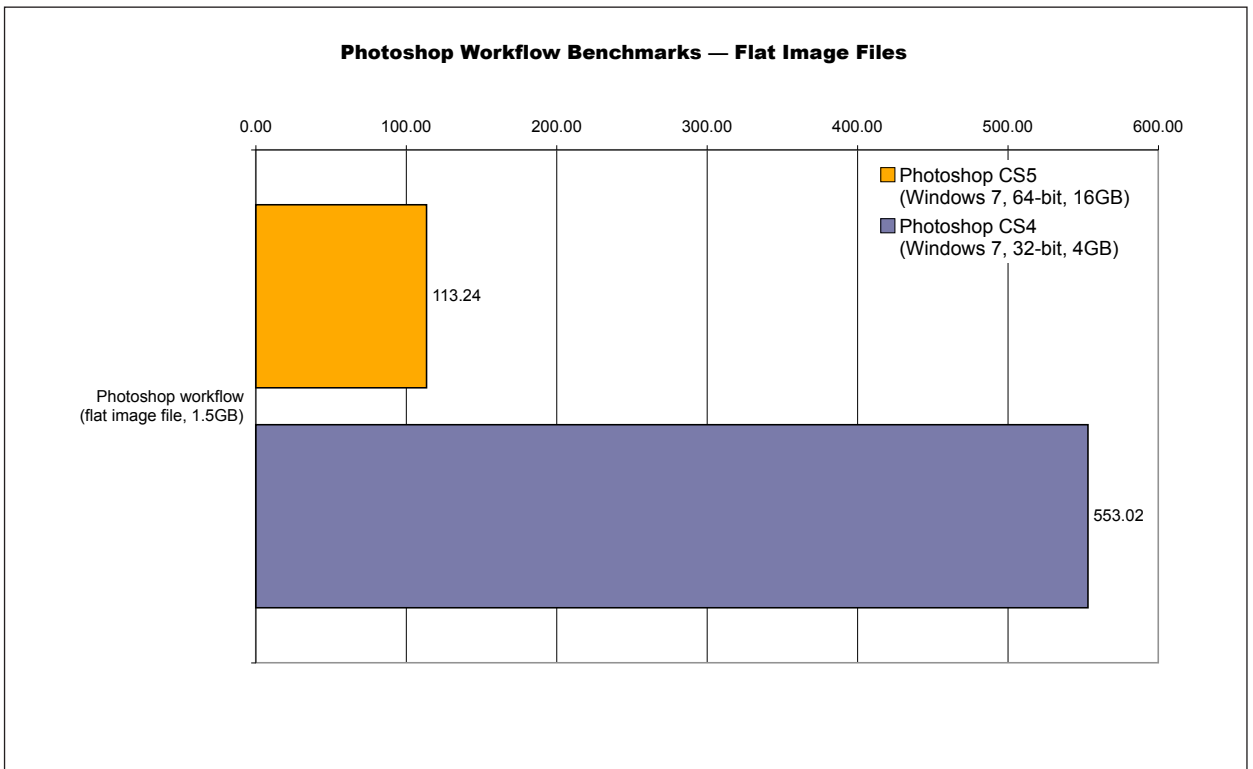


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Charts: Complete Results — Windows

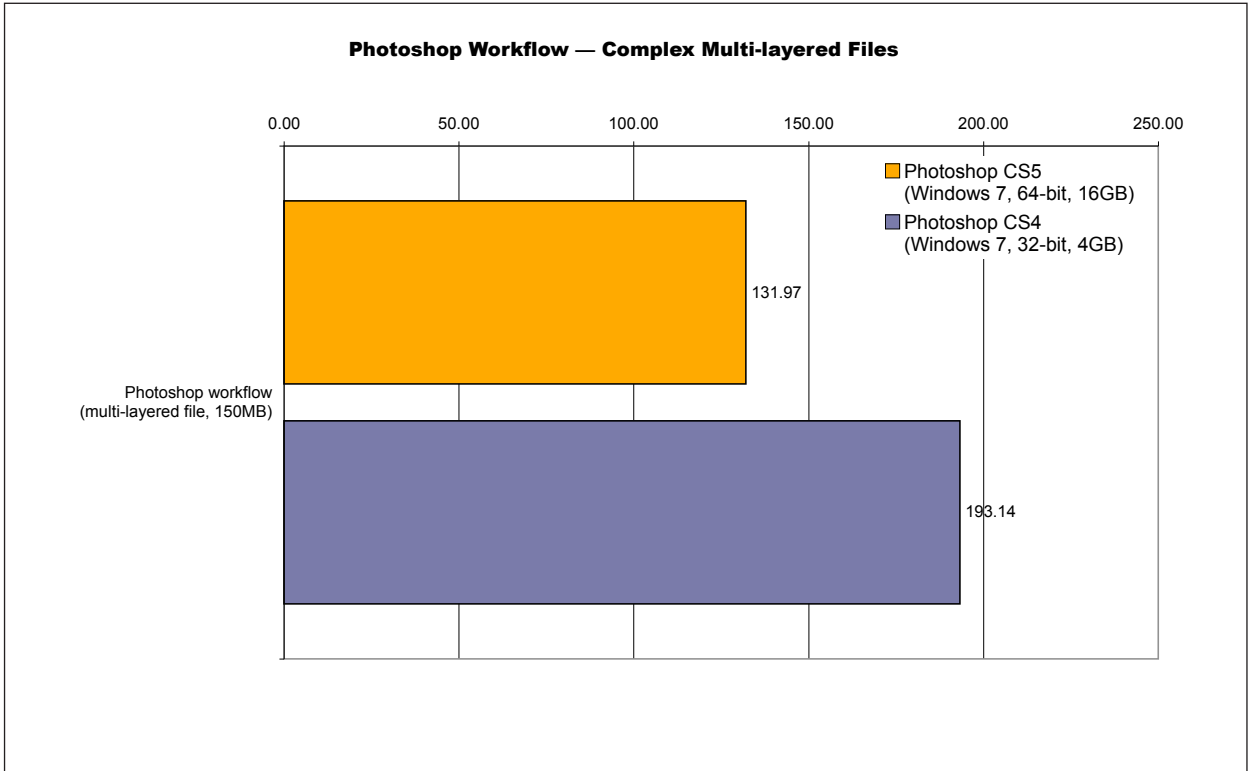


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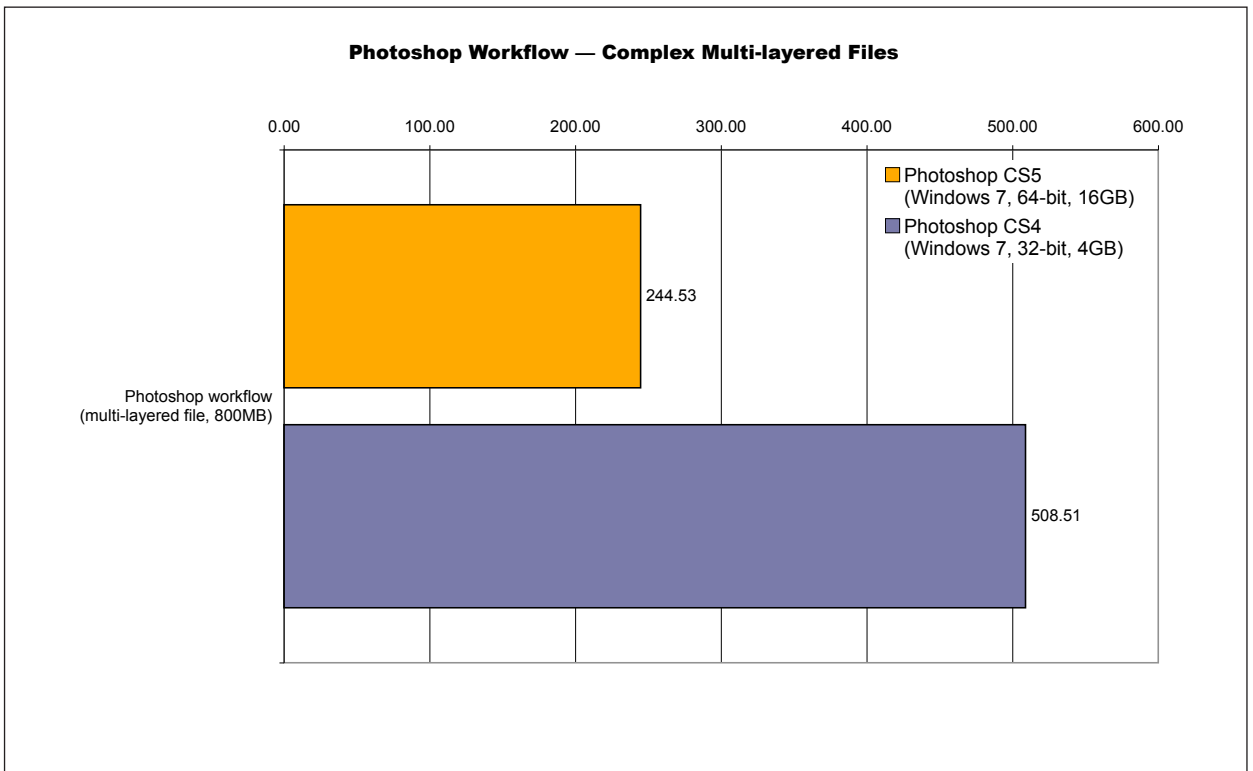


Time scale in seconds. Shorter is better.

