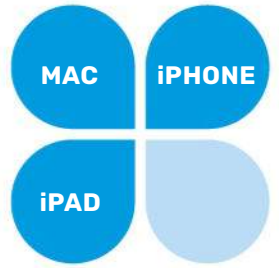


Mac|Life



AUGUST 2023 NO.209



+
Our verdict
on the new
MacBook Air
15-inch

INSIDE THE VISION PRO

A complete guide to spatial computing,
and how Apple is taking it to the next level



Upgrade Mac
productivity
with one trick

Easy ways to
back up with
Time Machine



Rated: **Nothing**
Ear 2. The budget
AirPod alternative



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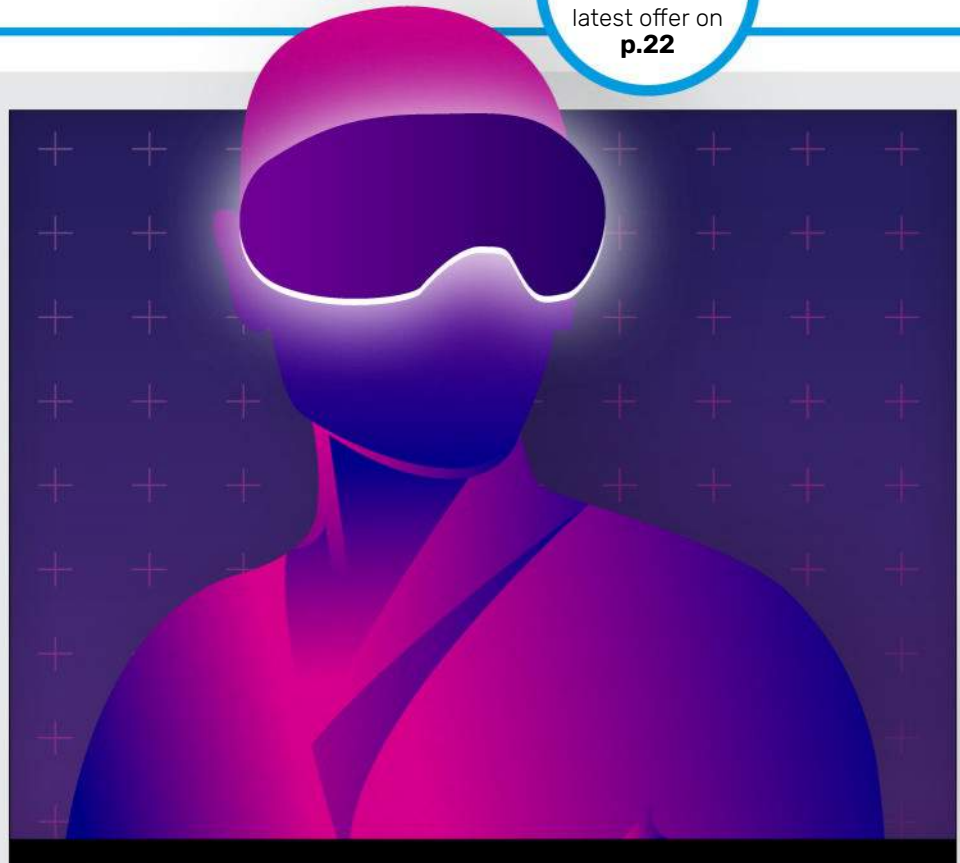
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SPATIAL AWARENESS



NOPE, YOUR EYES aren't deceiving you — Apple's new spatial computer, Vision Pro, is once again on the front cover of *MacLife*. Is it overkill? Maybe, but I'm so excited by last issue's "Vision of the future", and I think it's going to be that much of a gamechanger in the coming years, that we're covering it again. This time round, we're looking at spatial computing as a whole: where it all started (a long time ago, as it happens), what it's looking like now, and how Apple's groundbreaking headset is going to move things forward.

Understandably, spatial computing isn't for everyone yet (whether they can

afford it, or not), so we've got plenty of other material this issue which should help you to get the most out of the hardware that you actually have access to at present. The first of these is a feature that I've been wanting to cover for some time now, and that's how to upgrade an older Mac (p48), whether it's finding which modern apps still work with these more mature machines, upgrading the hardware inside (which to be fair is a lot easier to do than it is now), and we're even going to show you how to install macOS Ventura on an outdated Mac that was never intended to run it. Major caveat: this is a cool thing to do, but your Mac also might not like it, so don't try this at home if you rely on it for doing things day to day.

A somewhat more practical proposition for those with more recent Macs is a complete guide to backing up your system with Time Machine (p59). I'm sure plenty of you have already carried out this most essential of tasks, but if not, or you just want to start afresh, then I highly suggest you have a thorough read.

For what it's worth, the bean counters tell me that early reports suggest that *MacLife* in its digital-only incarnation is working out well, so long may the magazine continue. I'm still getting a number of emails from people asking me why they can't access their digital subscription. While I am happy to help those who get in touch, in some instances it would be easier to speak to our dedicated subscription team (contact details on p79). ■

Nick

NICK ODANTZIS, Editor
Twitter: @maclife

THE TEAM



Andrew Cottle
Art Editor

Andy has some old MacBooks, and thinks it's great that they still have potential — solving some of the issues he thought had written them off.



Rachel Terzian
Production Editor

Motion sickness is Rachel's biggest reason for not faring well with VR headsets, but will Apple's Vision Pro solve this problem? She certainly hopes!



Ian Osborne
Contributor

Ian is worried that Vision Pro won't be very spectacle-friendly, and hopes a future version will make it possible to wear glasses in use.

SHARE YOUR THOUGHTS

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>>> START

THE LATEST NEWS FROM THE WORLD OF APPLE

New Podcasts updates

Improved search, subcategories, and more to come

BY ALEX SUMMERSBY

APPLE'S PODCASTS APP has been updated with new search features, including subcategory charts and language-specific recommendations.

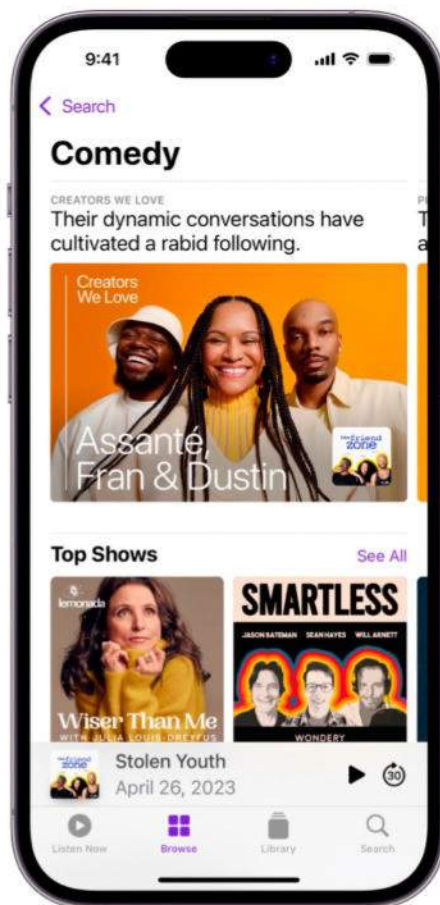
Apple has added nine subcategories in the Search tab across devices: Books, Mental Health, Relationships, Self-Improvement, Entrepreneurship, Personal Journals, Documentary, Parenting, and Language Learning.

