



## An HP EliteDesk 800 G4 with Intel Optane memory outperformed three configurations with twice as much RAM (Summary report)

Increased productivity and lower hardware costs add up to major savings

Selecting desktop systems for your employees usually involves striking a balance between cost and performance. You don't want to spend more than necessary, but you can't afford to have your employees waste time waiting for applications to respond. What if you were considering two systems and the speedier one had a lower price?

Intel® Optane™ memory is a hard drive accelerator that complements standard system memory (RAM).<sup>1</sup> At Principled Technologies, we conducted hands-on testing that showed that an HP EliteDesk 800 G4 desktop system with 16GB RAM and 16GB Intel Optane memory delivered better responsiveness than two current systems with 32GB RAM and higher price tags. It also outperformed an older system with 32GB RAM.<sup>2</sup>

Across a range of tasks, the Intel Optane configuration completed tasks in less time than the three RAM-only configurations, as much as 87 percent less. The time saved translates to dollars saved through improved employee productivity. When we factor in the lower price of the configuration with Intel Optane, the savings increase. Read on to learn how the HP EliteDesk 800 G4 with Intel Optane could help your organization.

Across 1,000 users over 3 years, the HP EliteDesk 800 G4 with Intel Optane memory could save...<sup>3</sup>

**\$4.2M**

vs. HP EliteDesk 800 G4  
with 32GB RAM  
(productivity + purchase price)

**\$4.7M**

vs. HP EliteDesk 800 G3  
with 32GB RAM  
(productivity + purchase price)

**\$3.5M**

vs. HP EliteDesk 800 G1  
with 32GB RAM  
(productivity only)

## Performance improves productivity

Adding RAM to a desktop system is one way to boost its performance. RAM can be expensive, but having your employees waste time waiting for their computers to respond also costs your organization in terms of decreased productivity. Another option for improving system performance is Intel Optane memory, which can be considerably less expensive than adding RAM.

To explore the performance these two upgrade approaches can deliver, we tested four systems:

- A current HP EliteDesk 800 G4 with 16GB RAM and 16GB Intel Optane memory
- A current HP EliteDesk 800 G4 with 32GB RAM
- A last-generation HP EliteDesk 800 G3 with 32GB RAM (still available for sale)
- A four-year-old HP EliteDesk 800 G1 with 32GB RAM

We performed a series of tasks on each system and measured the time to complete them. We then performed a productivity cost analysis that combines our test results with estimates of worker compensation costs and the frequency with which different user groups would perform tasks.

In this summary report, we answer three questions:

- How much could a company save through increased productivity and lower hardware expenditures by selecting the HP EliteDesk 800 G4 with 16GB RAM and 16GB Intel Optane memory rather than the HP EliteDesk 800 G4 with 32GB RAM?
- How much could a company save through increased productivity and lower hardware expenditures by selecting the HP EliteDesk 800 G4 with 16GB RAM and 16GB Intel Optane memory rather than the last-generation HP EliteDesk 800 G3 with 32GB of RAM?
- How much could a company save through increased productivity by replacing four-year-old HP EliteDesk 800 G1 systems with 32GB RAM with new HP EliteDesk 800 G4 systems with 16GB RAM and 16GB Intel Optane memory?

## About this summary report

This report summarizes three individual Principled Technologies reports, each focusing on one of the three comparisons we present here:

- Adding Intel Optane memory accelerated an HP EliteDesk 800 G4 more than doubling the RAM
- Intel Optane memory made an HP EliteDesk 800 G4 desktop faster and less expensive than an older desktop that has more RAM
- Upgrading 1,000 users to new HP EliteDesk 800 G4 desktops with Intel Optane memory could save millions in productivity costs over three years

## 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>.

## How we analyzed the savings that come with increased productivity<sup>4</sup>

We used a hypothetical organization shopping for desktop systems for 1,000 professional employees with robust computing requirements:

- **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.