Charts: Complete Results — Windows

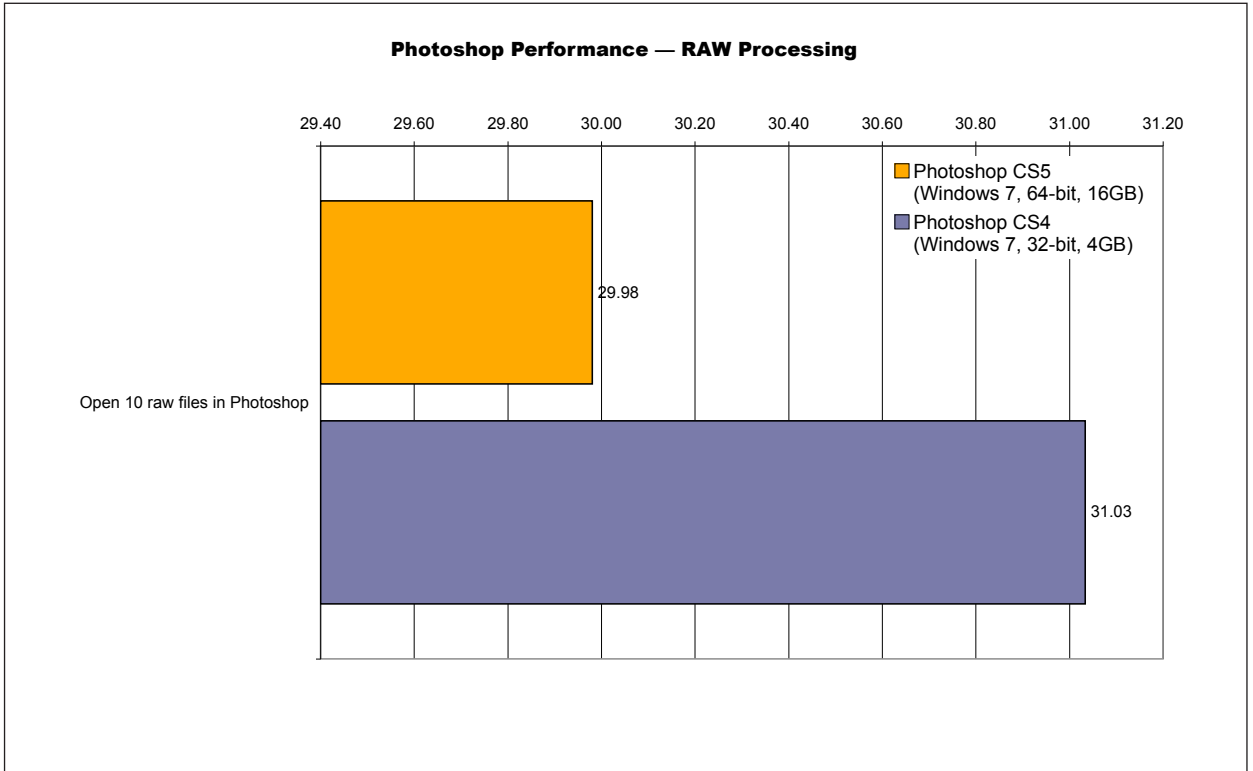


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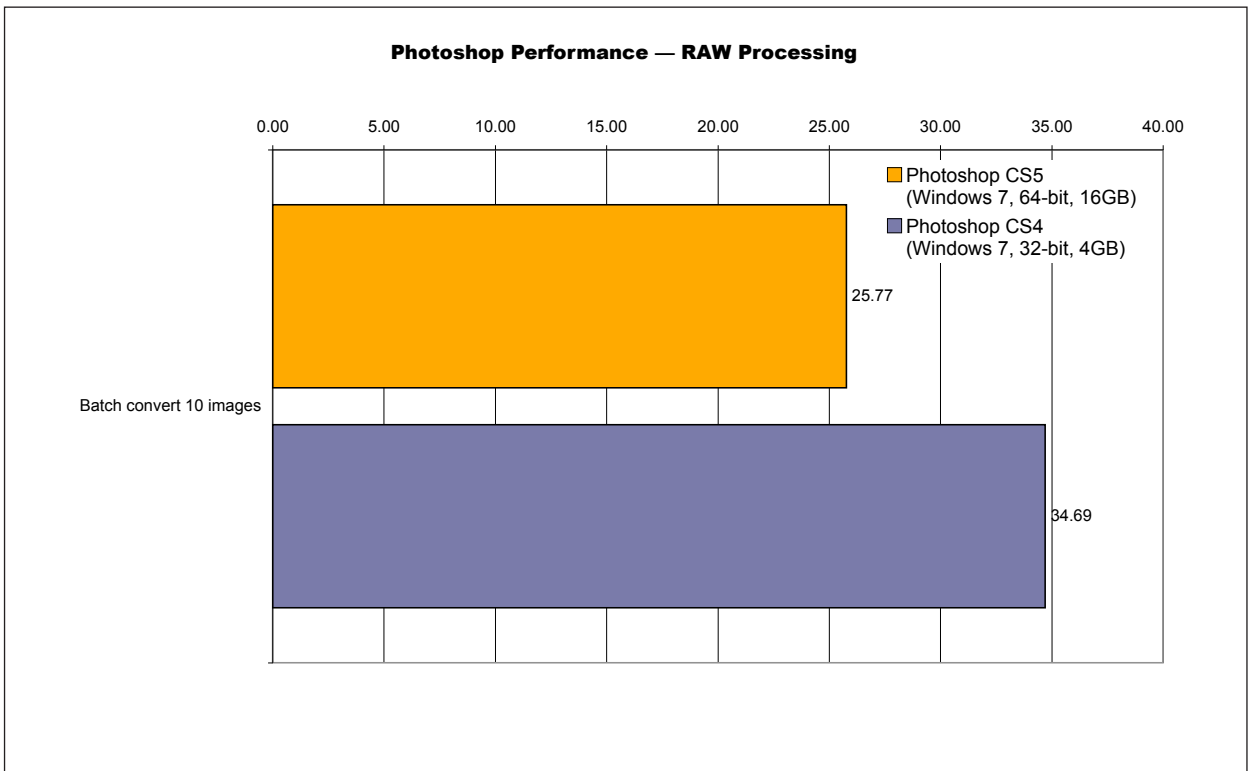


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Charts: Complete Results — Windows



Time scale in seconds. Shorter is better.



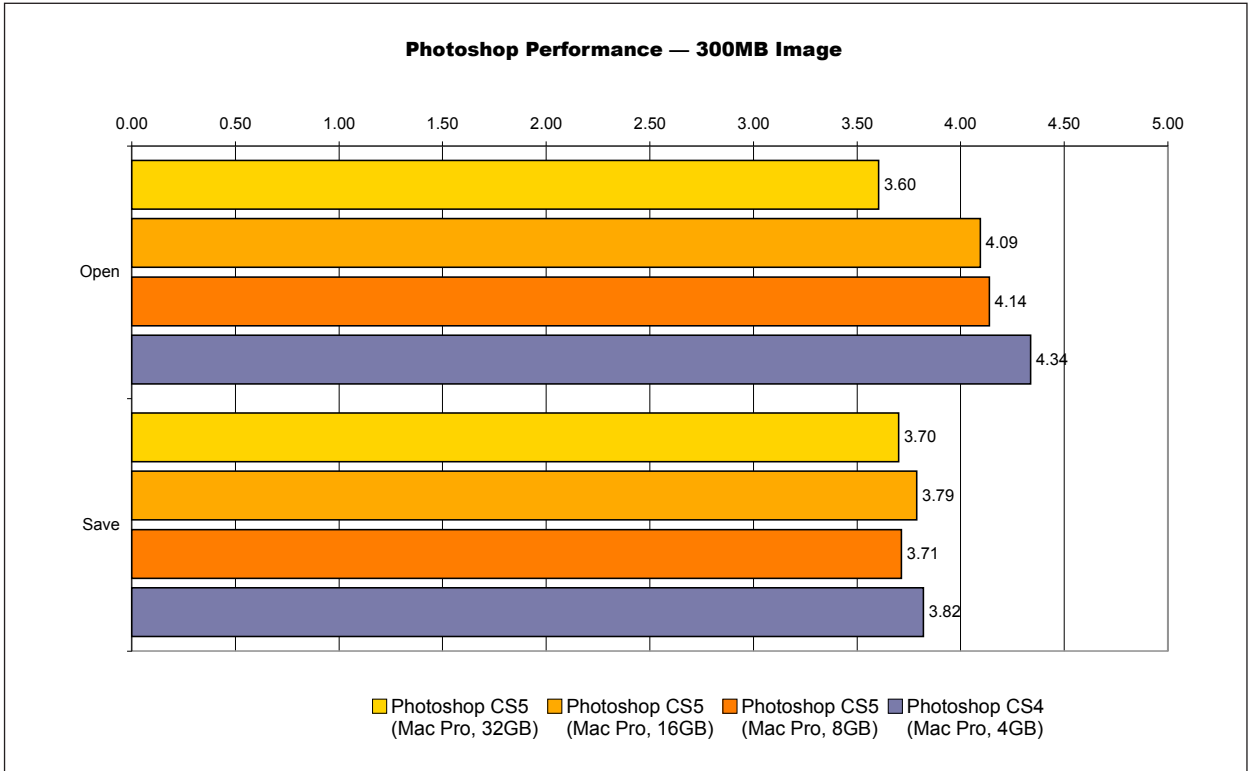
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Charts: Complete Results — Windows