Each subcategory has its own charts, with the 200 Top Shows and 200 Top Episodes available in your market, based on a mix of listening, follows, and completion rate.

All 19 categories and these nine subcategories have new artwork and recommendations, including Apple Podcasts Essentials — all-time favorite podcasts for each category curated by Apple's global editorial teams. Select categories will also regularly showcase New & Noteworthy shows, standout Shows of the Month, Featured Channels and Creators, and Global Highlights with popular shows from around the world.

Listeners in the US, UK, Canada, and Australia can now also find recommendations through Podcasts by Language, which supports more than 20 languages in total but a select range in each region. For example, a US listener can explore podcasts in Arabic, Chinese, French, and Spanish while a UK listener gets Dutch, Italian, and Portuguese. Select markets will feature an additional "Podcasts in English" destination.

Listeners can find all categories, subcategories, and Podcasts by Language from the Search tab on

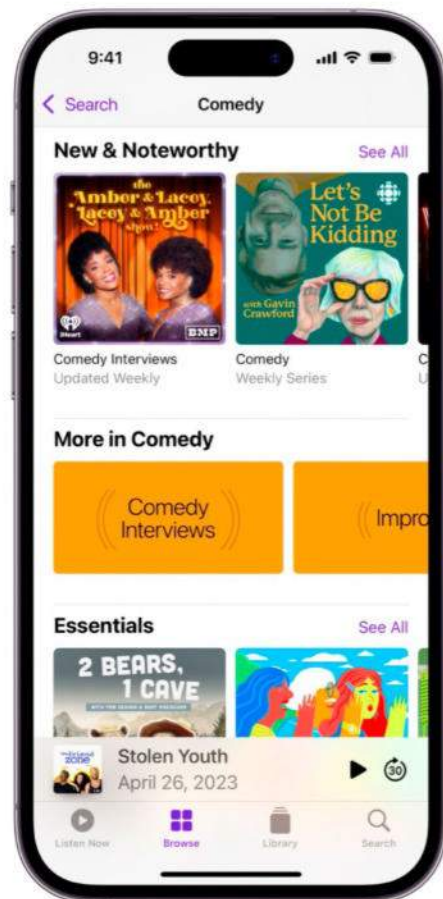


iPhone, iPad, Mac, and Apple TV, and browse the charts for a category or subcategory from the category page. A selection of charts for top categories are also accessible from Top Charts.

ALSO COMING TO PODCASTS

Apple has also previewed new features coming to Podcasts this fall:

> A refreshed Now Playing design features a sleek, dynamic background that showcases a podcast's art and has enhanced controls for managing the queue. Support for episode art enables



listeners to explore more about an episode. A new design for episodes, shows, and channels in Up Next makes it easier to preview, play, or follow podcasts.

> Subscribers will be able to stream the entire catalog of Apple Music radio shows ad-free on Podcasts, and follow individual shows to automatically download and be notified of new episodes as soon as they're released.

> Apple News+ subscribers will be able to listen to stories from top magazines and newspapers on Apple Podcasts.

> Listeners will also have the ability to access new shows and other benefits by connecting eligible subscriptions to top apps on the App Store, including Bloomberg, The Times, The Washington Post, The Wall Street Journal, and others.

> EU law forces change

After USB-C charging, it's removable batteries

EUROPEAN LAWMAKERS HAVE set tough new rules that could mean future iPhones and iPads will be required to have removable batteries.

This comes after the EU imposed laws requiring devices sold in Europe after 2024 to use USB-C for charging, meaning all future iPhone models will lose the Lightning port for USB-C.

The new rules cover the design, production, and waste management of all types of batteries sold in the EU. They include stricter waste collection targets, minimum levels of materials recovered, and minimum levels of recycled content in new batteries. To help make recycling easier, Europe will require "portable batteries in appliances" to be designed "in such a way that consumers can themselves easily remove and replace them."

Apple is slowly expanding its Self Service Repair program, which has

included iPhones from the start, but the program is aimed at users with experience of repairing electronic devices, not ordinary consumers. It is unclear whether Europe will be satisfied with anything less than pop-out swappable batteries.

Separately, Apple software VP Craig Federighi confirmed that Apple is "working with the EU" to comply with a new law taking effect in March 2024 that requires iOS users to have access to third-party sources of apps outside of the App Store. Bloomberg reports that there would still be security requirements, similar to those in macOS, and the option would be available only in countries where it is required by law, with the system verifying the user's location first.

This could soon extend to Japan, where lawmakers are proposing new "digital market competition" rules.

News in brief

A bite of the Apple

> HI-FI FROM SPOTIFY

Spotify is reportedly ready to roll out a more expensive subscription tier that offers "high-fidelity" music. Spotify announced it was working on a "HiFi" feature in 2021 but delayed its rollout when Apple Music and Amazon Music both began offering high-quality tracks as standard. Apple Music also offers Spatial Audio, which is not available from Spotify, but some users prefer the Spotify interface and experience. Bloomberg reports that the new tier will launch this year, but outside the US first.

> AIRPLAY IN HOTELS WITH LG

At WWDC in June, Apple announced that AirPlay support will be available in selected hotels "before the end of the year," enabling you to use a QR code to connect and play your own content or mirror your Apple device. The idea is that you aren't limited to what the hotel offers and can take advantage of a big screen, whether to enjoy a favorite show via a personal Apple TV+ subscription or prepare a presentation. LG Electronics, which describes itself as the leading provider of in-room hotel TVs, has announced that its latest Smart Hotel TVs will be the first to roll out the new feature. Watch for hotels advertising the service in the near future.

> Laptops dominate

IN THE 12 months ended March 2023, on its own figures, Apple shipped about \$33.8bn worth of Macs. However, the company does not disclose sales by model. The latest report by market research firm Consumer Intelligence Research Partners (CIRP) claims that in this period, "laptops accounted for over three-quarters of Mac computer sales."

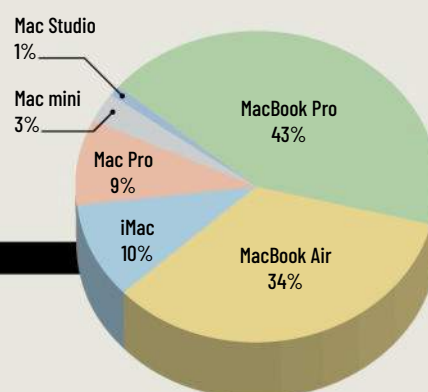
On CIRP's figures, the laptop lines' share increased by 3% from 74% last fall to 77%, with the MacBook Pro line at 43% and MacBook Air at 34%.

