



Lower cost, more choice: The benefits of choosing all-Dell business laptops

Our analysis found that Dell laptops offer more choices for configuration, many at a lower cost than Apple, and that an all-Dell fleet can be simpler to manage than a mixed environment of Apple and Dell devices

10,000 Dell devices vs. 5,000 Apple/5,000 Dell devices



Up to **9.7% lower cost** without accessories with an all-Dell environment*

Up to **22.4% lower cost** with accessories with an all-Dell environment**

Individual Dell devices vs. Apple devices



Up to **38.6% lower cost per device** with accessories with Dell***

The COVID-19 pandemic had a disruptive impact on the supply chain and the workforce in what some have called “the Great Reshuffle.”¹ During this period of change, some organizations allowed employees to choose their own laptops, leading to mixed IT environments that include both Windows-based PCs and Apple® devices. Fast forward to 2023 and inflation, higher interest rates, and the threat of a looming recession are causing many organizations to look for ways to save money.² According to Forbes, reducing IT operating expenses can have a significant impact on costs.³ To help companies seeking to lower IT costs, we compared the 3-year cost of purchasing and maintaining all-Dell™ devices versus a mix of Apple and Dell devices. We used vendor quotes and public sources to compare the purchase price of the devices, as well as other costs associated with operating business laptops for a 3-year period, such as accessories, software, deployment, management, support, and security.

*Compared to a fleet comprising 50 percent Dell and 50 percent Apple devices. 3-year cost of ownership for a fleet of 10,000 devices includes OS, Microsoft Office, MDM, security, deployment, support/accidental damage coverage

**Compared to a fleet comprising 50 percent Dell and 50 percent Apple devices. 3-year cost of ownership for a fleet of 10,000 devices includes OS, Microsoft Office, MDM, security, deployment, support/accidental damage coverage, wireless keyboard, wireless mouse, and monitor

***Compared to Apple devices. Includes OS, Microsoft Office, MDM, security, deployment, support/accidental damage coverage, wireless keyboard, wireless mouse, and monitor

- 1 Srikanth Karra, “The Great Resignation As An Opportunity For The Great Reshuffle,” accessed June 9, 2023, <https://www.forbes.com/sites/forbeshumanresourcescouncil/2022/09/27/the-great-resignation-as-an-opportunity-for-the-great-reshuffle/?sh=64c6abc5a5e4>.
- 2 Kaveh Khorram, “The Importance Of A CIO During A Recession: How Cost Optimization Vendors Can Help,” accessed June 9, 2023, <https://www.forbes.com/sites/forbestechcouncil/2023/01/05/the-importance-of-a-cio-during-a-recession-how-cost-optimization-vendors-can-help/?sh=57df8399523c>.
- 3 Kaveh Khorram.

We compared the cost of two hypothetical enterprise deployments of 10,000 devices: one comprising 10,000 Dell devices and one comprising 5,000 Dell and 5,000 Apple devices. Our analysis found that the cost of purchasing and maintaining an all-Dell environment was up to 9.7 percent lower without accessories than the cost of a hybrid Dell/Apple environment. Including the cost of accessories, an all-Dell environment cost up to 22.4 percent less than the hybrid environment. For more details about our models and calculations, see Table 2 in this report. Additionally, in a hybrid IT environment comprising both Dell and Apple devices, organizations typically set up, staff, and provide separate management, support, and deployment solutions for both types of devices. In addition to the cost savings we discuss here, other qualities of a homogeneous IT environment could allow organizations to save even more money. We identified six areas where maintaining an all-Dell IT environment might be simpler and less expensive:

- Device configurability
- Manageability
- Deployment
- Support
- Security
- Software compatibility

Our model

Different roles within an organization come with different performance needs, and therefore require different laptops and accessories. For example, a traveling sales representative might benefit from a lightweight device but wouldn't necessarily need the high level of computational power that a data scientist or engineer would require. For our model, we priced devices at different performance levels and base the distribution on an organization with the need for 10,000 devices including baseline laptops, premier laptops, and workstations. The actual distribution of performance needs within a fleet of devices will vary from one organization to another, but for the purposes of this report, we used a model that includes a range of performance levels across a range of prices. We compared models that were available to purchase in May, 2023. See Table 2 for a more detailed breakdown.

Our model comprises three persona groups that represent the range and distribution of roles and performance needs an example organization contains.⁴ We made comparisons at three performance levels. The first comparison looks at devices configured for *producers*: typically individual contributors with lower performance needs, like marketing or human resources workers. The second comparison looks at devices configured for *specialists*: workers with high-performance needs, such as engineers, creatives, or data scientists. The third comparison looks at devices configured for *leaders*: executives who work in multiple spaces. For each of the three personas, Dell identified a Dell laptop configuration that meets the needs of that group, and a Apple MacBook Air® or Pro® for comparison. The pairings we used match screen size, memory, and storage to the degree possible. To calculate the cost of maintaining the environments over a 3-year period for a hypothetical fleet of 10,000 devices, we assume 70 percent of users would fall into the *producers* persona group, 20 percent of users would fall into the *specialists* persona, and 10 percent of users would fall into the *leaders* persona.

For the accessories in our model, we chose the Apple Magic Keyboard, Magic Mouse, and Apple's most affordable monitor. Dell offers a range of accessory options for business at a variety of price points. We chose a midrange Dell keyboard/mouse combination and a 27-inch 4K Dell monitor.

⁴ Dell provided us with the persona groups we used in this model.

Table 1: The specifications and costs associated with the devices in each of our three comparisons. Totals are per device and include management costs. Source: Principled Technologies.

