Better performance doesn't have to come with a higher price tag

Adding Intel Optane memory accelerated an HP EliteDesk 800 G4 more than doubling the RAM

Productivity gains plus lower hardware costs equal great savings

If you're a corporate IT buyer, providing employees with desktop systems that meet their application demands is a top priority. Every time an individual has to pause and wait for their computer, their workflow suffers, and they are no longer performing at top effectiveness. It's a false economy to cut corners when replacing their older systems, so it's wise to budget appropriately. But better performance doesn't have to come with a higher price tag.

Intel® Optane™ memory is a system accelerator that complements standard system memory (RAM) and can improve overall system responsiveness more than adding extra RAM.[1] At Principled Technologies, we conducted hands-on testing of two HP EliteDesk 800 G4 desktop configurations: one with 32GB RAM and the other with 16GB RAM and a 16GB Intel Optane memory module.[2] Across a wide range of tasks accessing frequently used applications and/or files, the configuration with 16GB RAM and Intel Optane outperformed the pricier 32GB RAM configuration, completing tasks in up to 87 percent less time.

We also analyzed the ownership costs a hypothetical company purchasing systems for 1,000 employees could expect. In our model, Intel Optane decreased costs by $4,296,348 over three years, with more than 90 percent of the savings coming from the value of improved productivity and the remainder from lower hardware expenditures.[4] As you weigh the upgrade options for desktop systems, that number could make your decision an easy one.

Up to **87%** **less time** to perform everyday tasks

15% **lower** purchase price

Potential savings of **$4,296,348** across 1,000 users over three years[3]

Stronger performance along with lower purchase price greatly reduces cost of ownership

For workers with high performance requirements, adding RAM is one way to boost the capabilities of a desktop system. RAM can be expensive, but having your highly paid employees waste time waiting for their computers to respond is costly as well. Intel Optane memory is another option for improving system performance.

We tested the performance of two upgrade options for the HP EliteDesk 800 G4 desktop:[5]

- Adding 16GB additional memory at $380 for a total cost of $2,012 (32GB RAM configuration)
- Adding a 16GB Intel Optane memory module at $74 for a total cost of $1,706 (16GB RAM + Intel Optane configuration)

On the next page, we present the results of our hands-on testing, where the HP EliteDesk 800 G4 with 16GB RAM + Intel Optane performed tasks as much as 87 percent faster than the 32GB RAM configuration.

In our cost analysis section, we combine our test results with estimates of worker compensation costs and the frequency with which different user groups would perform tasks. Between the 16GB RAM + Intel Optane configuration's better performance and its 15 percent lower hardware cost, a company choosing this option for 1,000 high-level employees could spend $4,296,348 less over three years than they'd spend on the 32GB RAM configuration.

Read on to learn more.

About Intel Optane

Intel Optane memory is an accelerator that creates a bridge between RAM and storage to boost system responsiveness. A PC equipped with low-cost hard drives and Intel Optane can deliver both speed and capacity—and it can outperform a more expensive system configured with extra RAM.

Learn more at https://www.intel.com/content/www/us/en/architecture-and-technology/optane-memory.html.