This doesn't seem to square with the claim in the WWDC keynote by Apple's VP of Hardware Engineering, John Ternus, that the 13-inch MacBook Air with M2 chip is "the world's best selling laptop" – but he might have meant it's the best selling single model, not

product family. Or, some say, CIRP's survey might be skewed towards the US, rather than the big picture.

It's also surprising to see shipments of Mac Pro so high relative to the mass-market Mac mini and Mac Studio, and nearly level with iMac, especially considering that until WWDC, the Mac Pro had not been updated since 2019.

CIRP's figures might make sense if they're based on dollar value and not unit shipments – one high-priced Mac Pro offsets a lot of affordable Mac minis.



> THE SHIFT

MATT BOLTON thinks EyeSight is the smartest part of a very smart new headset, but it will be made fun of



THE APPLE VISION Pro headset is absolutely crammed with clever tech. In classic Apple style, very little of it is brand new tech we haven't seen before on some prototype or niche headset that was dead on arrival, but Apple has been able to bring it all together into something that feels complete.

There is one thing I haven't seen before, though: EyeSight. This is the screen on the outside of the Vision Pro that basically shows a recreation of your eyes inside the headset. It is weird, it is kind of dystopian in its general vibe, and it's also a brilliant solution to a genuine problem.

EYESIGHT IS AN AFFORDANCE THAT MIXES SOFTWARE AND PHYSICAL CUES

Long-time readers may remember that I've written here before about "affordances." In software, these are elements that let people know that something can be interacted with. A mouse pointer that turns into a pointing finger over a link is an affordance. The insertion point that flashes in text so you can see it is an affordance. A scrolling list that bounces when you reach the bottom so you know you've hit the end is an affordance.

These can come into real life too — I believe that the stick design of the AirPods is a valuable affordance because it makes them more visible, so people are more likely to realize that you can't hear them, stopping them from becoming embarrassed in the event of attempting to talk to you.

EyeSight is an affordance that mixes software and physical cues. The wags will point out that it creates a kind of uncanny valley situation, making it look kind of horrific. And they're not wrong... but the benefits vastly outweigh the silliness for me.

The simplest set of affordances in EyeSight are the way it clouds your "eyes" depending on what your visibility inside the headset is — if I can't see your eyes, you can't see me. If I can see your eyes but there's light swirling around them, you can see me but may be distracted. If I can see your eyes clearly, then you can see me clearly, easy.

But the second level of affordance is that you can still communicate using the eyes themselves. Sensors on the inside are reading your face, which means that if I speak to you, you can still make eye contact with me. I can see that even with the headset on, I do have your attention. I can see if your attention drifts for a moment, distracted by some notification or 3D dinosaur video. And then I can see if you suddenly tune me out, as your eyes go cloudy mid-sentence, which is sure to become a power



It might not be a full, romantic, gazing into each other's eyes experience, but it's a lot better than nothing.

move in any office where Vision Pro is actually used.

But that's the key — this is the kind of thing that shows Apple is thinking about people using this in the real world. It solves an actual problem, enabling you to stay in the headset for longer, rather than wearing it becoming a hassle because you need to take it off constantly to talk to people because it's not enough that you can see them — they need to see you too. Does it look silly? Yeah, sure, okay. So did AirPods at first. Then we got used to them. Then they took over the world.

>>> Matt is Managing Editor at Future's flagship technology website TechRadar and has been charting changes at Apple since his student days. He's skeptical of tech industry hyperbole, but still gets warm and fuzzy on hearing "one more thing."

LETTER OF THE MONTH

Nick, “New is not new anymore” is exactly why I am so frustrated. Underpowered base models, outrageous upgrade prices for larger memory and SSDs, and what I believe is deliberate downgrade performance in base model SSDs to force you to spend more. Improvement? The testing on the M1 base SSDs outperforms the new model from what I have read. How does that happen? Just like your desk, office, and the environment affect your productivity, I need a change to inspire creativity. Darn, I have to sit in front of that computer for hours.

Anyway, thanks for saying something that a lot of people are thinking and has probably stayed hidden from their marketing. It’s so refreshing to see journalism and critiques instead of just telling Apple how great they are! If they don’t watch it, in the current economy, they will go the way of many luxury car dealers that are struggling because the \$60,000 category only buys an average car right now! \$400 for a RAM or SSD to upgrade an underpowered Mac is obscene.

BURT ALLAN



We’re not in total agreement about the base models — if anything I’d say you get such great performance from the standard Apple silicon models that there’s less reason to upgrade (which was one of the points I was trying to make), though as ever storage is rather paltry. We were pretty pleased about the unveiling of the new MacBook Air at WWDC23. The new 15-inch option is very appealing, and along with the impressive M2 performance, it’s going to be great (check out p64). OK, it’s not revolutionary, but it’s what most people want. Apple has also redeemed itself somewhat with the launch of its exciting new Vision Pro too.

the digital version, one of which is you don’t need to rip up your issues to save pages as there’s a bookmark option, which means you can keep your favorite pages right in the app. Plus, you don’t need to worry about storing pages somewhere safe, and you can access them anywhere you are.

Two True Tone — no go

Up until a week ago, I had a Studio Display paired with my Mac Studio (running Ventura). As a treat for all my hard work, I bought a second Studio Display. Setup was a breeze — I connected each monitor directly to the Mac Studio. My issue is I cannot seem to get both monitors configured for True Tone. It appears only the primary display has the option to enable True Tone. The difference is quite noticeable when one monitor is True Tone enabled and the other is not. Help!

SCOTT PELUSO

After a bit of back and forth with Scott, there didn’t appear to be an obvious reason why there would be this limitation. We suggested that he got in touch with Apple Support, which he did, and they explained that this was a bug, as we initially thought it might be. Unfortunately Apple didn’t give Scott any idea as to when this bug might be fixed. Probably, there won’t be too many of you out there privileged enough to be running two Studio Displays, or so we think!

More digital options

I enjoy the new all-digital format and used the link you provided in the June 2023 edition to download the *MacLife* app for my MacBook Pro with M1 chip. The app works fairly well but crashed on me a couple of times. Based on that, I went back to the way I read the digital edition in the past, Apple News. I don’t recall you mentioning that readers could read their digital edition in the Apple News app in the

past. I thought readers may be interested in knowing that is an option.

MIKE ROBERTS

Michael, the suggestion is greatly appreciated. Apple News is a good alternative, provided you are going to get the most out of that \$9.99/month subscription. *MacLife* is only \$20/year, so unless you’re reading a lot of different titles, then it’s not the most cost-effective

option. In future it’s worth updating the *MacLife* app if you have any problems, as often we do updates shortly after a bug is detected.