	Producers (Baseline users, lower performance requirements)		Specialists (Creatives and designers etc., high-performance workloads)		Leaders (Execs, people working across different locations)	
	Dell configuration	Apple configuration	Dell configuration	Apple configuration	Dell configuration	Apple configuration
Device	Dell Latitude 3340 13 inch	MacBook Air 13	Dell Precision 5480 14 inch	MacBook Pro 14	Dell Latitude 7440 Laptop 14 inch	MacBook Pro 14
Configuration	13 th Gen Intel Core i5-1335U, 10 cores, 16GB RAM, 512GB SSD, Non-vPro	M2 8-Core CPU 8-Core GPU, 16GB RAM, 512GB SSD	13 th Gen Intel Core i7-13800H vPro, 14 cores, 32GB RAM, 512GB SSD	M2 Max with 12-core CPU, 30-core GPU, 16-core Neural Engine, 32GB RAM, 512GB SSD	13 th Gen Intel Core i5-1335U, 10 cores, 16GB RAM, 512GB SSD, Non-vPro	M2 Pro with 10-core CPU, 16-core GPU, 16-core Neural Engine, 16GB RAM, 512GB SSD
Total with management costs and without accessories per device	\$2,380.13	\$2,929.40	\$3,809.39	\$4,417.40	\$2,764.37	\$3,517.40
Total with management costs and including accessories per device	\$2,951.14	\$4,810.40	\$4,380.40	\$6,298.40	\$3,335.38	\$5,398.40
Savings per device with accessories	\$1,859.26	-	\$1,918.00	-	\$2,063.02	-
% savings with accessories	Up to 38.6%	-	Up to 30.4%	-	Up to 38.2%	-

Cost of a fleet of 10,000 Dell devices vs. 5,000 Dell/5,000 Apple devices with M2 series processors

Table 2: The cost of purchasing and maintaining a fleet of 10,000 devices without accessories over 3 years for an all-Dell environment versus a hybrid environment comprising 50 percent Dell and 50 percent Apple devices. Lower is better. Source: Principled Technologies.

User type	Producers		Specialists		Leaders		All groups	
% of users	70%		20%		10%		100%	
Total devices	7,000		2,000		1,000		10,000	
Without accessories	All-Dell	Hybrid (50% Dell/ 50% Apple)	All-Dell	Hybrid (50% Dell/ 50% Apple)	All-Dell	Hybrid (50% Dell/ 50% Apple)	All-Dell total	Hybrid total
Dell cost	\$16,660,910	\$8,330,455	\$7,618,780	\$3,809,390	\$2,764,370	\$1,382,185	-	-
Apple cost	-	\$10,252,900	-	\$4,417,400	-	\$1,758,700	-	-
Total	\$16,660,910	\$18,583,355	\$7,618,780	\$8,226,790	\$2,764,370	\$3,140,885	\$27,044,060	\$29,951,030
Savings	\$1,922,445	-	\$608,010	-	\$376,515	-	\$2,906,970	-
% savings	Up to 10.3%	-	Up to 7.3%	-	Up to 11.9%	-	Up to 9.7% savings without accessories	-

Table 3: The cost of purchasing and maintaining a fleet of 10,000 devices with accessories over 3 years for an all-Dell environment versus a hybrid environment comprising 50 percent Dell and 50 percent Apple devices. Lower is better. Source: Principled Technologies.

User type	Producers		Specialists		Leaders		All groups	
% of users	70%		20%		10%		100%	
Total devices	7,000		2,000		1,000		10,000	
With accessories	All-Dell	Hybrid (50% Dell/ 50% Apple)	All-Dell	Hybrid (50% Dell/ 50% Apple)	All-Dell	Hybrid (50% Dell/ 50% Apple)	All-Dell total	Hybrid total
Dell cost	\$20,657,980	\$10,328,990	\$8,760,800	\$4,380,400	\$3,335,380	\$1,667,690	-	-
Apple cost	-	\$16,836,400	-	\$6,298,400	-	\$2,699,200	-	-
Total	\$20,657,980	\$27,165,390	\$8,760,800	\$10,678,800	\$3,335,380	\$4,366,890	\$32,754,160	\$42,211,080
Savings	\$6,507,410	-	\$1,918,000	-	\$1,031,510	-	\$9,456,920	-
% savings	Up to 23.9%	-	Up to 17.9%	-	Up to 23.6%	-	Up to 22.4% savings with accessories	-

Comparing Dell and Apple offerings

Device configurability

Dell offers more business laptop and mobile workstation models and form factors, a broader selection of processors, more monitor models, and more options to customize device configuration than Apple. For example, consumers who purchase the Dell Precision™ 5480 have options to customize multiple aspects of the device, including a choice of processor, operating system, the amount of memory, the hard drive capacity, the graphics card, the battery size, and a choice of touch or non-touch screen displays.* Unlike Apple, Dell offers both clamshell and 2-in-1 models, screen resolution options on some models, and a larger 17-inch model. Apple models provide some customization options such as the choice of power adapter, keyboard language, processor speed, memory size, storage capacity, and chassis color; Dell provides these options as well.⁵

Some Dell models allow users to customize options relating to camera type and battery size. Dell also offers privacy features on some models not available to Apple customers, such as built-in camera shutters and other intelligent privacy features such as look away detection and onlooker detection. Dell also offers a built-in blue light functionality on some models.

The Dell portfolio of business laptops for enterprise buyers includes Latitude™ laptops for general-purpose productivity and collaborative work and mobile Precision workstations that target processor and graphic intensive workloads such as high-end content creation with CAD, video-editing, AI, and deep learning data analysis.