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.<sup>5</sup>

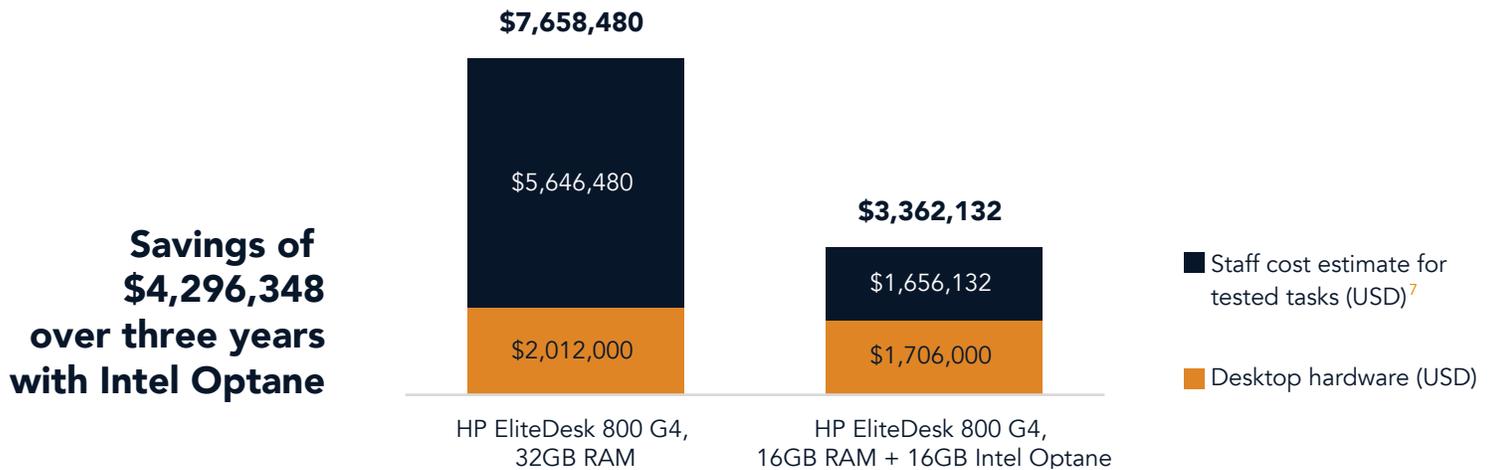
We calculated the weekly productivity cost for each task on each device by multiplying the following:

- 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)<sup>6</sup>

To determine the productivity costs of each system, we added the costs per task and device and multiplied this number by the total number of weeks in three years.

## How much could a company save by selecting the HP EliteDesk 800 G4 with Intel Optane rather than the HP EliteDesk 800 G4 with 32GB RAM?

As the chart below shows, by choosing the Intel Optane configuration of the current-generation HP EliteDesk 800 G4 instead of the version with 32GB RAM, a hypothetical company buying 1,000 systems could save more than \$4.2M over three years. The great majority of the savings (around \$3.9M or 93 percent) comes from increased employee productivity as a result of improved system and application performance. Lower hardware costs account for the remaining savings.



The table below breaks down the hardware cost of the two systems.