Paper is proper

I’m not a geek — I already miss the real magazine. I could tear out pages to save.

PAT QUINN

We miss the printed magazine too Pat! However, there are some benefits to

SHARE WITH US!

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MacLife



Mac malware on the rise?

The bad guys are coming for your Apple devices — we find out why. **WRITTEN BY** CHARLOTTE HENRY

Macs don't get malware. That was the old adage. However, over recent years, that has proven to be increasingly inaccurate, if it was ever true in the first place. There are now all manner of software nasties designed to attack Macs and other Apple devices.

Paul Ducklin, principal research scientist at Sophos, told us that decades ago, Macs and other minority platforms didn't get viruses "probably because people who wrote them weren't that interested, or there weren't that many people interested. But it kind of became almost like this touchstone, that it's obviously some magic smoke that got baked into my operating system of choice. 'I chose a Mac that's a minority system. I haven't seen any viruses, my Windows and my DOS chums are getting them all the time. It's either I'm very clever, or there's something fantastic and immune about Macs.' And unfortunately, it doesn't quite work like that."

Indeed, such a mindset can lead to a false sense of security among Mac users. If we think our computers are

somehow impenetrable, we might end up forgetting to do the cybersecurity basics, leaving ourselves vulnerable.

It is not like there aren't issues to be aware of. For example, recently an information stealer branded MacStealer was discovered by the company Uptycs and other researchers. This is not something you want on your device.

"The stealer can extract documents, cookies from a victim's browser, and login information. It affects Catalina and subsequent macOS versions riding on Intel, M1, and M2 CPUs," explained Uptycs researchers Shilpesh Trivedi and Pratik Jeware. The malware was being pushed on anonymous messaging app Telegram.

Trend Micro also detected that same malware, which their report described as "a cryptocurrency wallet and information stealer disguised as a plagiarized version of a legitimate play-to-earn (P2E) game app". Trend Micro researchers Qi Sun and Luis Magisa advised: "To

avoid and defend against threats like MacStealer, we strongly advise being wary of installing apps from unofficial sources and app platforms. Enabling the latest security solutions for devices can also help detect, block, and mitigate the risks of these kinds of threats."

This is a good approach to keeping your Mac safe in general. While it is true that Mac malware is less prevalent in comparison to what attacks other platforms, there is still a wide range of it floating around. In another incident, ransomware, which usually encrypts and scrambles data on a victim's device until a sum is paid to the attacker, has been detected for

macOS. Such attacks on Macs had basically been unheard of before. (It is worth noting that coughing up is never a guarantee that you will get your data back and is not necessarily advised by security experts.)

In a blog post about the ransomware, Ducklin outlined how it worked: "The crooks hacked into



Paul Ducklin dispels the popular myth that Macs can't get malware.





Using a Virtual Private Network (VPN) such as NordVPN can help keep you safe on public Wi-Fi.

the download server of a popular BitTorrent client called Transmission, created a fake version numbered 2.90 and published it as an official download on the site. The Transmission app itself was very slightly modified to include an additional snippet of code to run the malware, which was added to the Transmission package under the innocent-looking name General.rtf.”

He highlighted that this piece of malware does not require a user to enter a password to gain full administrative powers: “That means you won’t see any dialogs popping up asking you to provide your

administrative password. Some Mac users still wrongly think that a password dialog is an inevitable side-effect of a malware infection, and is thus a handy way to spot that something malicious is about to happen, but that’s not correct.”

APPLE’S APPROACH

Apple cares deeply about all this. It wants its users to be safe and has a variety of support documents explaining how we can all take simple steps to protect ourselves. Furthermore, security is cited as a reason why it has not yet allowed so-called sideloading on iPhones and

WE CAN ALL ABSENTMINDEDLY CLICK ON A DUBIOUS LINK OR OPEN A HARMFUL EMAIL ATTACHMENT

iPads, insisting that all software is downloaded from the App Store. The Mac ecosystem is somewhat freer, as users are not limited only to software that is available via the Mac App Store. Of course, we can all absentmindedly click on a dubious link or open a harmful email attachment.

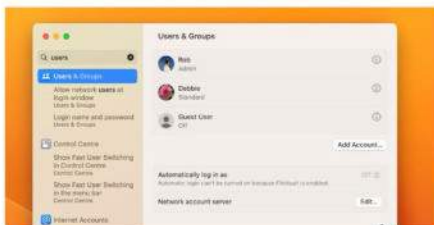
Ducklin said that while part of the reason Apple forces iOS users to download only from the App Store is about controlling the platform, this “did have the effect of controlling malware much more strictly on the iOS platform than we originally saw with Android and certainly on Windows, and even on the Mac where it’s a bit more of a free-for-all.”

BEING PROACTIVE

However, Ducklin warns: “Anybody is allowed to submit a program to Apple, and anybody is allowed to have that program accepted into the App Store, whether it’s for Mac or iOS. So, on a Mac, you can lock yourself to the App Store, on an iPhone or an iPad you

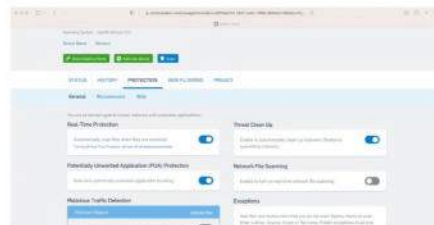
Top tips for staying safe

None of these tips are a guarantee of safety, but they can all help a bit



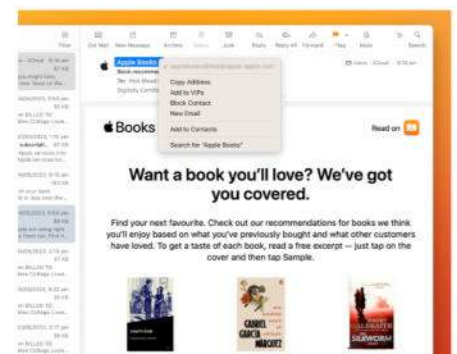
Limit the number of administrator accounts

Apple recommends using mostly standard user accounts. Only admins can download and install software, reducing the risk of malware spreading.



Run antivirus software

This can spot any nasty software you may have downloaded, hopefully stopping you installing it before it becomes a problem. It can also clean your computer if you do install something problematic.



Check sender or developer

It is worth double-checking who an email is from. Do you know the sender? Is this their real email address? Similarly, make sure software you install is from a known, trustworthy company.