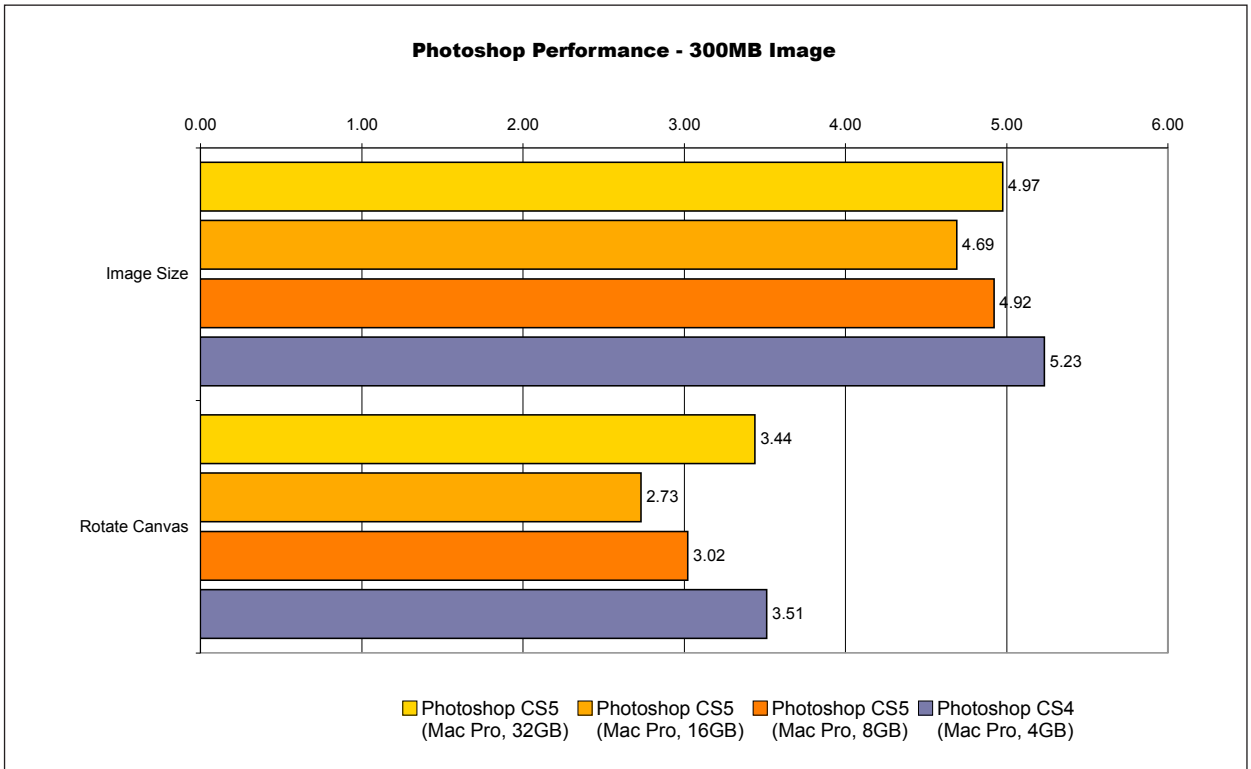
Pfeiffer Consulting 01001011	Client: Adobe	Project: Adobe Photoshop CS5 64-bit Benchmarks
	Document: Complete Benchmark Report	

Charts: Complete Results – Memory Comparison

Charts: Complete Results – Memory Comparison	
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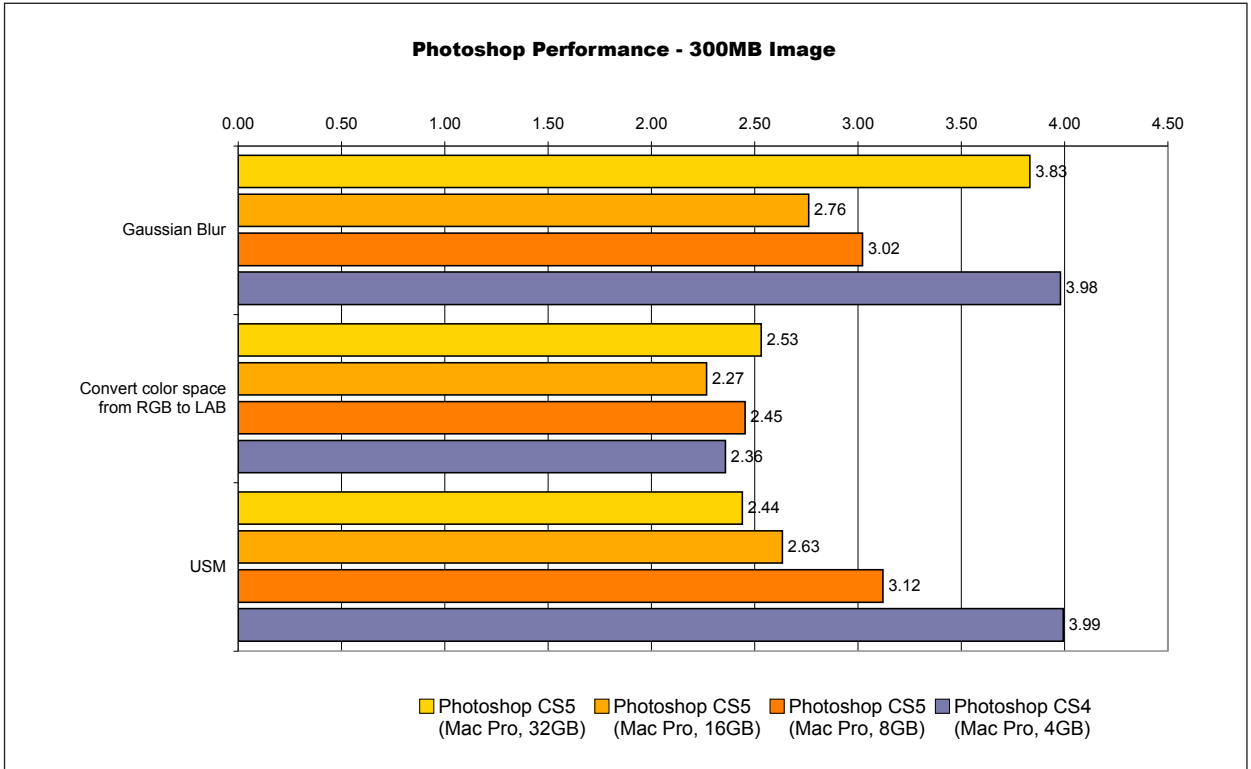


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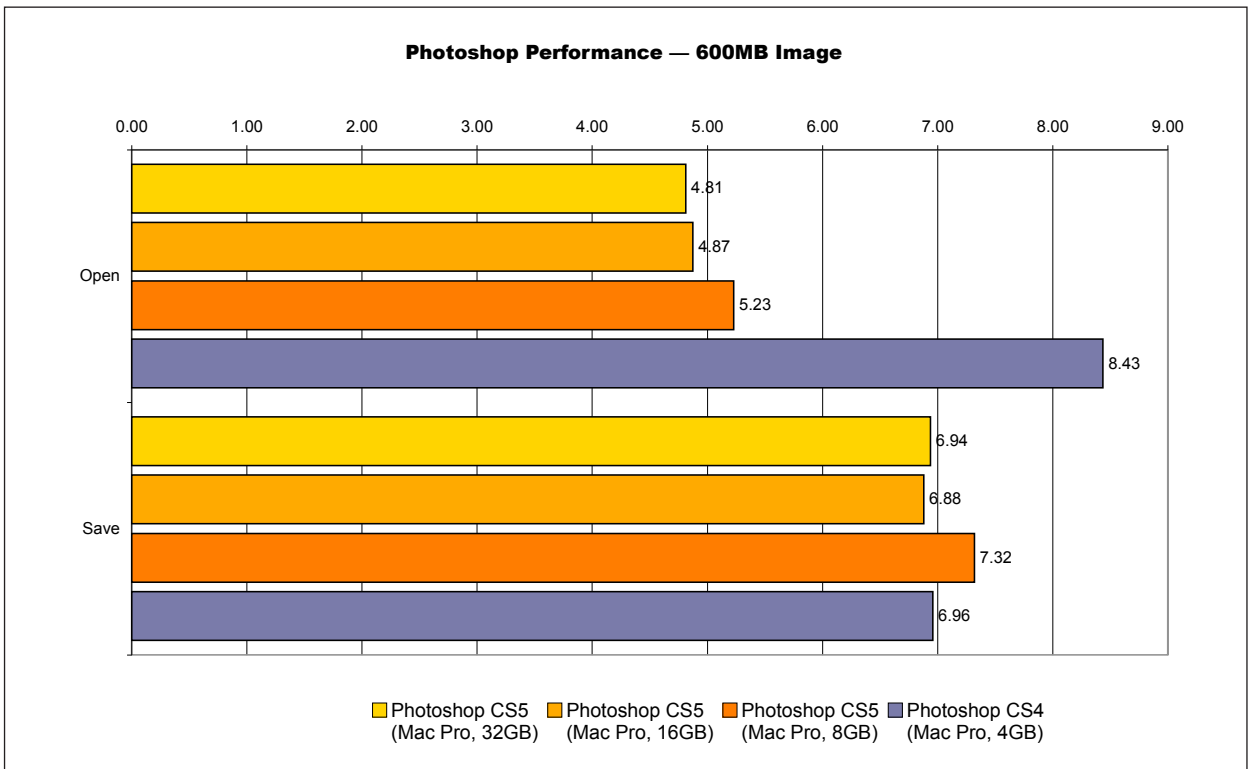