Dell Latitude and Precision lines include feature options for enterprise such as Intel® vPro™-enabled processors, security features such as smart card readers, display options, and mobile broadband options on some models.⁶ IT can remotely discover, manage, secure, and update laptops configured with processors that have Intel vPro Enterprise enabled.⁷ Processors with vPro are standard for Precision workstations, though some models offer both vPro Enterprise and lower-cost processor choices that have Intel vPro Essentials, a trimmed-down version of vPro that targets SMB. The Latitude line also offers non-vPro-enabled options that offer savings for enterprises where IT device management processes don't require vPro capabilities; the Latitude 3000 Series offers only non-vPro-enabled processors.

Dell Latitude and Precision models include Dell Optimizer at no additional cost, which fine tunes application and device performance as you work. Dell also offers network connection optimization options not available to Apple customers. According to Dell, their Dell Optimizer network module feature "allocates the maximum bandwidth to conference applications while you are on video calls and selects the best network available for which the user has credentials."⁸ Dell Optimizer also uses artificial intelligence and machine learning to prioritize frequently used applications, which can allow them to launch faster and run more efficiently.⁹ For some models of the Latitude 9000 Series, which targets C-suite and other mobile professionals, the Dell Optimizer tool set offers a Collaboration Touchpad for controlling Zoom®.

**Not all models have all options*

5 Apple, "MacBook Pro," accessed June 7, 2023, <https://www.apple.com/macbook-pro/>.

6 Dell, "Help Me Choose: Mobile Broadband," accessed June 7, 2023, <https://www.dell.com/en-us/lp/hmc-mobro>.

7 Dell, "Now You're Equipped to Do It All," accessed June 7, 2023, <https://www.intel.com/content/www/us/en/architecture-and-technology/vpro/overview.html>.





































8 Dell, "Dell Optimizer Version 2.0 User's Guide," accessed June 9, 2023, https://www.dell.com/support/manuals/es-cr/dell-optimizer/dell-optimizer-2.0_ug/optimizing-network?guid=guid-33aa4fc9-badd-4bf7-b1f8-b459b431678e&lang=en-us.

9 Dell, "Dell Optimizer," accessed June 7, 2023, <https://www.delltechnologies.com/asset/en-us/products/unified-workspace/briefs-summaries/dell-optimizer-brochure.pdf>.

Dell offers more options for accessories for business at a range of price points including many models at lower cost than the few choices Apple offers. Apple gives customers the choice of only two displays: the Studio Display that retails for \$1599 and the Pro Display XDR that retails for \$4999.¹⁰ Apple sells only one mouse, the Magic Mouse®, which retails for \$79. Apple sells four keyboards that range in price from \$99 for the Magic Keyboard® to \$199 for the Magic Keyboard with Touch ID and Numeric Keypad.¹¹ Dell offers multiple keyboard, mouse, and monitor models for significantly less than the lowest Apple prices. The Dell store shows dozens of monitors for business buyers with prices ranging from \$120 for a 22-inch FHD monitor to \$6400 for an 86-inch 4K monitor with touch screen.¹²

Because Dell offers a broader portfolio of devices with more customization options, organizations can potentially lower costs by paying for only what their users need.

Table 4: A comparison of options available on Dell Latitude and Precision devices and Apple MacBook devices. Source: Principled Technologies.

Available options		
	Dell Latitude and Precision*	Apple MacBook
Touch screen		
2-in-1		
17-inch model		
Choice of operating system		
Choice of battery size		
Screen resolution options		
Built-in blue light functionality		
Choice of camera type		
Built-in camera shutter		
Built-in privacy screen		
Mobile broadband		
Onlooker detection		
Look away detection		
Choice of keyboard language		
Choice of processor speed		
Choice of memory size		
Choice of storage capacity		
Choice of chassis color		

*Not all models have all options

10 Apple, "Displays," accessed June 9, 2023, <https://www.apple.com/displays/>.
 11 Apple, "Mice & Keyboards," accessed June 9, 2023, <https://www.apple.com/shop/mac/accessories/mice-keyboards>.
 12 Dell, "Business Monitors - Monitors & Monitor Accessories," accessed June 9, 2023, <https://www.dell.com/en-us/shop/monitors-monitor-accessories/ar/8605?sortBy=price-descending&appliedRefinements=43886>.

Manageability

For IT teams, effective management of a large fleet of devices can minimize data loss, security threats, and system downtime by ensuring that they consistently apply software and security updates to all devices. Management tools are essential for ensuring a smooth experience for users while helping secure proprietary information on apps and devices. The right tool could make the difference between streamlining IT tasks and creating issues that multiply across devices.

In a heterogeneous IT environment, admins need to apply updates to multiple operating systems, which can make rolling out updates more complicated and time consuming. In a homogeneous IT environment, software and security updates target only one operating system, and security policies can remain consistent across the fleet. Additionally, support staff needs to be familiar with only one operating system, potentially reducing the cost of training. Our model includes the cost of management software, but not the cost of staffing. By simplifying management, a homogeneous IT environment could provide lower IT costs than a heterogeneous IT environment with multiple operating systems.

Microsoft Intune® and Jamf Business® are among the most popular device and application management tools in their spaces. Jamf manages Apple devices only; Intune manages both Windows PC and Apple devices. The mobile device management (MDM) solution from Apple, Apple Business Essentials (ABE), supports only 500 users, which limits its use to SMBs.¹³ Enterprise organizations with 500 or more employees need a third-party MDM solution that supports Apple computers, such as Jamf Business, and in some cases, Jamf Business and Microsoft Intune.¹⁴ In an all-Dell environment, an organization can manage all of its devices with Intune, which is included with Microsoft 365 or available for purchase on its own.¹⁵

According to Microsoft, Intune is “a cloud-based endpoint management solution” that “manages user access and simplifies app and device management across your many devices, including mobile devices, desktop computers, and virtual endpoints.”¹⁶ Admins can use Intune to manage devices running operating systems such as Android™, iOS, iPadOS®, macOS®, Linux®, and Windows.¹⁷ They could also use it to manage access to specific apps on a given device. Intune documentation states that it “simplifies app management with a built-in app experience,” integrates with other Microsoft endpoint management services, and provides a web-based admin center.¹⁸ For IT administrators accustomed to Microsoft interfaces and workflows—and for businesses looking to utilize tools that come included with other costs—Microsoft Intune is a good management option. Dell Client Command Suite is another Dell offering that IT can use in a mixed environment.