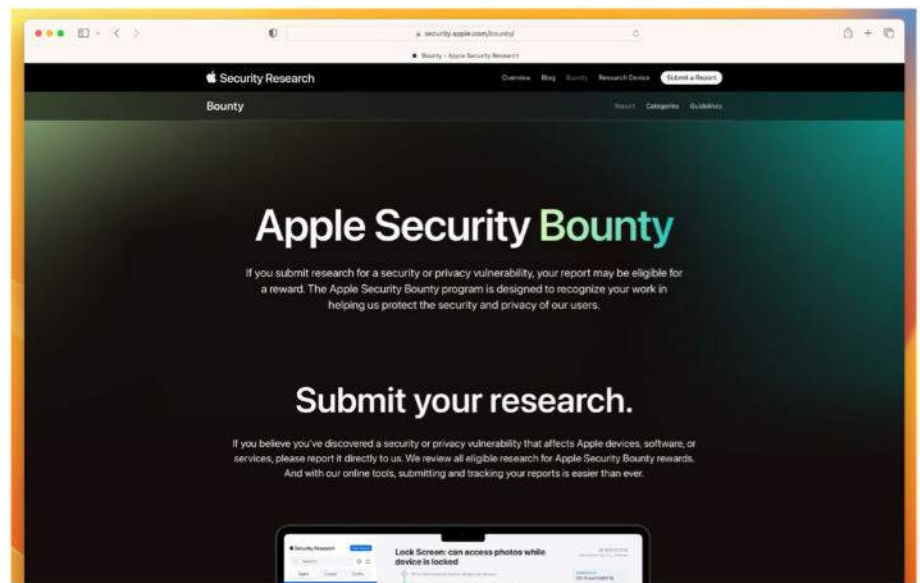
have no choice. But even then, Apple's trying to keep things open enough to have thousands or hundreds of thousands of developers.

"Google's doing the same. They don't actually look at the code in every app; they put it through some automated tests. Malware even gets into the so-called walled gardens."

Part of the reason why Mac malware is seemingly growing might simply be that because there are more Macs in the world, attackers are more interested in going after them. It was just not worthwhile to them before.

Apple had also been criticized for not having a proper bug bounty program, unlike other companies. Such programs reward security researchers, often handsomely, for finding and reporting vulnerabilities to the company so it can fix them. This can encourage more research and lead to issues being discovered and stamped out more quickly. Finally, in December 2019, Apple launched a program that was expanded beyond just iOS devices, meaning Mac issues were included, and was not just invitation based. The company also increased rewards to a maximum of \$1 million, depending on what type of issue a researcher found.

Apple is also taking a much more proactive approach to tackling these



Apple finally launched a bug bounty program in 2019.

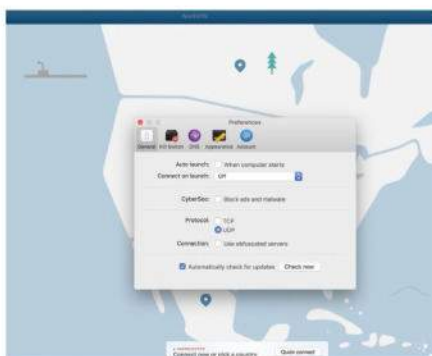
issues, starting to push out updates for both macOS and iOS that deal with one single problem, instead of waiting for weeks to push a fuller version update that deals with a variety of malware all at the same time. Indeed, the company recently pushed out its first Rapid Security Response for the iPhone, separate to any wider iOS update. This might seem a scary thing to receive as a user, but it is positive that potential problems are being tackled quickly.

A key issue that might trigger such a response from Apple is a "zero-day" — a previously unknown piece of malware — being found out in the

wild. Again, the company is taking robust action against such problems and visibly fixing them, which might actually be a positive.

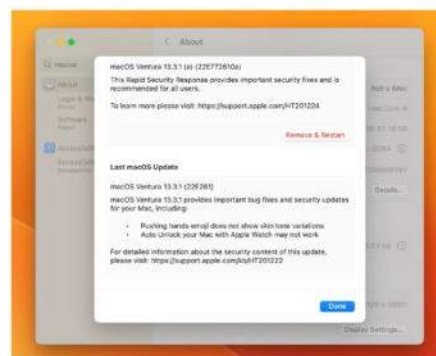
"Are we getting more zero-days," Ducklin asks, "or are we just getting better at finding them and fixing them really quickly, and getting people to notice them and warn the world? And I like to think that it's the latter."

Overall then, Mac malware has become something that we all need to pay more attention to. But by following some good digital hygiene, and thanks to growing support from Apple, we can continue to use our computers safely and effectively. ■



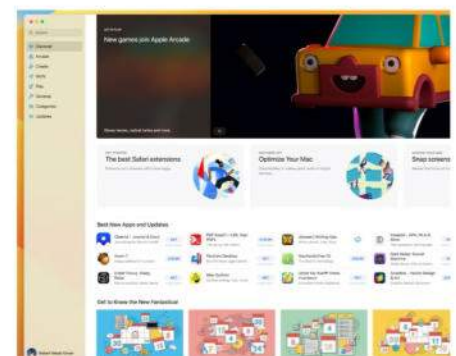
Use a VPN

A VPN like NordVPN or ExpressVPN creates a secure internet connection. This offers an extra layer of protection, particularly if you're using public Wi-Fi in a coffee shop, airport, etc.



Use up-to-date operating systems

Apple regularly updates its operating systems, and these updates include security fixes. It is worth installing these to make sure you are protected.



Use App Store software

Using the App Store on Mac, iPhone or iPad is no guarantee that a piece of software is okay, but it's generally better to download from there than to get random programs from the web.

VISION ON

A stylized illustration of a person's head and shoulders in profile, facing right. The person is wearing a VR headset with a large, dark, curved visor. The illustration uses a color gradient from dark purple at the bottom to bright pink at the top. The background is a solid dark purple with a repeating pattern of small, light purple plus signs.

Is Vision Pro the future market leader, or just an overpriced gimmick? We look at the history and future of virtual and augmented reality

WRITTEN BY IAN OSBORNE

THE PAST, PRESENT AND FUTURE OF SPATIAL COMPUTING

VIRTUAL AND AUGMENTED reality have been sci-fi staples for years. Virtual reality puts you in an alternate world, where you can look, move and interact as if you were really there (think *Star Trek*'s holodeck). Augmented reality overlays computer-generated graphics and information over the real world, so you see both through your glasses or on your screen (like in *Pokémon Go*). These concepts have a longer history than you realize in the actual world too.

Over the last few years, the technology has matured to the point where it's ready to change the world. We're promised immersive games, with the player at the center of the action. Video chats could be transformed, with the participants sitting around a virtual table in a virtual living room or office, probably drinking virtual coffee. Your augmented reality glasses could be used to find directions, which could then be superimposed on the street as you walk or drive. And if promoters replaced a seat at a concert or sporting event with a 360-degree HD camera, they could sell that seat hundreds of times over to virtual reality enthusiasts all over the world.

Here we look at the past, present and future of virtual and augmented reality. Where it came from, where it's going, and how Apple fits into this space.