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Charts: Complete Results — Memory Comparison

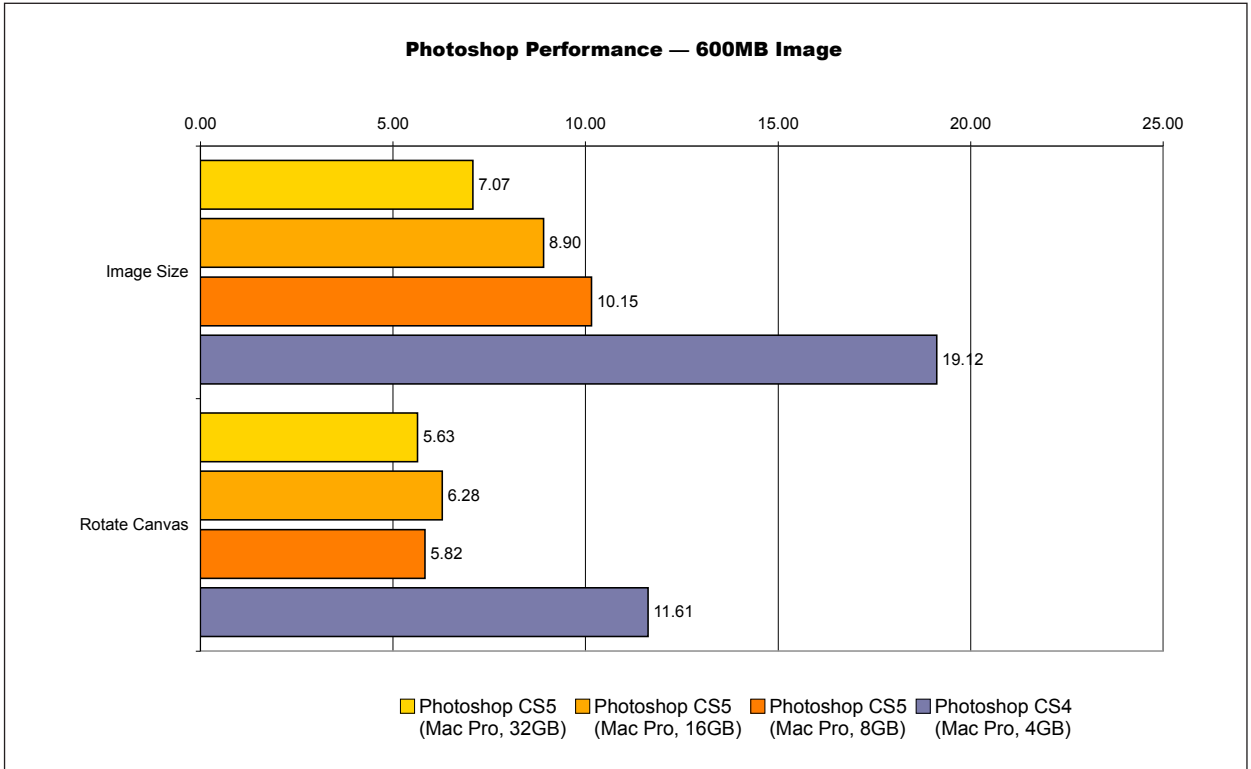


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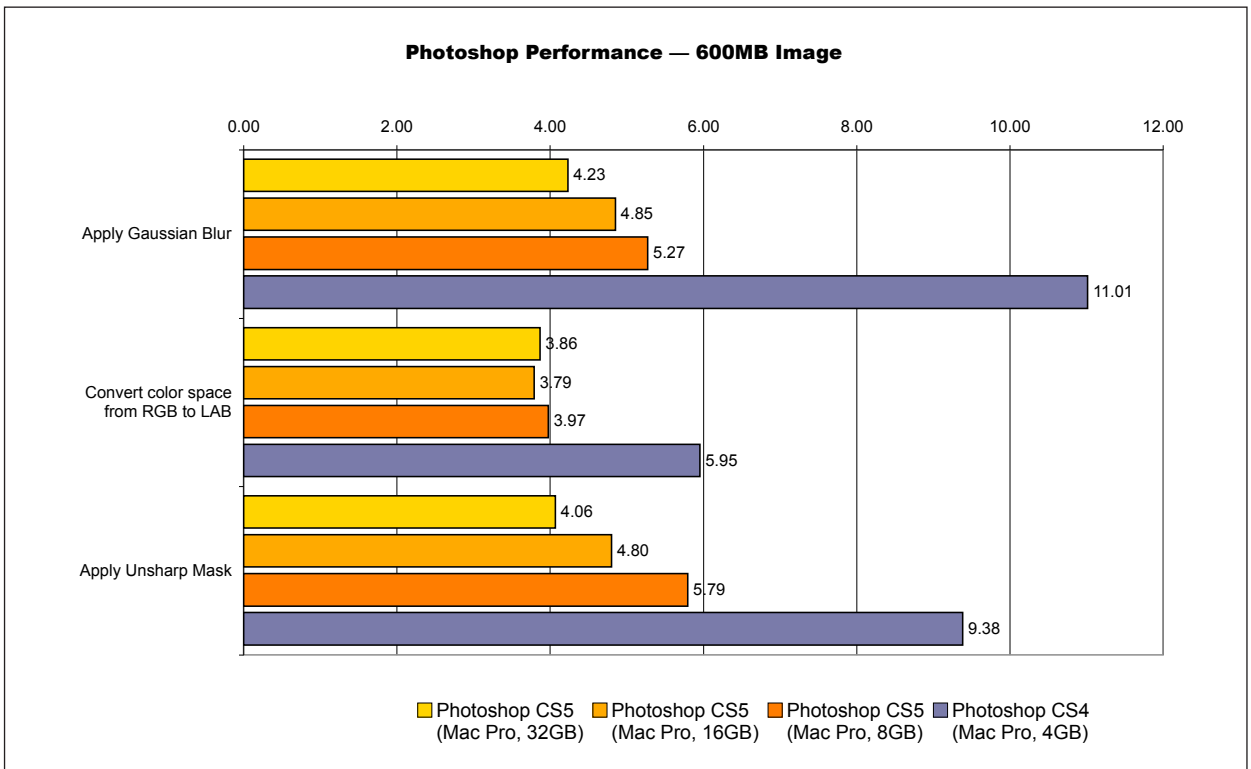


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Charts: Complete Results — Memory Comparison