13 Apple, “Apple Introduces Apple Business Essentials,” accessed June 9, 2023, <https://www.apple.com/newsroom/2021/11/apple-introduces-apple-business-essentials/>.

14 Apple, “Apple Introduces Apple Business Essentials.”

15 Microsoft, “Microsoft Intune,” accessed June 9, 2023, <https://www.microsoft.com/en-us/security/business/endpoint-management/microsoft-intune>.

16 Microsoft, “Microsoft Intune securely manages identities, manages apps, and manages devices,” accessed June 9, 2023, <https://learn.microsoft.com/en-us/mem/intune/fundamentals/what-is-intune>.

17 Microsoft, “What does device management mean?,” accessed June 9, 2023, <https://learn.microsoft.com/en-us/mem/intune/fundamentals/what-is-device-management>.

18 Microsoft, “Microsoft Intune securely manages identities, manages apps, and manages devices,” accessed June 9, 2023, <https://learn.microsoft.com/en-us/mem/intune/fundamentals/what-is-intune>.

Although Microsoft Intune can manage Apple devices, it does not have all the features of an Apple-focused product such as Jamf Business. We therefore included costs for Jamf Business in the cost analysis we used for claims earlier in this report. As a platform whose mission is to “help organizations succeed with Apple,”¹⁹ Jamf can manage Mac®, iPhone®, iPad, and Apple TV® devices.²⁰ Jamf Business includes three products: Jamf Pro (for device management), Jamf Connect (for application management), and Jamf Protect (for endpoint security).²¹ Jamf does offer several Microsoft integrations,²² including an Intune integration with Jamf Pro; however, setting up the Intune integration could require additional steps,²³ even with a more automated optional process.²⁴

Table 5: A comparison of the management solutions we chose for the model of an all-Dell and hybrid Dell and Apple IT environment. Source: Principled Technologies.

Management solutions	
Dell environment	Hybrid Dell and Apple environment
Microsoft Intune	Microsoft Intune Jamf Business

19 Jamf, “About Jamf,” accessed June 9, 2023, <https://www.jamf.com/about/>.
 20 SecureW2, “Jamf vs. Intune: The Best Way to Manage Apple Devices,” accessed June 9, 2023, <https://www.securew2.com/blog/jamf-vs-intune-manage-apple-devices>.
 21 Jamf Shopping Cart, accessed February 7, 2023, <https://store.jamf.com/1594/purl-jamfbusiness>.
 22 Jamf, “Microsoft Integrations,” accessed June 9, 2023, <https://www.jamf.com/integrations/microsoft/>.
 23 Microsoft, “Manually Integrate Jamf Pro with Intune for compliance,” accessed June 9, 2023, <https://learn.microsoft.com/en-us/mem/intune/protect/conditional-access-integrate-jamf>.
 24 Microsoft, “Configure the Jamf Cloud Connector to integrate with Microsoft Intune,” accessed June 9, 2023, <https://learn.microsoft.com/en-us/mem/intune/protect/conditional-access-jamf-cloud-connector>.

About Dell ProSupport and ProSupport Plus

According to Dell, the ProSupport Suite provides customers with “uninterrupted system productivity and a seamless end-user experience.”²⁵ Dell also states that ProSupport allows users to monitor the health of their fleets from “anywhere, anytime.”²⁶

With ProSupport Plus, Dell says users gain access to “AI-driven telemetry that predicts issues and provides actionable steps for prevention, resolution, optimization and upgrades,”²⁷ as well as the following:

- “Support anywhere, 24x7
- Actionable fleet health scores
- Automated custom update catalogs
- Seamless remote update delivery
- Customized rules for automated remediation
- Protection against accidents
- Access to a Service Account Manager for enterprises with 500+ systems”²⁸

Dell offers accidental damage protection as an add-on to ProSupport.*

For more information about Dell ProSupport and ProSupport Plus, visit <https://www.dell.com/en-us/dt/services/support-services/prosupport-client-suite.htm>.

**Dell Accidental Damage Service excludes theft, loss, and damage due to fire, flood or other acts of nature, or intentional damage. Customers must return the damaged unit. There is a limit of one qualified incident per contract year. Dell ProSupport Plus availability and terms vary by region and product. Dell ProSupport Plus features are not available on all products. For more information, visit <https://www.dell.com/servicecontracts/global>.*

Support

For our model environment’s support coverage, we looked at the most comparable plans Dell and Apple offer: Dell ProSupport with the Dell Accidental Damage Protection add-on and AppleCare for Enterprise. These include the choice of a basic warranty, Dell ProSupport, or Dell ProSupport Plus. For enterprises with 1,000 or more devices, Dell offers ProSupport Flex.²⁹ ProSupport plans cover up to 5 years with a monthly subscription option for ProSupport Plus and ProSupport Flex.** Apple offers AppleCare for Enterprise to organizations that purchase 200 or more devices in a year and offers lower support prices for higher-device-count tiers.³⁰ AppleCare for Enterprise plans cover up to 4 years. Dell ProSupport Plus and AppleCare for Enterprise both offer 24/7 phone support for hardware and software issues and as early as next business day on-site repair services (though some restrictions may apply based on location).^{31, 32}

***To use Dell ProSupport Flex, customers must commit to purchase 1,000 Dell client assets with ProSupport Flex within 12 months, have a centralized IT help desk of their own, and commit to using Dell TechDirect.*

25 Dell, “ProSupport Suite for PCs,” accessed June 9, 2023, <https://www.dell.com/en-us/dt/services/support-services/prosupport-client-suite.htm>.