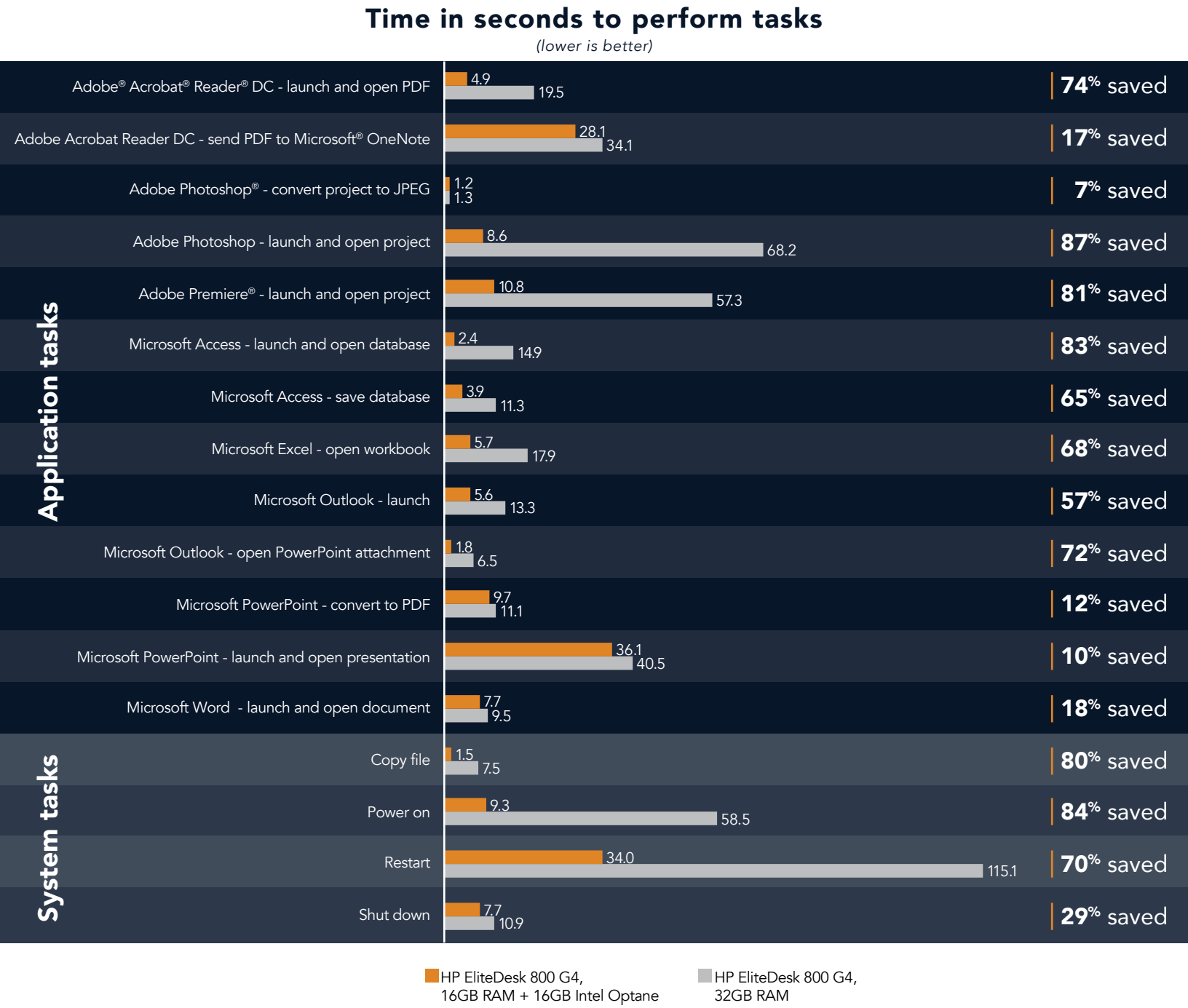
About the HP EliteDesk 800 G4

According to HP, the EliteDesk 800 G4 delivers "enterprise-class productivity, plus industry-leading reliability, security, and manageability." The HP EliteDesk 800 G4 is available in three form factors: Desktop Mini, Small Form Factor (which we used in our testing), and Tower. Learn more at https://www8.hp.com/us/en/elite-family/elitedesk-800.html.

Carry out tasks more quickly with Intel Optane memory

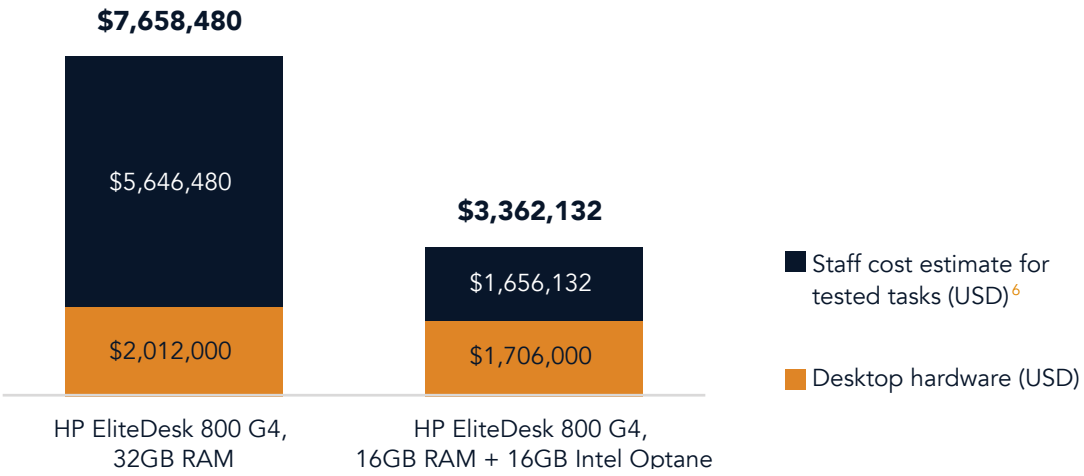
The chart below shows the time in seconds our two test systems took to complete a range of system and application tasks. The greatest improvements the 16GB RAM + Intel Optane configuration delivered were in powering on and restarting the system, copying files, and launching large graphics, video, and database files.

The time that the 16GB RAM + Intel Optane configuration saved ranged from 7.7 percent for converting a Photoshop project to JPEG to 87.4 percent for launching a Photoshop project. The average savings across the 17 tasks was 54.3 percent.



How the savings add up

Savings of $4,296,348 over three years with Intel Optane



We set out to estimate the productivity savings a company might yield from choosing the HP EliteDesk 800 G4 with16GB RAM + 16GB Intel Optane memory rather than the 32GB RAM configuration. To do so, we used a hypothetical organization shopping for desktop systems for 1,000 professional employees with robust computing requirements:[7]

- **100 communicators.** These workers primarily use office applications to work with email, documents, spreadsheets, and PDFs.
- **450 content creators**. This group uses specialized applications to create video and graphic content in addition to general office applications.
- **450 data analysts.** These employees work with specialized database applications for data analysis in addition to general office applications.