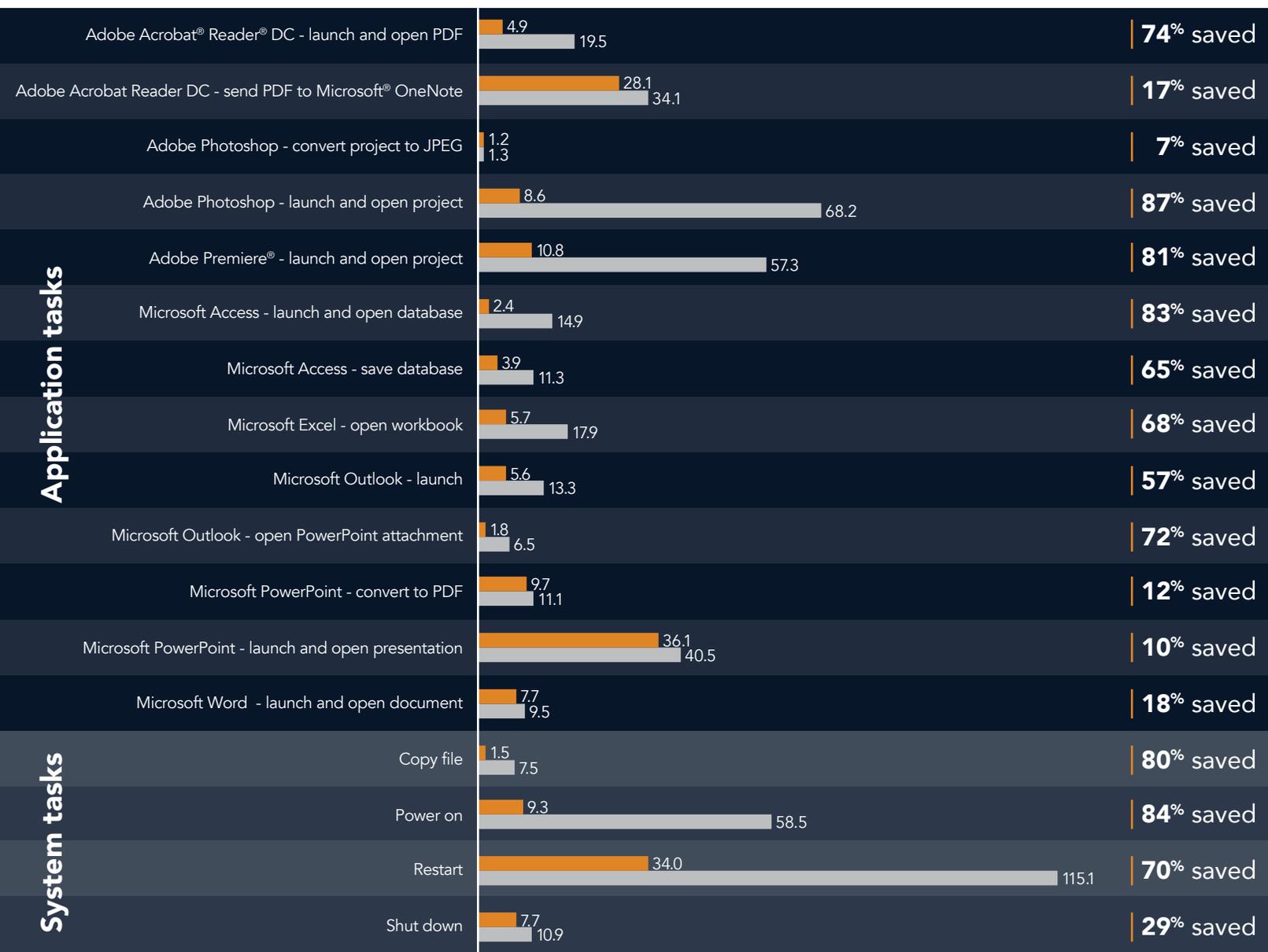
	HP EliteDesk 800 G4, 32GB RAM	HP EliteDesk 800 G4, 16GB RAM + 16GB Intel Optane
Cost of system with 16GB RAM	\$1,632	\$1,632
Cost of additional memory	16GB RAM	16GB Intel Optane
	\$380	\$74
Total cost	\$2,012	\$1,706

## Time saved on tasks

The chart below shows the time in seconds the two current-generation 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 Intel Optane configuration saved ranged from 7.7 percent for converting an Adobe® Photoshop® project to JPEG to 87.4 percent for launching a Photoshop project, with 11 of the 17 tasks taking less than half the time than they did on the all-RAM configuration.