The Past

VR and AR have been around longer than you think

THE ROOTS OF virtual reality can be traced back to 3D games and software where the environment is viewed from a first-person perspective. And these didn't start with *Doom* either. Which was the first such title is disputed; it's either space shooter *Spasim* or the blaster *Maze War*, both of which were released around 1974. They weren't actually virtual reality, of course. The gamer played them on a computer screen, just like any other game. But it's here one of its key features was established; the environment was viewed through the player's eyes, instead of their being represented as an on-screen avatar. Later first-person games included the ZX81's *3D Monster*

Maze, *Wolfenstein 3D* and, of course, *Doom*.

From these basic first-person video games, the first-person shooter genre eventually took shape. When computers and consoles grew powerful enough, as well as moving through a virtual 3D environment, you could also look around in a 360-degree space by moving your in-game head. You now had the ability to look up and down, not just left and right.

Headsets with motion tracking had been worked on since the 1960s, mostly by the military for training and viewing dangerous situations. Myron W. Krueger's VIDEOPLACE appeared in 1975, and is generally regarded as the first interactive VR



Much was expected from Google Glass, the augmented reality smart spectacles, but they never caught on. They were expensive, and lacked a killer feature.

THE LEGEND QUEST HARDWARE

When the Legend Quest virtual reality arcade opened in 1992, there was nothing else like it. Four gamers played together using VR headsets, with motion tracking and hand controllers to look after movement and actions. The player stood inside a circular barrier while playing, to make sure they didn't trip over anything in the real world while they explored the virtual one.

The hardware used was based on seven enhanced Amiga 3000 computers. It could move 30,000 flat-shaded polygons at 20 frames per second with a maximum of 250 objects, though it slowed when there was too much happening on the screen. The helmet, which contained motion tracking technology to see which way you were facing, completely covered the eyes with a small viewing screen in front of each eyeball. A speaker over each ear carried the sound effects, creating the impression of which direction a sound came from. It was true virtual reality, albeit primitive by today's standards.



In *Dactyl Nightmare*, you had to shoot rival gamers with your virtual pistol. If you were hit, you respawned; the player with the most kills wins.

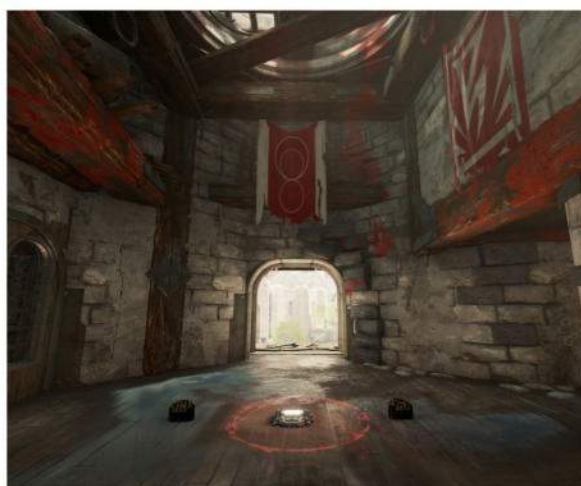
system. It didn't feature a helmet, but its cameras and screens could measure the position of the user and react accordingly. The VITAL helmet, developed as a pilot training tool by McDonnell-Douglas, included a head tracker. Also of note is Ivan Sutherland's Sword of Damocles, a head-mounted display which hung from the ceiling and added computer-generation graphics to the user's perception of the world.

A NEW WORLD OF VR GAMING

The term "Virtual Reality" was coined in 1987, by Jaron Lanier. His company, VPL, went on to release the Dataglove and the EyePhone head-mounted display. They're a major milestone in the history of VR, but way too expensive to become mainstream. The term "Augmented Reality" came from researchers Thomas Caudell and David Mizell, who used it for a head-mounted display for aircraft construction at Boeing.

At the start of 1992, a virtual reality arcade featuring two VR games opened in Nottingham, UK. Legend Quest saw four players at a time compete in the sci-fi themed *Dactyl Nightmare*, a death-match where you blasted other players while being

stalked by killer pterodactyls. There was a fantasy role-playing game also called *Legend Quest*, where you played a warrior, wizard or thief and chose from three character races: human, elf or dwarf. It gained a decent cult following, but it wasn't widely franchised as had been hoped.



First-person games like *Unreal Tournament* let you look around in 360 degrees by using a mouse or joystick to move your in-game head.



The most popular virtual reality system for home consoles is Sony's PlayStation VR.

Home VR got off to a slow start. The Sega VR headset for the Sega Genesis/Mega Drive console was revealed at the 1993 Consumer Electronics Show, but never released. Ten years later a Kickstarter was launched which eventually led to the popular Oculus Rift, which was soon bought by Facebook. The Oculus Quest 2 is currently the best-selling VR headset of all time.

Google Glass proved much less popular. First sold as a prototype in 2013, it was underpowered and cost \$1,500, which proved too much to allow it to find its niche in the nascent home spatial computing field.

Home VR gaming is still being fought over. As well as the aforementioned Oculus headsets (now known as "Meta"), Sony's PlayStation VR has sold over five million units, the Valve Index is great for VR games on Steam, and there's HTC Vive and Samsung Gear VR to choose from too. Microsoft's HoloLens has been promised for years, but as of yet, it's not available to consumers. A public release has yet to happen.

And if you're on a budget, there's always the unpowered VR goggles that house your smartphone and are used to watch online VR videos. Some people love them, but they can be very unkind to those who wear glasses.



VIRTUAL REALITY: THE CURRENT KIT

Vision Pro faces some stiff competition from the leading virtual reality options already available. **PlayStation VR**, for example, is relatively affordable, runs quality, ambitious games and is comfortable to wear. The **HTC Vive Pro 2** is more expensive, needs a decent-specced PC, and can look a little foggy at times, but its hardware is very comfortable to wear and overall picture clarity is good.

The **Valve Index** is another VR system that needs a PC; it still doesn't support macOS. It's prohibitively expensive too, costing \$999. But if you're serious about virtual reality, it has excellent picture quality, a superb 130-degree field of vision and some of the best controllers available on a home VR system. The very affordable **Samsung Gear VR** was once a no-brainer if you had a Samsung Galaxy smartphone, but the device is steadily being discontinued and doesn't support devices that update to Android 12.

Our favorite current virtual reality system is the **Meta Quest 2** (formerly **Oculus Quest 2**). It's very well priced, requires no other hardware and gives an incredibly immersive experience. Look out for the new **Meta Quest 3** in the fall too.

The Present

What's unique about Vision Pro, and how did it reach fruition?

APPLE HAS LONG been interested in what it's now calling spatial computing. As early as October 2020 the company introduced a LiDAR scanner in the iPhone 12 Pro. It stands for Light Detection and Ranging, and is a remote sensing method that uses a pulsed laser to measure the distance between the device and surrounding objects. This gives an excellent 3D impression of the room. It's great for augmented reality features, like trying out new furniture before buying by superimposing its graphic onto the room.