26 Dell, “ProSupport Suite for PCs.”

27 Dell, “ProSupport Suite for PCs.”

28 Dell, “ProSupport Suite for PCs.”

29 Dell, “Service Description,” accessed June 9, 2023, https://i.dell.com/sites/csdocuments/Legal_Docs/en/us/dell-prosupport-flex-for-client-en.pdf.











30 Apple, “AppleCare for Enterprise,” accessed June 9, 2023, <https://www.apple.com/support/professional/enterprise/>.

31 Dell, “ProSupport Plus for PCs,” accessed June 9, 2023, <https://www.dell.com/en-us/dt/services/support-services/prosupport-client-suite.htm>.

32 Apple, “AppleCare for Enterprise,” accessed June 9, 2023, <https://www.apple.com/legal/sales-support/applecare/applecareforenterprise/>.

While many of the features of these plans are similar, there are a few differences. The plans differ, notably in their coverage of batteries. ³³ Dell ProSupport replaces batteries that fail while covered by their one-year warranty.³⁴ In the case of some long-life battery devices, Dell extends the coverage period to 3 years.³⁵ AppleCare for Enterprise, meanwhile, replaces batteries whose charging capacity drops below 80 percent of original capacity during the 2 to 4-year-coverage period.³⁶ Dell ProSupport includes AI-powered analytics that can proactively monitor and fix issues before they become a problem.³⁷

Table 6: A comparison of the services included in Dell ProSupport and AppleCare for Enterprise. Source: Principled Technologies.

Support		
	Dell ProSupport and Dell Accidental Damage Protection	AppleCare for Enterprise
Technical support		
Next-day business repairs		
Accidental damage repair or replacement for all covered devices		
Battery replacement	 *	 **
AI-powered proactive analytics		

*For batteries that fail within the first year, longer for some models

**For batteries that won't charge above 80 percent of their original capacity

Security

IT departments managing a hybrid environment may need to provide security training for staff and deploy security updates for two different operating systems, which could mean more work and more opportunities for security breaches. Apple devices would require a separately managed set of policies from Windows PCs in a mixed environment, adding more complexity. In an all-Dell environment, IT departments can provide the same security training for the entire workforce and make security updates across the entire environment once. Enterprises that purchase the Microsoft 365 E3 package also have access to the security solutions that come standard with Microsoft Enterprise Mobility and Security E3, including Microsoft Intune.³⁸

33 Apple, "AppleCare for Enterprise," accessed June 9, 2023, <https://www.apple.com/support/professional/enterprise/>.

34 Dell, "Dell Notebook Battery Warranty Support," accessed June 9, 2023, <https://www.dell.com/support/kbdoc/en-us/000123808/dell-notebook-battery-warranty-support>.

35 Dell, "Dell Notebook Battery Warranty Support."

36 Apple, "AppleCare for Enterprise," accessed June 9, 2023, <https://www.apple.com/legal/sales-support/applecare/applecareforenterprise/>.

37 Dell, "Proactive support with modern insights," accessed June 22, 2023, www.delltechnologies.com/asset/en-us/services/support/technical-support/dell-prosupport-for-pcs-datasheet-comm.pdf.

38 Microsoft, "Microsoft Intune core capabilities," accessed June 9, 2023, <https://www.microsoft.com/en-us/security/business/endpoint-management/microsoft-intune>.

Deployment

Organizations that purchase Dell or Apple devices can take advantage of near-zero-touch deployment, which allows organizations the ability to send their users a device with corporate-defined security settings in place, including optional encryption. For Apple devices, zero-touch deployment for enterprise requires a combination of Apple Business Manager and a third-party MDM, such as Jamf Business. IT departments can use Jamf Business to manage and configure security settings.³⁹ In contrast, Dell offers organizations Dell Connected Provisioning, which is a single source of deployment that allows IT to send devices directly to users that Dell configured in the factory to meet the organization's needs.⁴⁰

Software compatibility

Another possible complication of choosing a hybrid Dell and Apple IT environment stems from the fact that not all business applications run natively on macOS. Examples of such applications include some AutoDesk apps such as Civil 3D 2023,⁴¹ Inventor 2023,⁴² and 3DS Max,⁴³ as well as Microsoft Access. Additionally, users might run into compatibility issues on Apple devices, as some applications have macOS versions for Intel processor-enabled MacBook devices, but not for the newer ARM®-based M1 and M2 processor-enabled devices.

Users can install apps that have Mac versions designed for Intel processors via the Apple Rosetta 2 emulator⁴⁴ on the ARM®-based M1 and M2 processor-enabled devices. For other applications that run only on Windows, Apple M1 and M2 processor-enabled devices would need to use Windows 365 Cloud PCs or Parallels® Desktop v18 to run ARM versions of Windows 11 Pro and Windows 11 Enterprise in a virtual environment assuming the apps support that solution.⁴⁵ For example, AutoDesk doesn't support virtualization for all its applications or provide technical support for virtualized applications, and other apps may be missing drivers for the ARM Windows version.⁴⁶ Running Windows apps in Parallels would require maintaining two operating systems, which adds more work for IT departments. While it is possible to make many Windows applications work on these new Apple devices, the solutions add costs and create more work for IT departments.