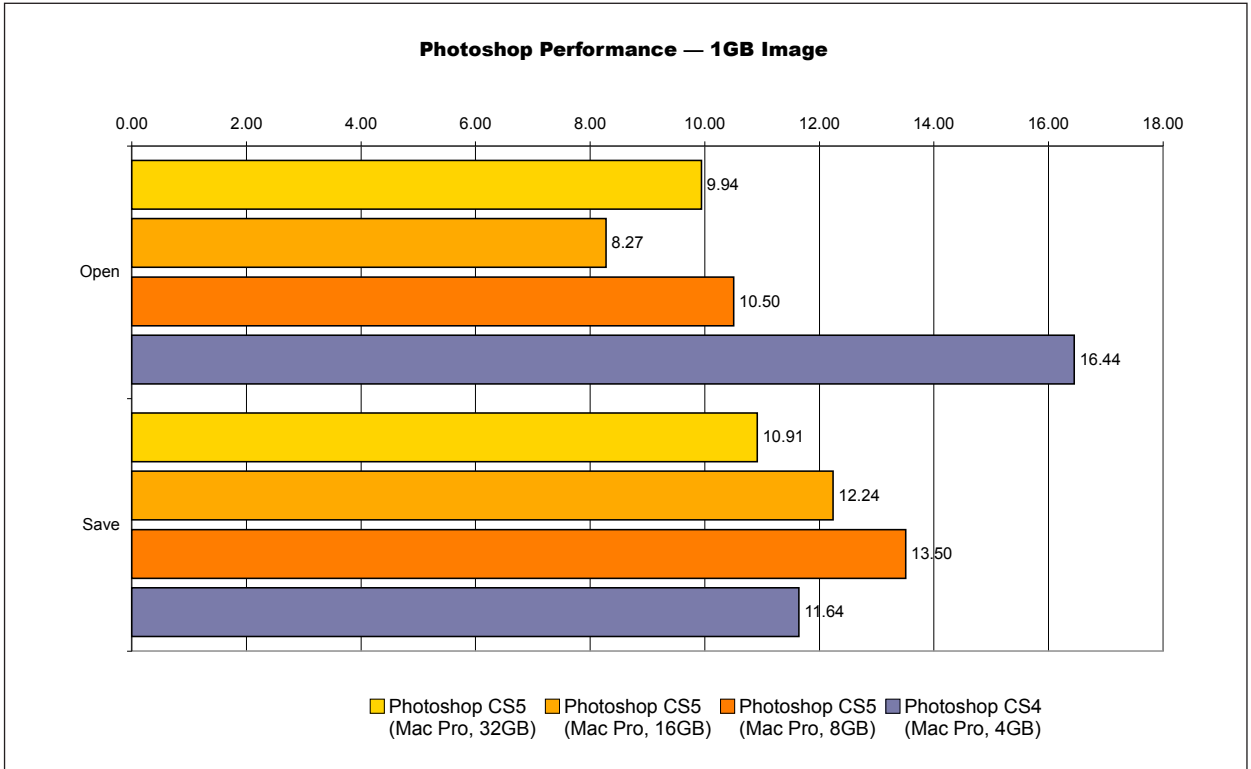


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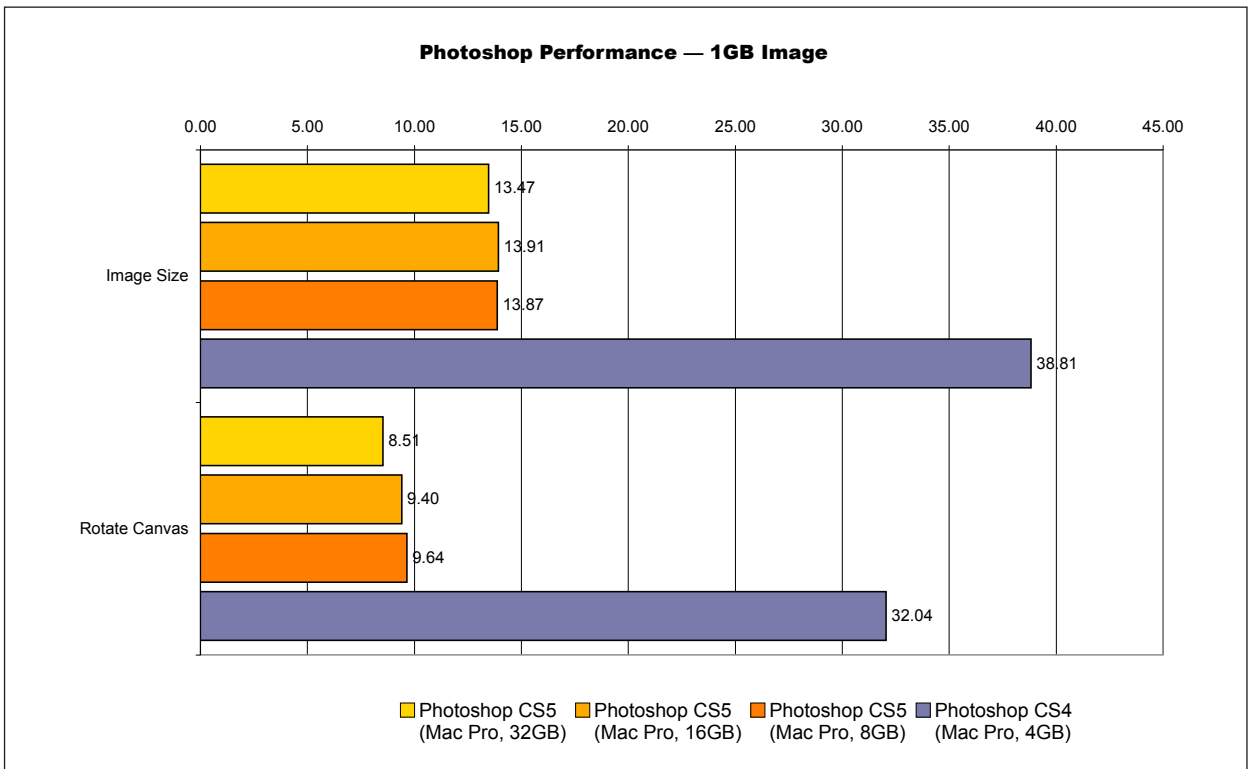


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Charts: Complete Results — Memory Comparison