### Time in seconds to perform tasks

(lower is better)

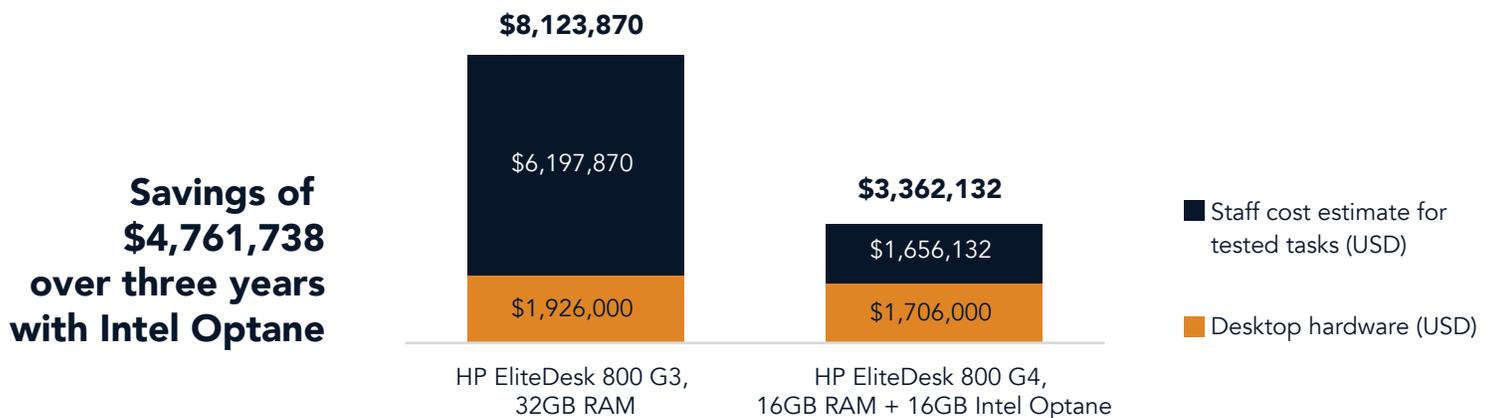


■ HP EliteDesk 800 G4, 16GB RAM + 16GB Intel Optane
 ■ HP EliteDesk 800 G4, 32GB RAM

## How much could a company save by selecting the HP EliteDesk 800 G4 with Intel Optane memory rather than the last-generation HP EliteDesk 800 G3 with 32GB RAM?

Companies sometimes attempt to get more for their money by purchasing last year's model. You might think that doubling the RAM of a previous-generation HP EliteDesk 800 G3 to 32GB would be a good strategy. However, as the chart below shows, by choosing the Intel Optane configuration of the current-generation HP EliteDesk 800 G4 instead, a hypothetical company buying 1,000 systems could save over \$4.7M over three years. The great majority of the savings (around \$4.5M or 95 percent) comes from increased employee productivity as a result of improved system and application performance. Lower hardware costs account for the remaining savings.

The table below breaks down the cost of the two systems.