Dell Precision business laptops are "tested and certified by leading industry software application providers," so they can run Windows software without the added complications and costs of emulators, VMs, and additional operating systems.⁴⁷ The Dell Precision 5480 in this comparison has Independent Software Vendor (ISV) certifications for AutoDesk AutoCAD 2023, Dassault Systèmes SolidWorks 2023, and other high-performance engineering, media and entertainment, and scientific applications. ISV certification verifies that Dell has engineered and tested Dell Precision workstations "to optimize performance and reliability on leading industry high-performance applications."⁴⁸

39 Laurie Mona, "Jamf Fundamentals and Jamf Business Plan: Which one is better for your business?", accessed March 1, 2023, <https://www.jamf.com/blog/jamf-fundamentals-plan-or-jamf-business-plan-pick-up-the-best/>.

40 Dell, "Connected Provisioning," accessed June 9, 2023, <https://www.dell.com/en-us/dt/services/connected-provisioning.htm>.

41 AutoDesk, "System requirements for AutoDesk Civil 3D 2023," accessed June 9, 2023, <https://www.autodesk.com/support/technical/article/caas/sfdcarticles/sfdcarticles/System-requirements-for-Autodesk-Civil-3D-2023.html>.

42 AutoDesk, "System requirements," accessed March 1, 2023,

<https://help.autodesk.com/view/NINCAD/2023/ENU/?guid=GUID-D2868744-49CD-4D09-AB6C-DCB09ECAFBE>.

43 AutoDesk, "3ds Max," accessed March 1, 2023, <https://knowledge.autodesk.com/support/3ds-max/troubleshooting/caas/sfdcarticles/sfdcarticles/System-requirements-for-Autodesk-3ds-Max-2023.html>.

44 Roman Loyola, "RIP Boot Camp: Microsoft endorses Parallels for Windows on M1 and M2 Macs," accessed February 24, 2023, <https://www.macworld.com/article/1515349/microsoft-windows-mac-boot-camp-virtualization-parallels.html>.

45 Roman Loyola, "RIP Boot Camp: Microsoft endorses Parallels for Windows on M1 and M2 Macs."

46 AutoDesk, "Virtual Environments support with 3ds Max and Maya," accessed March 3, 2023, <https://knowledge.autodesk.com/support/3ds-max/learn-explore/caas/sfdcarticles/sfdcarticles/Running-3ds-Max-and-Maya-in-Virtual-Environments.html>.

47 Dell, "Business Laptops," accessed March 1, 2023, <https://www.dell.com/en-us/lp/business-laptops>.

48 Dell, "Power your business with a Dell Precision workstation that is certified," accessed June 9, 2023, https://i.dell.com/sites/csdocuments/Shared-Content_data-Sheets_Documents/en/DEICHNC04897-WS-Certification-Brief-generic-LO.pdf.

The persona groups in our model

Producers


For our first comparison, we chose configurations appropriate for baseline users with lower performance requirements. These workers match the *producer* persona from Dell, which Dell targets with 3000 Series and 5000 Series Latitude laptops.⁴⁹ These workers can do their general-purpose work with 8 to 16 GB of memory, a 256 to 512GB SSD, and an FHD graphics display. We assume a 13- to 14-inch laptop would have a big enough display for this workload while still being small and light.

The current generation of Dell Latitude 7000 Series laptops are available in 13-, 14-, and 16-inch models. Some 7000 Series models are available in multiple form factors: the 7340 and 7440 models have laptop, ultralight laptop, and 2-in-1 formats. The Latitude 9440 is available in a 2-in-1 configuration.⁵⁰ Dell has 13-inch and 14-inch models in both the 3000 Series and 5000 Series targeted here. Apple has three current models in the 13- to 14-inch range we target for this group: the 13-inch MacBook Air M2, the 13-inch MacBook Pro M2, and the 14-inch MacBook Pro with the more powerful M2 Pro or M2 Max chips. The M2 processor in the two 13-inch MacBooks is the closest match for the workload of this group.

We compared a Dell Latitude 3340 laptop, a 13-inch laptop with a 13th Generation Intel Core i5-1335U processor, and a 13-inch Apple MacBook Air with an Apple M2 processor with an 8-core CPU and 8-core GPU. Both systems have 16 GB of memory and 512GB SSDs. Our analysis found several other areas in this comparison where purchasers could save money with Dell. For users who require more memory, the cost to upgrade the Latitude 3340 from 8GB RAM/256GB SSD to 16GB RAM/512GB SSD was \$248.17, \$151.83 less than the same upgrade on the MacBook Air (\$400).

Table 7: The per unit cost of the devices with and without accessories in our first comparison. Totals include management costs. Source: Principled Technologies.

Producers (per unit cost)	
MacBook Air 13-inch <i>M2 with 8-core CPU, 8-core GPU, 16GB RAM, 512GB SSD</i>	
Total per unit including management costs, without accessories***	\$2,929.40
Total per unit including management costs, with accessories****	\$4,810.40
Dell Latitude 3340 13-inch <i>13th Gen Intel Core i5-1335U, 10 cores, 16GB RAM, 512GB SSD, Non-vPro</i>	
Total per unit including management costs, without accessories*	\$2,380.13
Total per unit including management costs, with accessories**	\$2,951.14



Up to 38.6% lower per unit cost with accessories with Dell

*Dell total without accessories includes Device, Microsoft 365 (OS/Office/MDM/Security), ProDeploy Client Suite Provisioning, Information, Configuration Services, and Dell ProSupport and Next Business Day On-site Service, and Accidental Damage Service.

**Dell accessories include Dell Premier Multi-Device Wireless Keyboard & Mouse, Dell UltraSharp 27 4K USB-C Hub Monitor (27"), 3 Years ProSupport with Advanced Exchange Service for Dell UltraSharp 27 Monitor. Dell accessories cost \$571.01.

***Apple total without accessories includes Laptop, OS, Support (AppleCare for Enterprise - Tier 3 36 months), 3 years Microsoft 365, Jamf for Business (per user) 3 years.