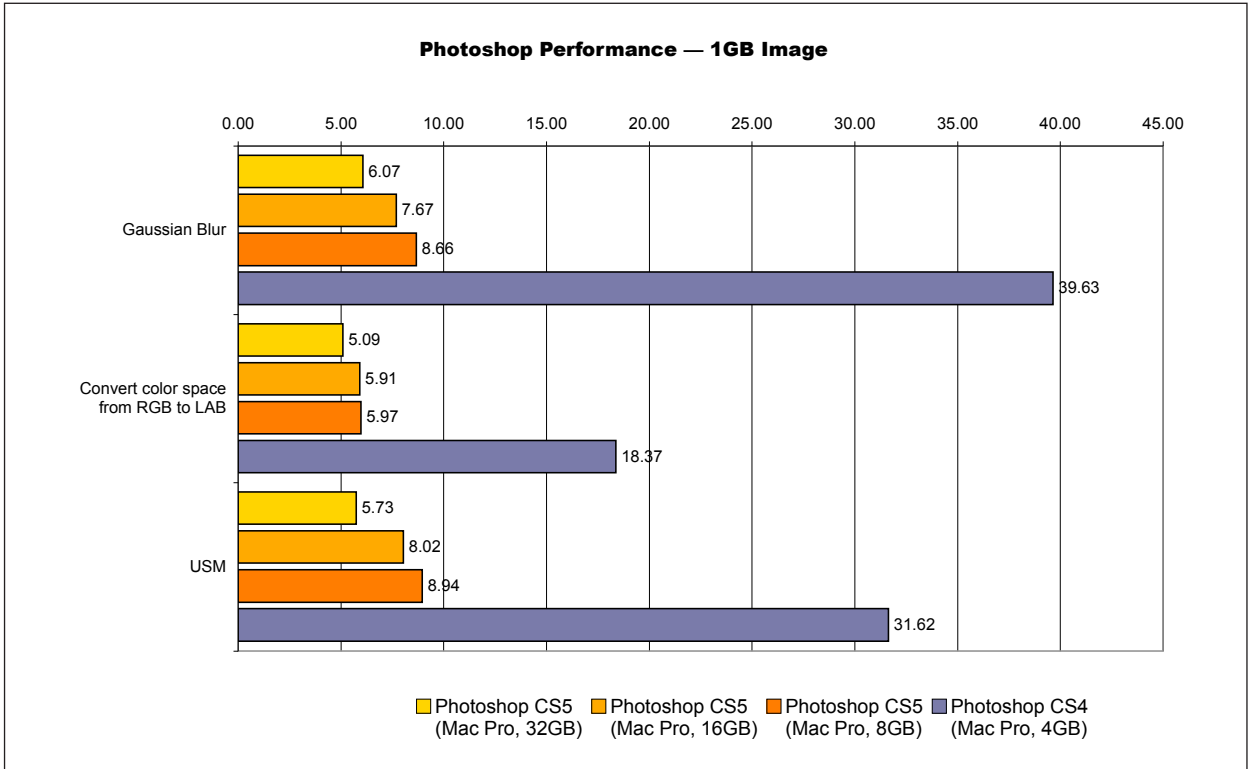


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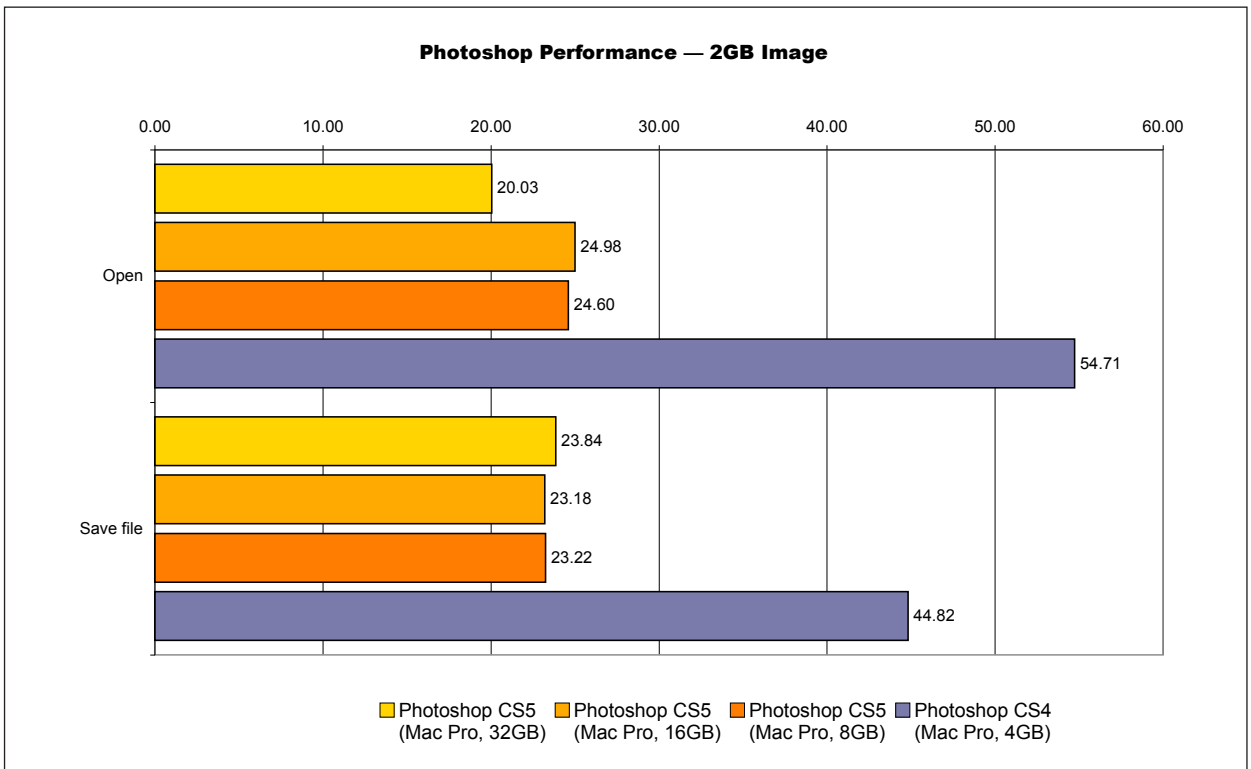


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Charts: Complete Results — Memory Comparison

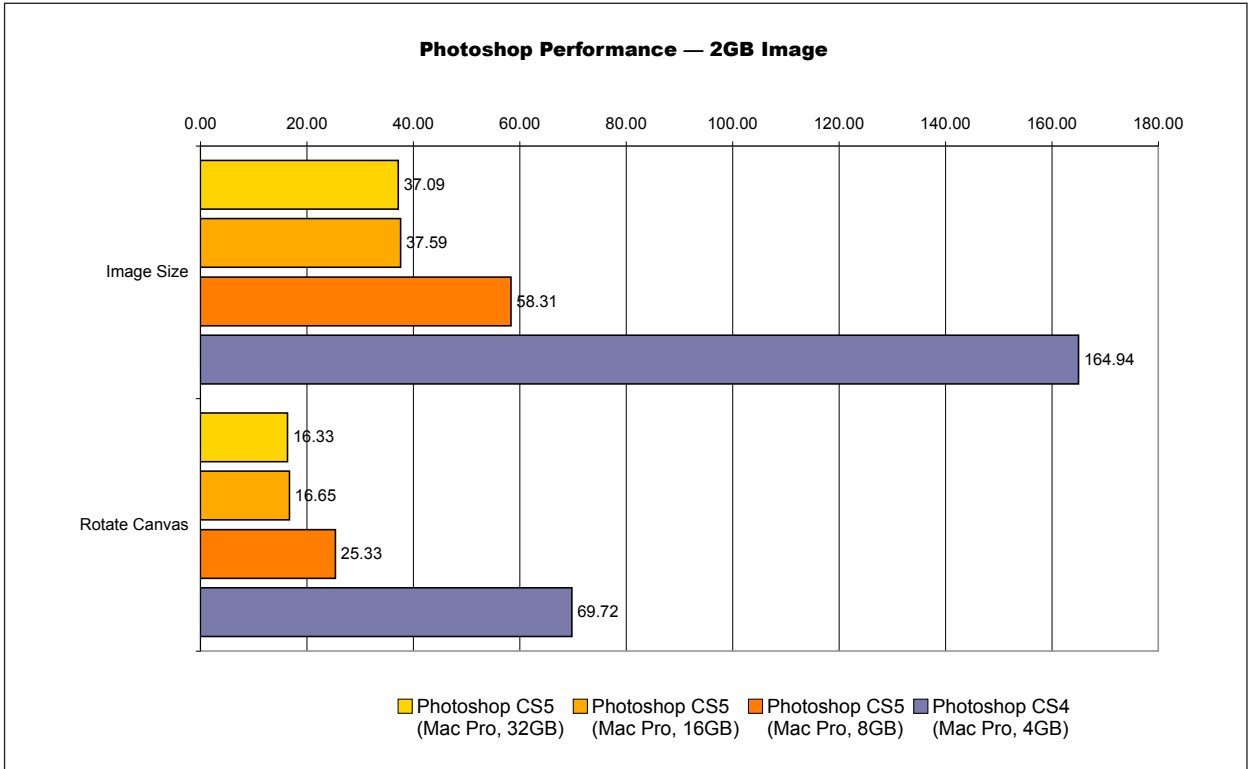


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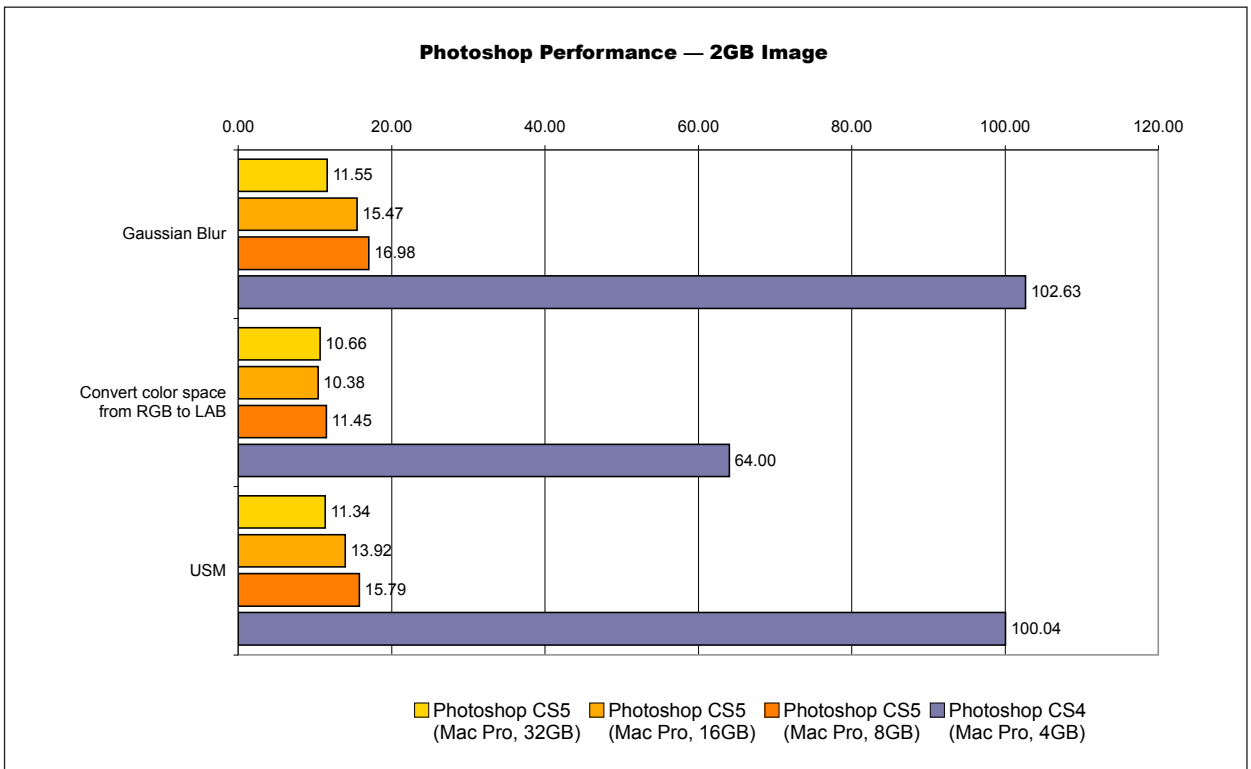


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Charts: Complete Results — Memory Comparison