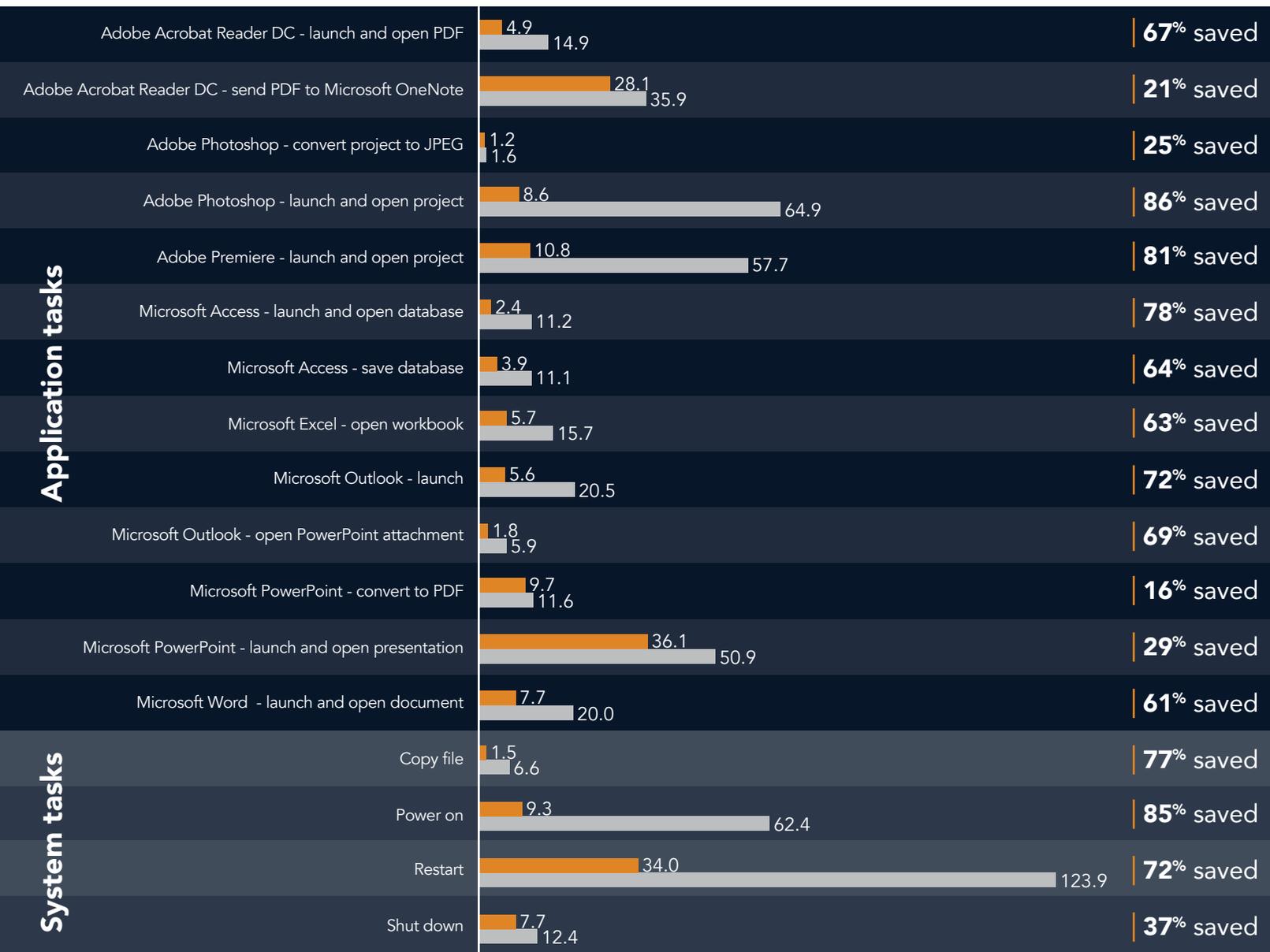
	HP EliteDesk 800 G3	HP EliteDesk 800 G4, 16GB RAM + 16GB Intel Optane
Cost of system with 16GB RAM	\$1,546	\$1,632
Cost of additional memory	16GB RAM	16GB Intel Optane
	\$380	\$74
Total cost	\$1,926	\$1,706

## Time saved on tasks

The chart below shows how long last year's HP EliteDesk 800 G3 with 32GB RAM and this year's model with Intel Optane needed to complete our 17 system and application tasks. The EliteDesk 800 G4 with Intel Optane delivered especially strong results when launching Adobe apps, saving 56.3 seconds (86.7 percent) on Photoshop and 46.9 seconds (81.2 percent) on Premiere. For system tasks, even with 32 GB of RAM, the EliteDesk 800 G3 needed more than a minute to power on. The G4 device with Intel Optane booted in just over nine seconds. For 12 of the 17 tasks, the Intel Optane configuration got the job done in less than half the time.