For third-party developers, Apple released ARKit, offering augmented reality frameworks and tools for them to use. There are some great augmented reality apps and games available on Apple's app store, and you can check them out at <https://bit.ly/3Xn7tMo>.

After years of development, this technology comes into its own with the Vision Pro. These VR/AR goggles "seamlessly blend digital content with your physical space". Announced at WWDC23 in June and due for release "early next year", Apple's "first spatial computer" gives you an interface superimposed on the real world which is controlled with your eyes, hands, and voice. Its operating system is visionOS, which has a home page that resembles iOS and macOS-like windows with which you interact. Vision Pro's ultra-high-resolution display system packs in 23 million pixels, and it runs on an Apple silicon dual-chip system. An M2 chip takes care of the processing, while a new R1 chip handles input from the device's 12 cameras, five sensors, and six microphones.



Apple's CEO Tim Cook shows off the new Vision Pro at the Worldwide Developers Conference, 2023.

You can watch movies on the new device for a real cinema-like experience. Apple TV+ is a no-brainer, we're already promised Disney+, Netflix seems inevitable, and providers of TV streaming and catchup services are sure to release their own apps too. Naturally, gaming on such a large virtual screen would also be great fun.

A BLENDING OF WORLDS

As you'd expect from Apple, a lot of attention to detail has been taken with the interface. It's sensitive to light, adapting to ambient conditions and in-room decor, so the windows and menus become part of the room. They even cast virtual

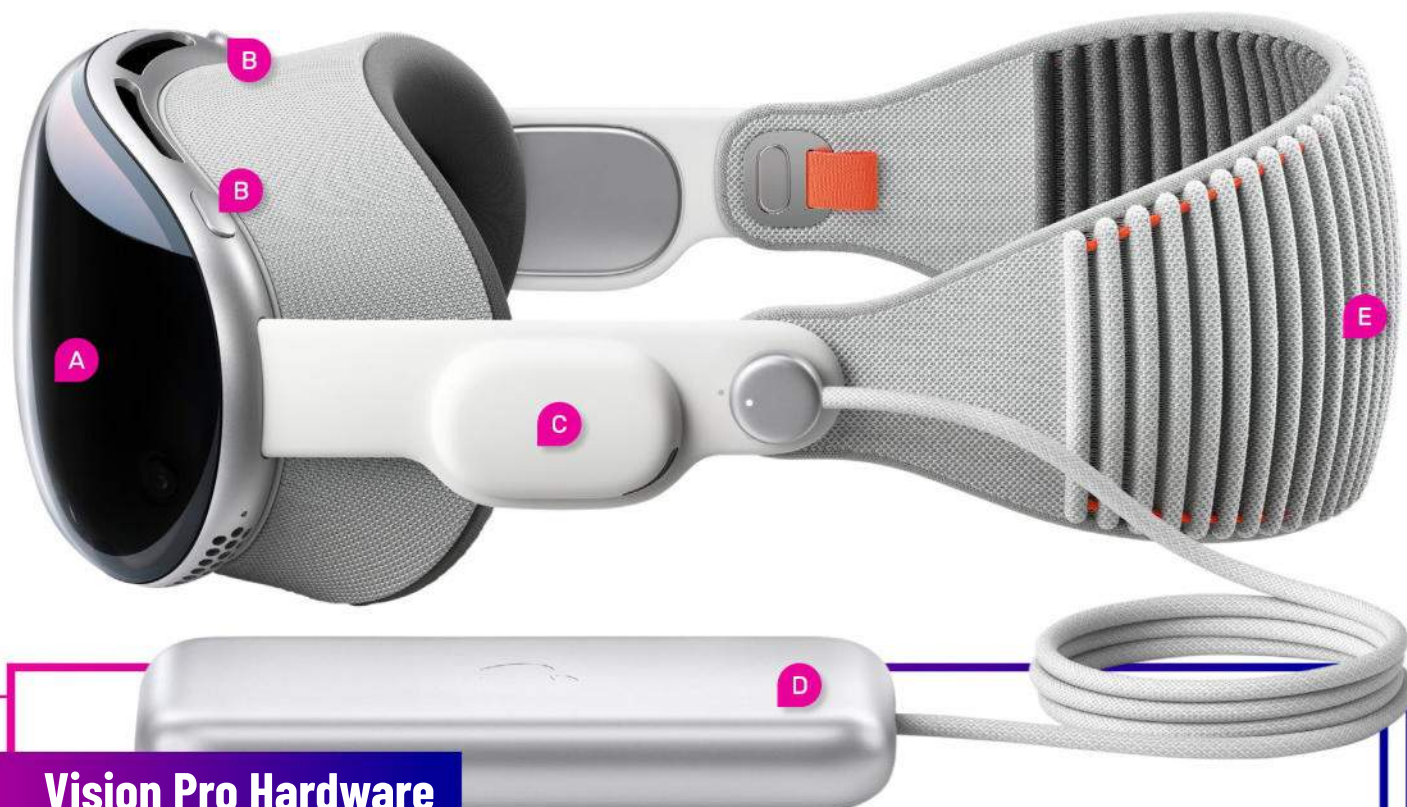
visionOS INTERFACE

VisionOS is instantly familiar to anyone who's used an iPhone or an iPad. Apps are presented as icons, but you open and close them with hand gestures and voice commands instead of tapping a screen.

Some of the apps will also be familiar to existing Apple fans, as will their functions and features. The Photos app, for example, syncs with your iCloud data and shows your pictures and videos, crystal clear and imposed on your physical space. You're no longer limited by the size of your screen. You can make your apps any size you want.



The visionOS interface is clearly inspired by iOS and iPadOS.



Vision Pro Hardware

A

3D GOGGLES

Two micro-OLED displays each deliver more pixels than a 4K TV, and a light seal keeps out ambient light.

B

CONTROLS

The device's controls are clearly inspired by Apple Watch. There's a Digital Crown and a button.

C

SPATIAL AUDIO

The speakers are positioned close to your ears, and deliver 3D audio that blends with real-world sounds.

D

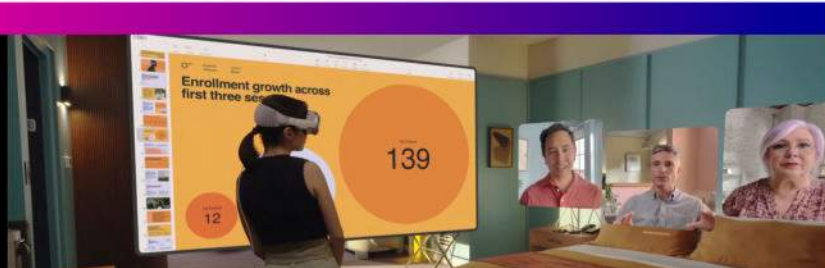
THE BATTERY

The external battery, connected to the headset with a cable, provides around two hours of use.