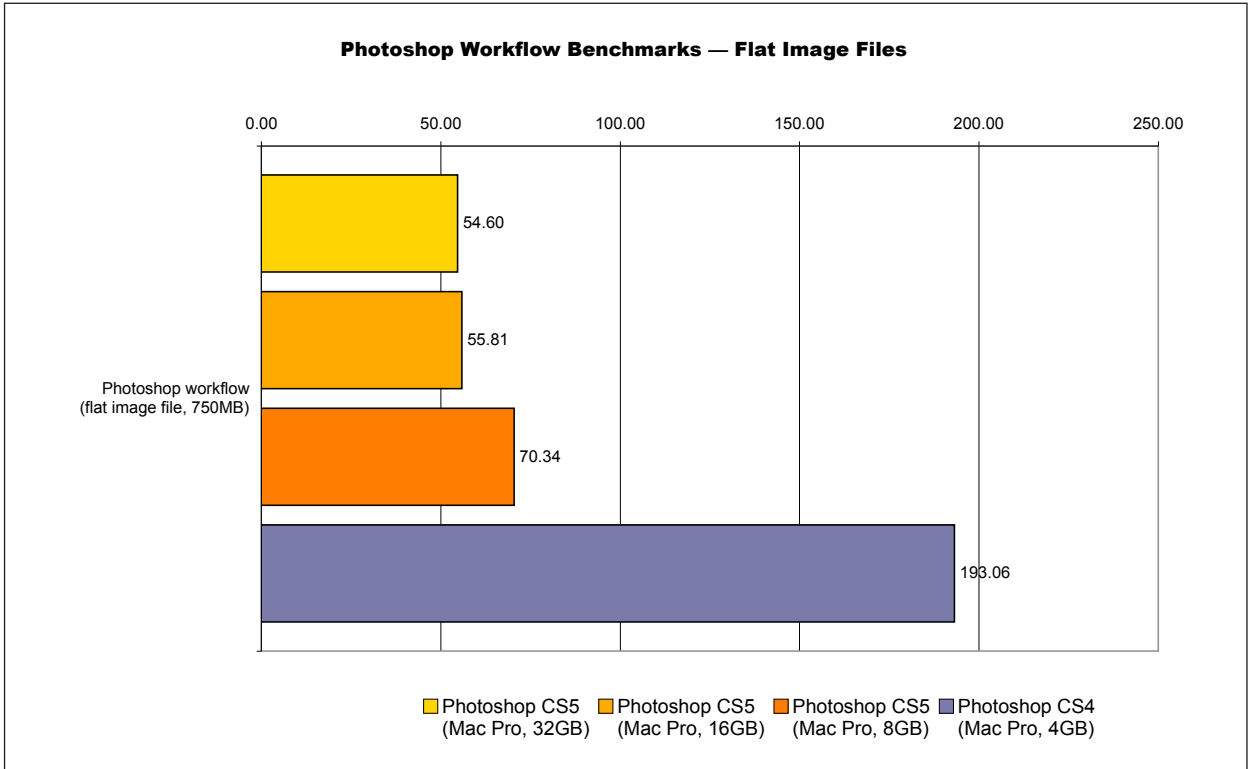


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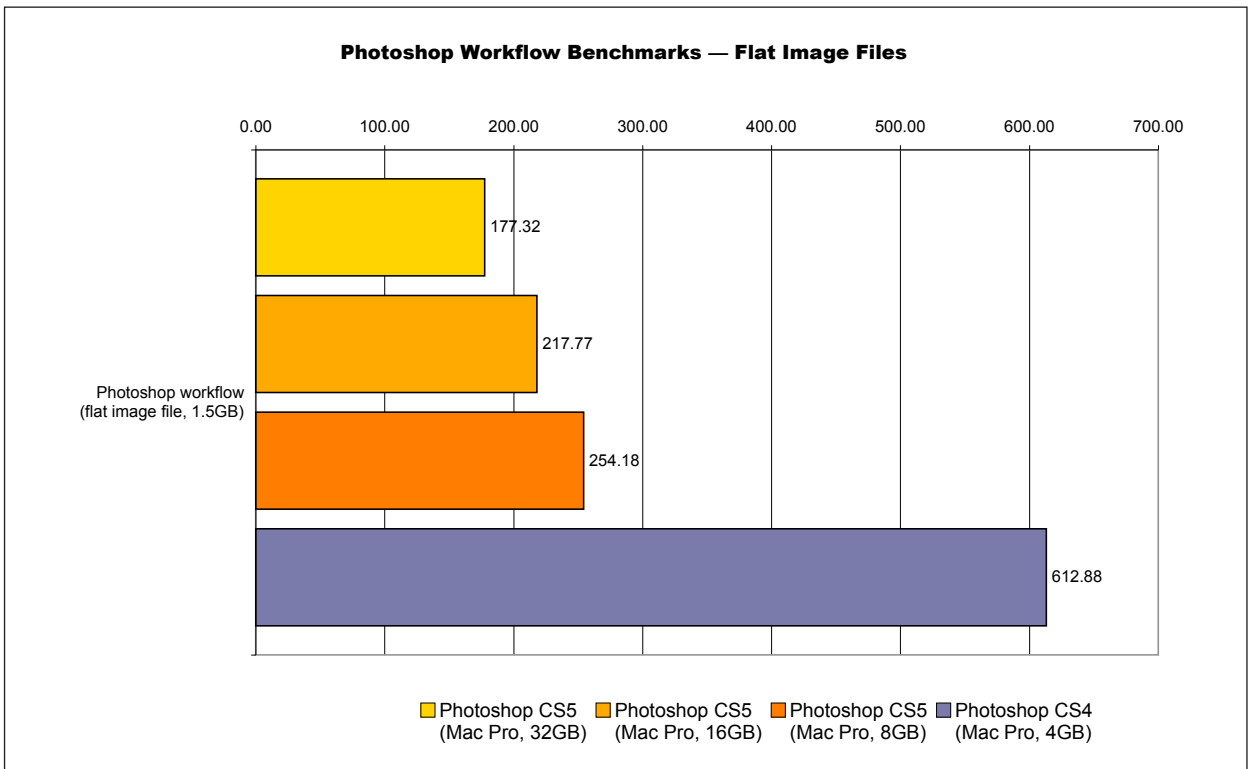


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Charts: Complete Results — Memory Comparison