### Time in seconds to perform tasks

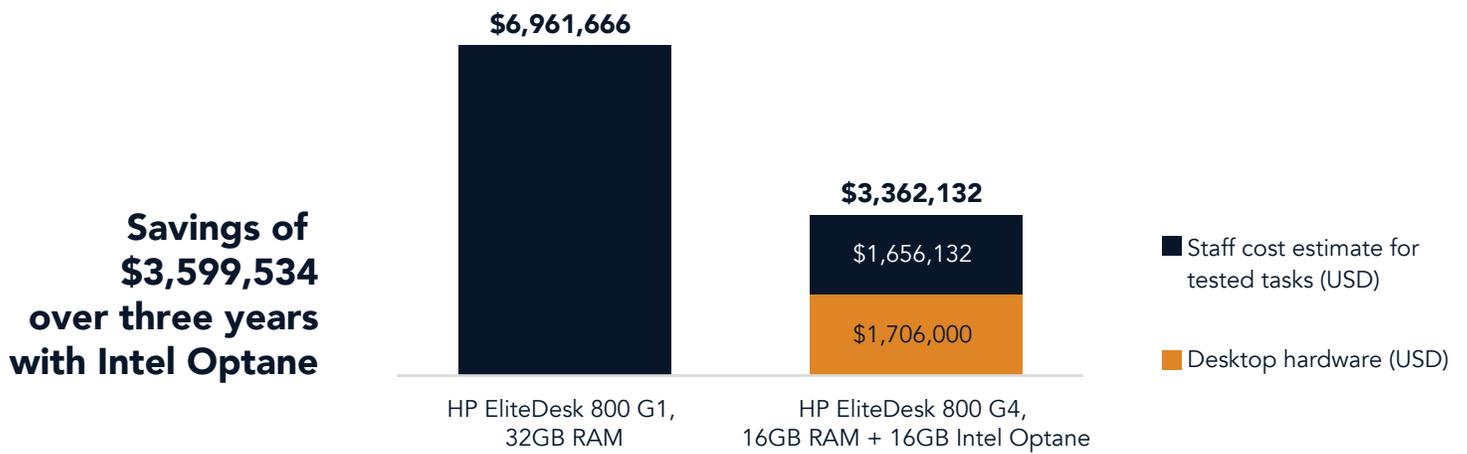
(lower is better)



■ HP EliteDesk 800 G4, 16GB RAM + 16GB Intel Optane
 ■ HP EliteDesk 800 G3, 32GB RAM

# How much could a company save by replacing four-year-old HP EliteDesk 800 G1 systems with 32GB RAM with new HP EliteDesk 800 G4 systems with Intel Optane?

A cost-conscious company might believe that keeping older desktops in service until they become unusable would save money in the long run. However, our testing demonstrated that by replacing older G1 EliteDesk systems with the current-gen model with Intel Optane memory, a company could make enormous gains in employee productivity due to improved performance. As the chart below shows, our hypothetical company would save more than \$3.5M across 1,000 employees over three years by replacing older systems, even after accounting for the purchase price of the new systems. (The productivity savings of \$5.3M more than make up for the \$1.7M hardware expenditure.)