****Apple accessories include Magic Keyboard with Numeric Keypad, Magic Mouse, Apple Studio Display - Standard Glass - Tilt-Adjustable Stand, AppleCare for Enterprise for Apple Studio Display Tier 3 36 months. Apple accessories cost \$1,881.00.

49 Dell, "Latitude Laptops & 2-in-1s," accessed June 7, 2023, <https://www.dell.com/en-us/shop/dell-laptops/sr/laptops/latitude-laptops>.

50 Dell, "Latitude Laptops & 2-in-1s."

Specialists


For our second comparison, we chose configurations appropriate for the high performance requirements that creatives and developers typically have. These workers match the *specialist* persona from Dell, which Dell targets with 5000 Series Precision workstations. Their workloads require more RAM and at least as much storage as the systems for the workers in the *producers* persona. We assume 512 GB is a sufficient amount of SSD storage if workers use cloud storage for everything but their current files. We increased the memory to 32 GB for this comparison. We opted for FHD displays on the assumption that workers will prefer to use an external 4K monitor for graphic work that would benefit from a higher-end display.

Dell currently offers Precision mobile workstations in the entry-level 3000 Series, the premium 5000 Series, and the highly scalable 7000 Series. For the *specialist* group, Dell matches the 13th Generation Intel Core i7 or Core i9 processors to these workloads.⁵¹ Apple has 14-inch and 16-inch MacBook Pros with M2 series processors. According to PCMag, the M2 Pro and M2 Max processors are “made to offer business and workstation-class capabilities, respectively.”⁵²

We compared a current-generation Dell Precision 5480 mobile workstation, a 14-inch laptop with a 13th Generation Intel Core i7-13800H processor with vPro, and a 14-inch Apple MacBook Pro with an Apple M2 Max processor with 12-core CPU and 30-core GPU. Both systems have 32 GB of memory and 512GB SSDs.

Table 8: The per unit cost of the devices with and without accessories in our second comparison. Totals include management costs. Source: Principled Technologies.

Specialists (per unit cost)	
MacBook Pro 14-inch <i>M2 Max with 12-core CPU, 30-core GPU, 16-core Neural Engine, 32GB RAM, 512GB SSD</i>	
Total per unit including management costs, without accessories***	\$4,417.40
Total per unit including management costs, with accessories****	\$6,298.40
Dell Precision 5480 14-inch <i>13th Gen Intel Core i7-13800H vPro, 14 cores, 32GB RAM, 512GB SSD</i>	
Total per unit including management costs, without accessories*	\$3,809.39
Total per unit including management costs, with accessories**	\$4,380.40



Up to 30.4% lower per unit cost with accessories with Dell

*Dell total without accessories includes Device, Microsoft 365 (OS/Office/MDM/Security), ProDeploy Client Suite Provisioning, Information, Configuration Services, and Dell ProSupport and Next Business Day On-site Service, and Accidental Damage Service.

**Dell accessories include Dell Premier Multi-Device Wireless Keyboard & Mouse, Dell UltraSharp 27 4K USB-C Hub Monitor (27"), 3 Years ProSupport with Advanced Exchange Service for Dell UltraSharp 27 Monitor. Dell accessories cost \$571.01.

***Apple total without accessories includes Laptop, OS, Support (AppleCare for Enterprise - Tier 3 36 months), 3 years Microsoft 365, Jamf for Business (per user) 3 years.

****Apple accessories include Magic Keyboard with Numeric Keypad, Magic Mouse, Apple Studio Display - Standard Glass - Tilt-Adjustable Stand, AppleCare for Enterprise for Apple Studio Display Tier 3 36 months. Apple accessories cost \$1,881.00.

51 Dell, “Help Me Choose: Intel Processors for Business,” accessed June 7, 2023, <https://www.dell.com/en-us/lp/hmc-intel-processor-business>.

52 PCMag, “The Best Business Laptops for 2023,” accessed June 7, 2023, <https://www.pcmag.com/picks/the-best-business-laptops>.


Leaders

For our third comparison, we chose configurations appropriate for executives and users who may work in multiple difference spaces in a typical week. These mobile workers need lightweight devices and high-quality cameras for videoconferencing, and may want connectivity options such as mobile broadband. These users match the *leader* persona from Dell, which Dell targets with the Latitude 7000 and 9000 Series devices.

We compared a Dell Latitude 7440 laptop, a 14-inch laptop with a 13th Gen Intel Core i5-1335U processor, and an Apple MacBook Pro 14 with an Apple M2 Pro processor with a 10-core CPU and a 16-core GPU. Both systems have 16 GB of memory and 512GB SSDs. These users may not encounter the same demanding workloads as the *specialists*, so we compared an Apple device with an M2 Pro processor to a Dell device with an Intel Core i5-series processor. These processors are less powerful than the M2 Max and Intel Core i7-series processors we chose for the *specialists* persona.

Table 9: The per unit cost of the devices with and without accessories in our third comparison. Totals include management costs. Source: Principled Technologies.

Leaders (per unit cost)	
MacBook Pro 14-inch M2 Pro with 10-core CPU, 16-core GPU, 16-core Neural Engine ,16GB RAM, 512GB SSD	
Total per unit including management costs, without accessories***	\$3,517.40
Total per unit including management costs, with accessories****	\$5,398.40
Dell Latitude 7440 Laptop 14-inch 13 th Gen Intel Core i5-1335U, 10 cores, 16GB RAM, 512GB SSD, Non-vPro	
Total per unit including management costs, without accessories*	\$2,764.37
Total per unit including management costs, with accessories**	\$3,335.38



Up to 38.2% lower per unit cost with accessories with Dell

*Dell total without accessories includes Device, Microsoft 365 (OS/Office/MDM/Security), ProDeploy Client Suite Provisioning, Information, Configuration Services, and Dell ProSupport and Next Business Day On-site Service, and Accidental Damage Service.