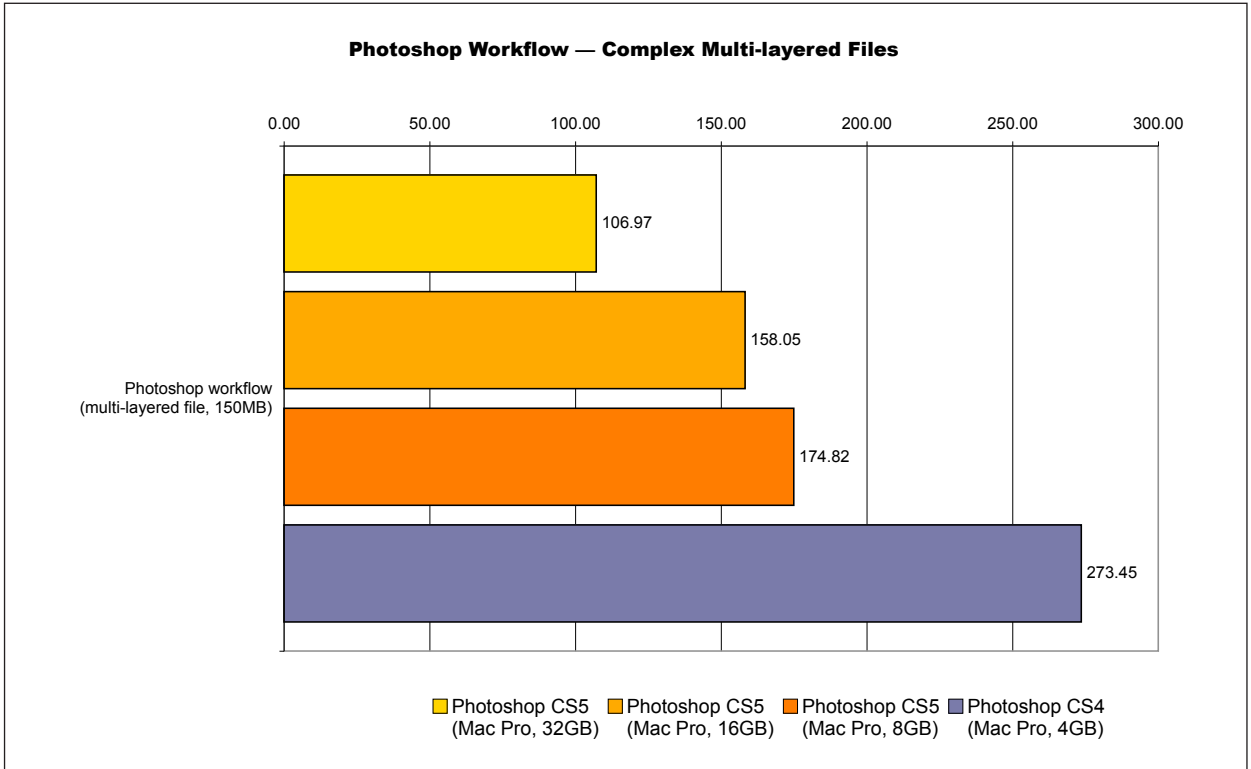


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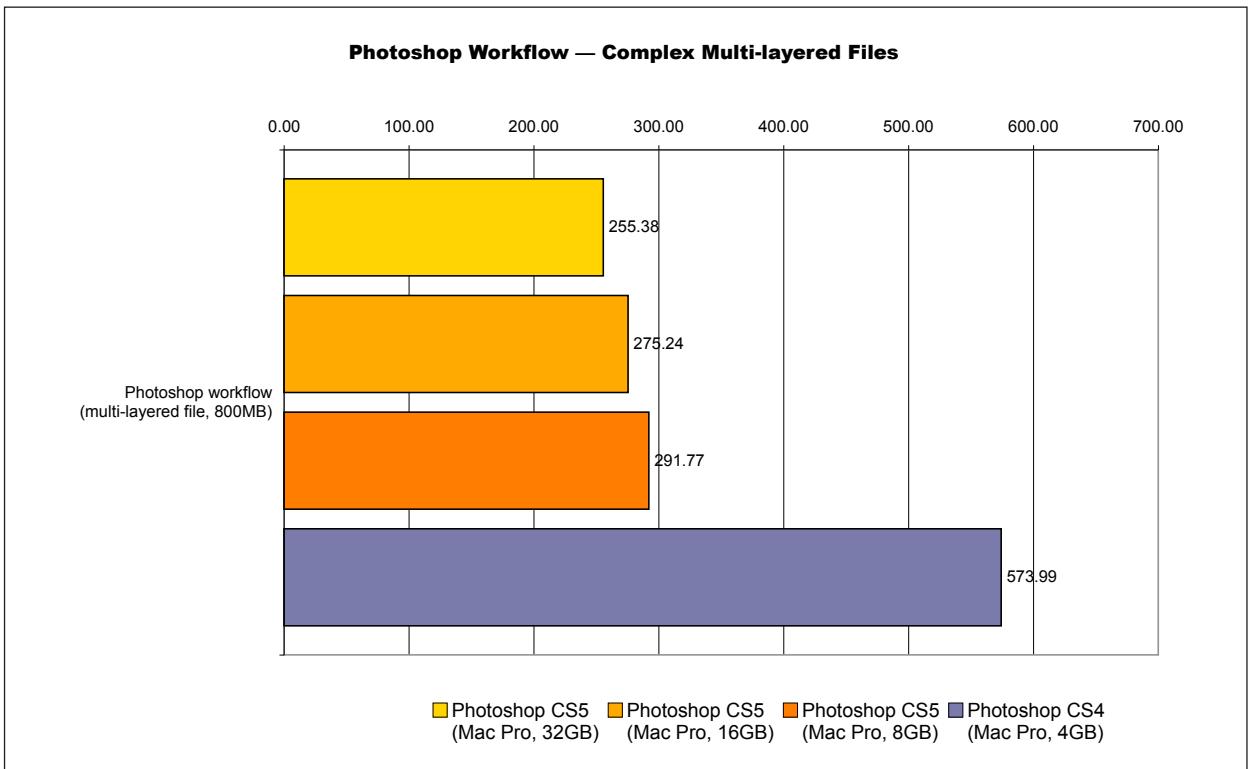


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Charts: Complete Results — Memory Comparison

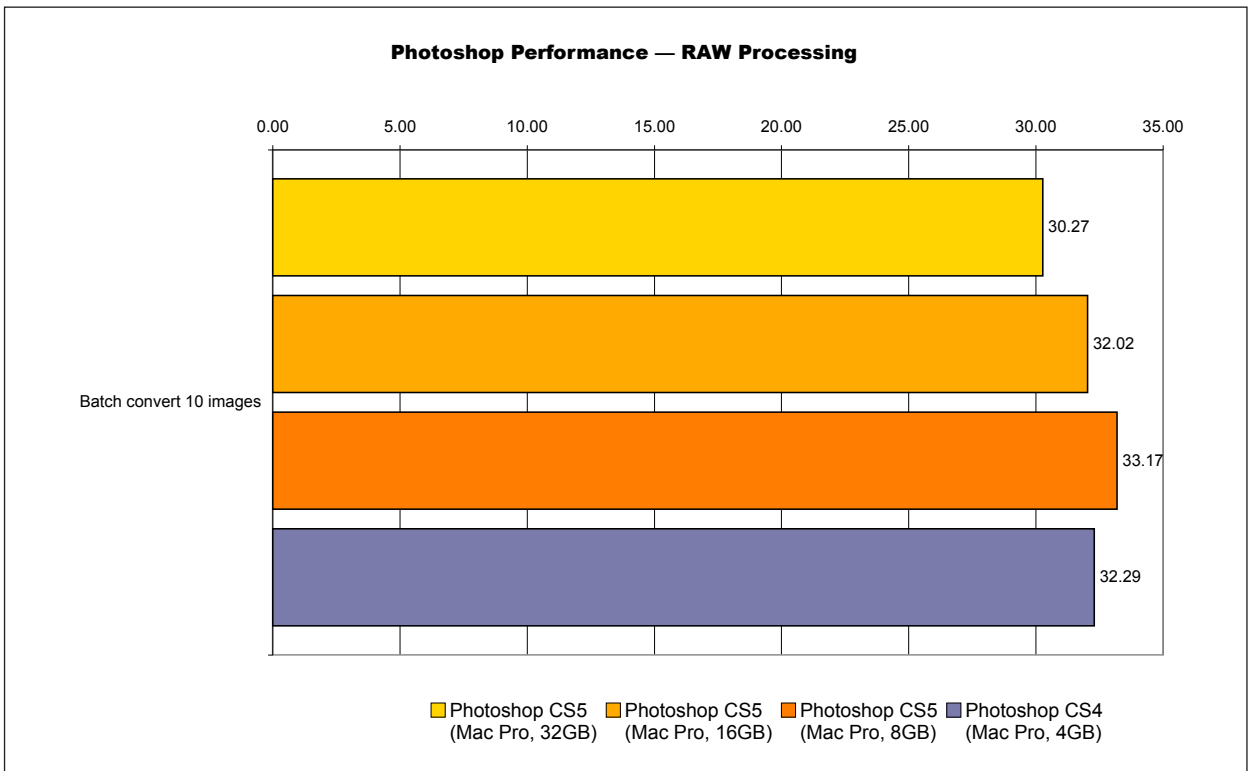
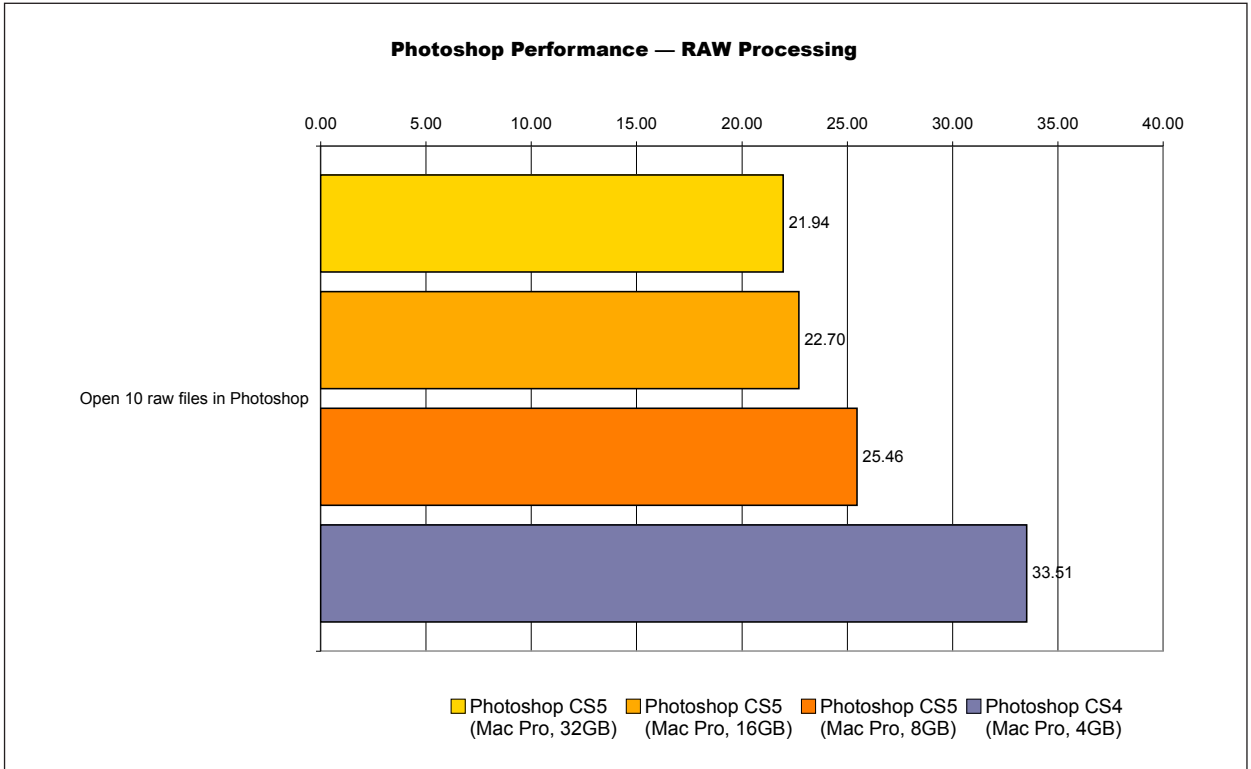


Time scale in seconds. Shorter is better.



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Charts: Complete Results — Memory Comparison



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