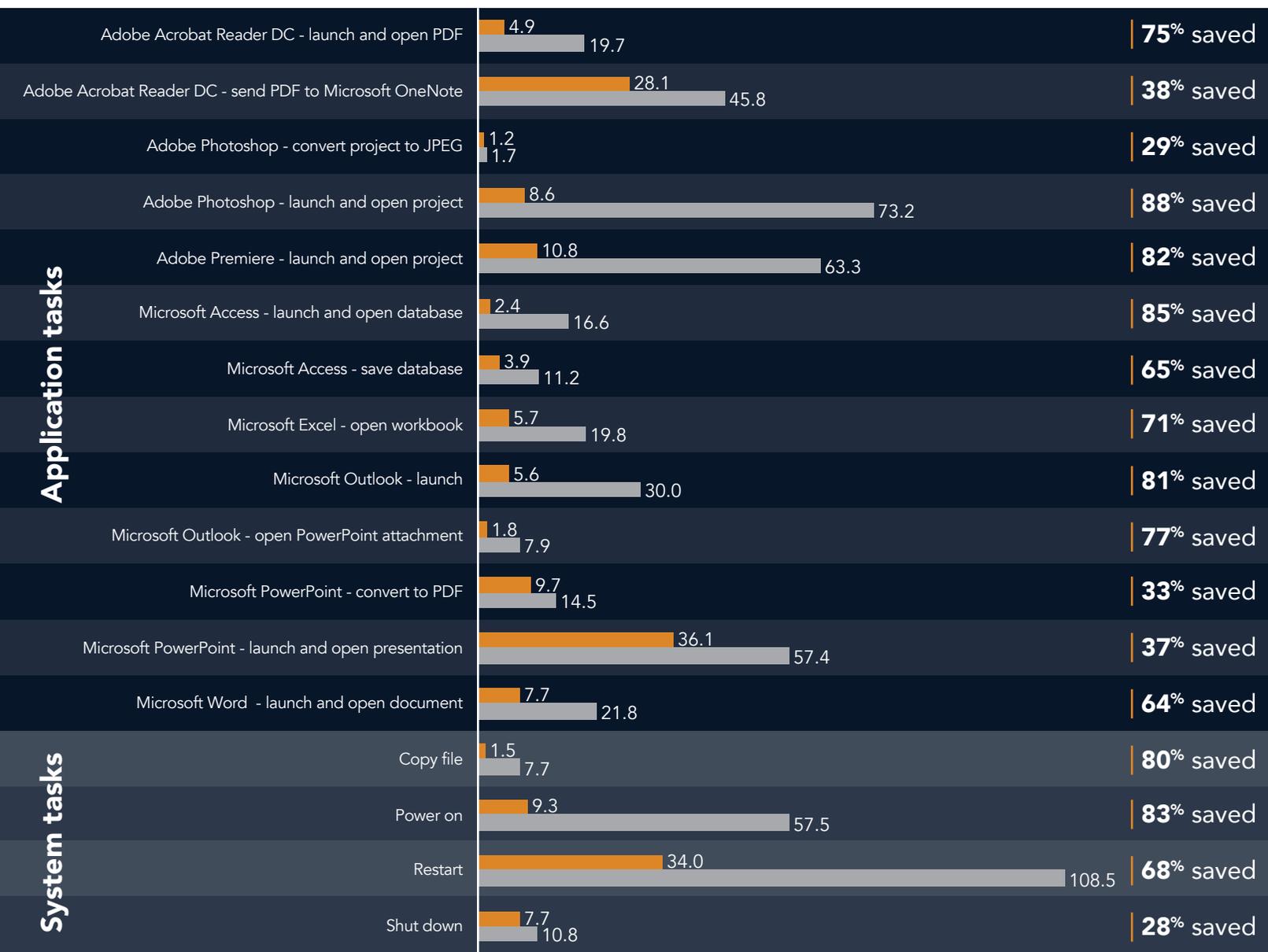


## Time saved on tasks

As the chart below shows, the HP EliteDesk 800 G4 with Intel Optane delivered especially strong results when launching Adobe apps, saving 64.6 seconds (88.2 percent) for Photoshop and 52.5 seconds (82.9 percent) for Premiere. For system tasks, it took nearly a minute for the EliteDesk 800 G1 to boot up—even with 32GB RAM. The G4 device with Intel Optane powered on in less than 10 seconds. For 12 of the 17 tasks, the Intel Optane configuration got the job done in less than half the time.

### Time in seconds to perform tasks

(lower is better)



■ HP EliteDesk 800 G4, 16GB RAM + 16GB Intel Optane
 ■ HP EliteDesk 800 G1, 32GB RAM

## Conclusion

If you're in business, you're used to making tradeoffs and you accept that better performance usually comes at a price. However, our study found the HP EliteDesk 800 G4 with 16GB RAM + 16GB Intel Optane memory to be an exception to this rule by consistently outperforming three other desktop systems with twice as much RAM. Whether you've already made the decision to purchase new systems for your employees or have been trying to eke another year or two out of aging desktops, these findings have great significance for you. By purchasing the Intel Optane configuration of the current EliteDesk model, you can give your employees great performance while also enjoying savings. Turns out that sometimes, you can have your cake and eat it too.

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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 the four systems, see the [science addendum](#) to this report.
  - 3 Based on the cost analysis we discuss on page 3 and detail in the [science addendum](#) to this report.
  - 4 For a detailed discussion of our assumptions and approach we used, see the [science addendum](#) to this report.
  - 5 The [science addendum](#) to this report provides a detailed table presenting the weekly frequency of tasks for each group of workers.
  - 6 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.
  - 7 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.

Read the science behind this report at <http://facts.pt/53eizhz> ►



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This project was commissioned by HP.