To meet the computing needs of these employees, the hypothetical organization is considering purchasing the HP EliteDesk 800 G4 with 32GB RAM (list price $2,012). However, by instead choosing the 16GB RAM + Intel Optane configuration (list price $1,706), the company saves in two ways: (1) by gaining employee productivity as a result of improved system and application performance and (2) by spending considerably less on hardware.

We looked at the list of tasks we tested and estimated the average frequency with which our three groups of employees would perform each task weekly. All 1,000 employees would power on and restart their systems and perform tasks related to working with email, documents, spreadsheets, and PDFs. Those in the content creation and data analysis roles would also perform tasks using specialized applications.[8]

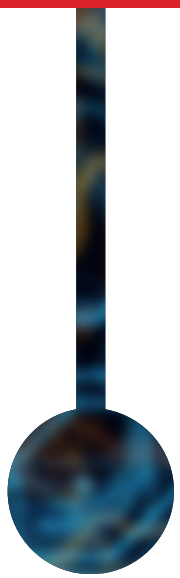
We calculated the weekly productivity cost for each task on each device by multiplying the following:

- Task frequency per week across all 1,000 users
- Median time (in seconds) to complete the task
- Cost per second (calculated from estimated employer expenditure for salary and benefits)[9]

We then added the costs per task and device and multiplied this number by the total number of workweeks in three years. The table below shows the final productivity cost results along with the hardware costs. We combined these two numbers to determine the total expenditures. For the full details of how we conducted our cost analysis, see the science addendum to this report.

	HP EliteDesk 800 G4, 32GB RAM	HP EliteDesk 800 G4, 16GB RAM + 16GB Intel Optane	Estimated savings with Intel Optane
Productivity cost estimate for 1,000 users over 3 years for tested tasks (USD)	$5,646,480	$1,656,132	$3,990,348
Desktop hardware costs for 1,000 systems (USD)	$2,012,000	$1,706,000	$306,000
Total cost	$7,658,480	$3,362,132	$4,296,348

As the table above shows, the three-year cost for these 1,000 workers in our model was $4,296,348 lower for the HP EliteDesk 800 G4 with 16GB RAM + 16GB Intel Optane than it was for the 32GB RAM configuration.



Conclusion

Many different fields use some form of the adage "Good, fast, cheap—pick two." In other words, purchasing a good or service usually requires tradeoffs. As we learned through our hands-on performance testing and our cost analysis, however, Intel Optane memory brings to mind another adage: "There's an exception to every rule."

An HP EliteDesk 800 G4 with 16GB RAM + 16GB Intel Optane memory performed system and application tasks so much more quickly than the 32GB RAM configuration that a company could save $3,990,348 in productivity improvements alone across 1,000 users over three years. When you add in the Intel Optane configuration's lower price tag, the savings skyrocket to $4,296,348, or more than $4,000 per employee. Sometimes, you really can have it all.

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1 Intel Optane memory (cache) is sold separately. Intel Optane memory system acceleration does not replace or increase the DRAM in your system. Available for HP commercial desktops and notebooks and for select HP workstations (HP Z240 Tower/SFF, Z2 Mini, ZBook Studio, 15 G5, and 17 G5) and requires a SATA HDD, 7th Gen or higher Intel Core™ processor or Intel Xeon® processor E3-1200 V6 product family or higher, BIOS version with Intel Optane supported, Microsoft Windows® 10 version 1703 or higher, M.2 type 2280-S1-B-M connector on a PCH Remapped PCIe Controller and Lanes in a x2 or x4 configuration with B-M keys that meet NVMe™ Spec 1.1, and an Intel Rapid Storage Technology (Intel RST) 15.5 driver.

2 For complete configuration details of these two systems, see the science addendum to this report.

3 Based on the cost analysis we discuss on pages 4 and 5 and detail in the science addendum to this report.

4 We have based the results of the calculations on a combination of a variety of features and functionalities under comparison and use industry figures and/or costs to determine the potential ROI savings customers may derive from the use of the HP products. We present these values not to represent actual savings a customer may expect to see but solely to illustrate potential savings. Many factors and variables may affect whether any customer sees any potential savings.

5 Compared to an HP EliteDesk 800 G4 with 16GB RAM and a list price of $1,632. Source for pricing: HP online store, accessed October 25, 2018, https://store.hp.com/us/en.

6 See endnote 4.

7 For a detailed discussion of our assumptions and approach, see the science addendum to this report.

8 The science addendum to this report provides a detailed table presenting the weekly frequency of tasks for each group of workers.

9 We arrived at the $48.39 hourly employer cost by starting with a $60.49 hourly employer cost for the "Management, professional and related" occupational group, from a September 2018 news release from the Bureau of Labor Statistics that reports data from June 2018: https://www.bls.gov/news.release/pdf/ecec.pdf (accessed October 25, 2018). Because not every minute or second of saved time increases productivity, we used 80 percent of this figure.

Read the science behind this report at http://facts.pt/mq0buag ▶

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For additional information, review the science behind this report.

This project was commissioned by HP.