**Dell accessories include Dell Premier Multi-Device Wireless Keyboard & Mouse, Dell UltraSharp 27 4K USB-C Hub Monitor (27"), 3 Years ProSupport with Advanced Exchange Service for Dell UltraSharp 27 Monitor. Dell accessories cost \$571.01.

***Apple total without accessories includes Laptop, OS, Support (AppleCare for Enterprise - Tier 3 36 months), 3 years Microsoft 365, Jamf for Business (per user) 3 years.

****Apple accessories include Magic Keyboard with Numeric Keypad, Magic Mouse, Apple Studio Display - Standard Glass - Tilt-Adjustable Stand, AppleCare for Enterprise for Apple Studio Display Tier 3 36 months. Apple accessories cost \$1,881.00.

How we determined costs

The Dell North American Commercial Sales department provided us with a quote for the Dell laptops that included Dell ProDeploy services and 3 years of ProSupport with as soon as next-business-day, on-site hardware-support service and Accidental Damage Protection. Because PT is an SMB, this quote included the standard SMB discounts Dell offers and were before any educational discounts. These discounts may vary depending on the size of your organization and the number of devices you purchase.⁵³ We included ProSupport in our model and added Accidental Damage Protection service so it would be comparable to the Apple enterprise support plan, AppleCare for Enterprise, that we use in our Apple pricing model.

The Apple Store for Business provided us with a quote for the Apple laptops. We base the price of AppleCare for Enterprise we use in our model on prices in the Apple US Education Institution hardware and software price list.⁵⁴ Other vendors offer different AppleCare for Enterprise options, so an organization's cost may vary depending on its needs and choice of vendor. For more information, visit <https://www.apple.com/support/professional/enterprise/> and <https://www.apple.com/support/professional/>.

In our calculations, we include the cost of zero-touch deployment, MDM, security, operating system, and office productivity software. For Dell, we include Dell Connected Configuration service for zero-touch deployment, as well as Microsoft 365 E3 for mobile device management, security, Microsoft Office software, and Outlook email. Microsoft 365 E3 includes Office 365 E3, Enterprise Mobility + Security E3, Intune, and the Windows 11 Enterprise OS.⁵⁵ Because Intune is included with Microsoft 365 E3,⁵⁶ the homogeneous Dell fleet in our model would incur no additional cost for management software. For Apple, we include Jamf Business for near-zero-touch deployment, device management, and security, and Microsoft Office 365 E3 for Microsoft Office software and Outlook email. Because the Apple systems have Jamf Business for management and security, they don't need the full Microsoft 365 E3 package.

Our model also examines the additional cost of peripheral hardware that many business users can require. We included the cost of a Dell or Apple wireless keyboard, wireless mouse, and monitor for each device. Our model assumes purchasers use a single source (Dell or Apple) for devices and accessories.

We did not include end-of-life residual value in our calculations. Enterprises may want to keep their laptops in use beyond the 3 years, resell them, or recycle them. Apple devices have traditionally had a better residual value than many Windows laptops; we don't know if that will continue to be true for these models in 3 years.

We also did not include an analysis of repairability or the ability to upgrade devices after purchase in our calculations. According to the US Public Interest Research Group (PIRG), Dell devices are twice as easy to open up and repair as Apple devices.⁵⁷ Depending on the model, users can upgrade the RAM, SSD and/or graphics of their Dell devices up to their limits after purchase, but users of Apple M2 processor-enabled devices cannot.⁵⁸

53 Dell, "ProSupport Suite for PCs."

54 Apple, "US Education Institution - Hardware and Software Price List," accessed June 7, 2023, https://www.apple.com/education/pricelists/pdfs/Apple_US_Education_Institution_Price_List-03-16-2023.pdf.

55 Microsoft, "Microsoft 365 E3," accessed March 1, 2023, <https://www.microsoft.com/en-us/microsoft-365/enterprise/e3?activetab=pivot:overviewtab>.

56 Microsoft, "Microsoft Intune licensing," accessed February 7, 2023, <https://learn.microsoft.com/en-us/mem/intune/fundamentals/licenses>.

57 U.S. PIRG, "'Failing the Fix' scorecard helps you buy a repairable laptop and cellphone," accessed June 22, 2023, <https://pirg.org/edfund/resources/failing-the-fix/>.

58 Mahmoud Itani, "Can I upgrade the RAM and storage on the MacBook Pro (2023)?," accessed June 22, 2023, <https://www.xda-developers.com/upgrade-ram-and-storage-macbook-pro-2023/>.

Conclusion

Organizations seeking to lower IT costs can make better decisions when they have the full picture of the costs associated with their laptop fleets. In our comparison of the cost of a Dell IT environment versus a heterogeneous Dell and Apple environment, we created models that take into consideration many of the costs associated with a representative fleet of business laptops. When we calculated the costs of the two environments for a hypothetical fleet of 10,000 devices, we found the all-Dell IT environment was up to 9.7 percent less expensive without accessories, and up to 22.4 percent less expensive with accessories over a 3-year period. Our analysis also found that Dell offers purchasers more choices for configuration, meaning organizations pay for only the features and performance level they need. In addition to the savings we present here, the simplification of management, deployment, security, and support associated with a homogeneous IT environment has the potential to further lower IT costs.

Main findings

Six areas where maintaining an all-Dell IT environment might be simpler and less expensive than a hybrid Dell/Apple IT environment

 **Device configurability**

 **Manageability**

 **Deployment**

 **Support**

 **Security**

 **Software compatibility**

This project was commissioned by Dell Technologies.



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