E

HEADBAND

The headband is breathable and stretchable for comfort. A Fit Dial is used to make sure it's snug.



FACETIME ON VISION PRO

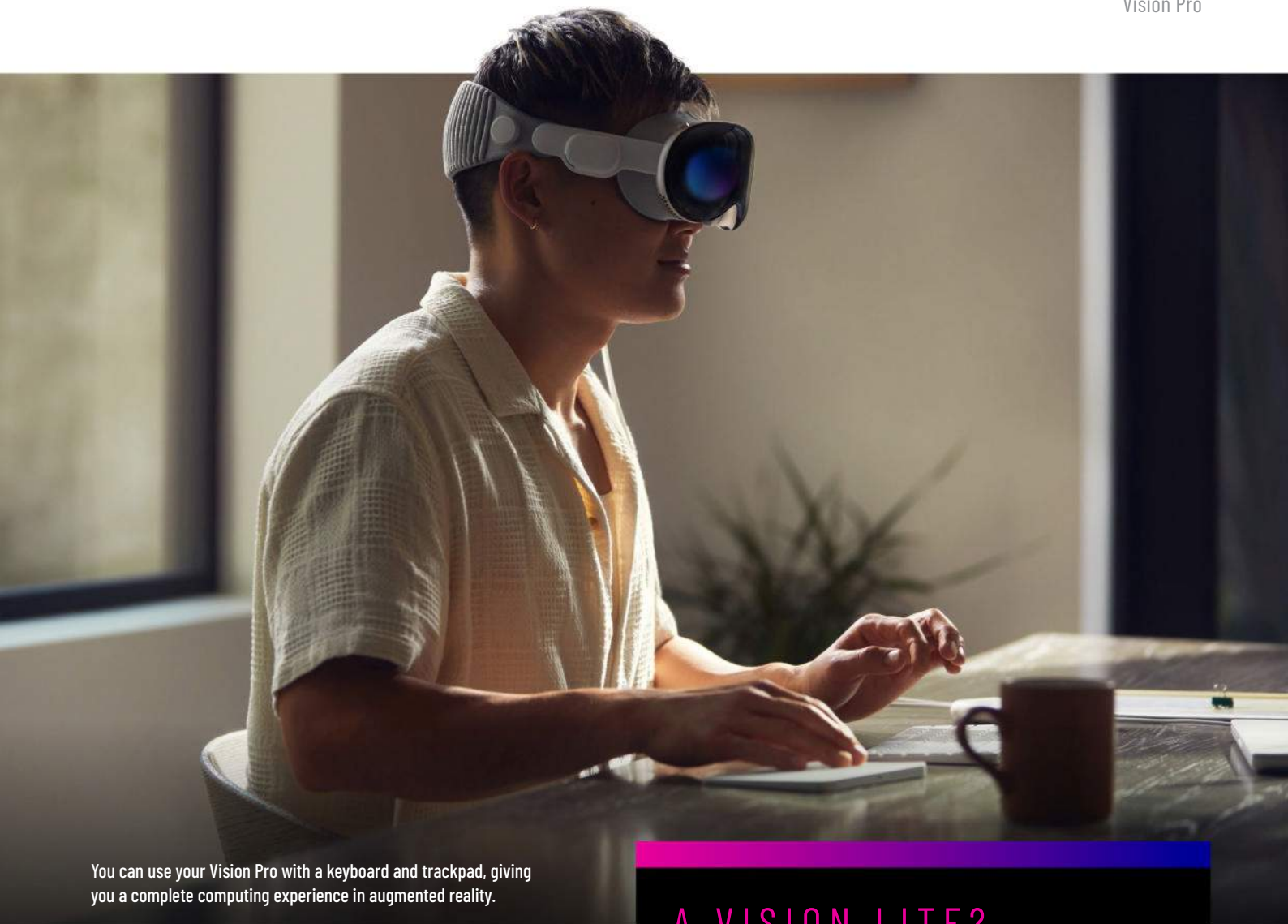
As with most recent Apple products, communication is at the heart of Vision Pro. FaceTime calls are catered for, with each participant in the video conversation appearing in a different tile. You can scale and position the tiles however you please, and to make conversation more natural, the device's spatial audio features make it appear that each person's voice is coming from the location of their tile.

You can use your Vision Pro to create a very realistic digital avatar of yourself. This allows others to see your face while you're wearing Vision Pro in a video chat, dynamically following your head and hand movements.

shadows, offering a sense of scale and distance. You can move apps around the room, and expand or reduce their size by dragging corner handles.

You don't have to use your own room as a backdrop either. Apple's Environments are scenes from around the world which you can use as the equivalent of an iOS/iPadOS wallpaper or a macOS desktop image. You can even use a blend of the two, turning the device's Digital Crown to set how immersed you are.

As well as bringing existing technologies on board, Vision Pro is packed with new innovations. Take EyeSight. As Vision Pro augments your environment rather than taking you out of it completely, while using the device your eyes are shown on the back of the goggles. If you choose to immerse yourself in the virtual environment, so you can't see those around you, your eyes are replaced by a colored pattern so others know you can't see them. Vision Pro is also Apple's first ever 3D camera. You can take pictures and videos in 3D, and relive those memories as never before. It's amazing what we might be able to achieve with Apple's first spatial computer.



You can use your Vision Pro with a keyboard and trackpad, giving you a complete computing experience in augmented reality.

The Future

Where next for spatial computing and the Apple Vision Pro? We take a look at what to expect

THE TECHNOLOGY BEHIND Vision Pro looks great, but as Apple is well aware, tech is a means to an end not an end in itself. What will the company's first spatial computer be used for? And how will it find its place in the modern home and office?

With apps like Safari, Keynote, Calendar, Messages, Notes, Freeform, the Microsoft Office suite and more, Vision Pro could be a real boon for work, and not just for remote video meetings. You can, for example, use the Messages app to send 3D images as well as regular missives, pulling them out of the app and exploring them in your own space. This is great for industrial designers, architects and engineers, for example, and others who might need to share prototypes.

Image rights: Apple Inc.

A VISION LITE?

One of the ways Apple increased the iPhone's market penetration was to release a lower-cost device for entry-level users: the iPhone SE. Could the company take a similar approach with the Vision Pro?

Being such a new device in an emerging market (unlike the iPhone, which was preceded by many other cell phones), we would expect the Vision Lite (or whatever Apple calls it) to arrive early in the product's life cycle; maybe as early as a year after the release of Vision Pro. Where Apple would make the savings required to keep the retail price down is a puzzle, but maybe a year's worth of Vision Pro production would pave the way for a lower-cost device with fewer components. Perhaps a new Apple silicon chip could integrate the M2 and R1 chipsets, for example, in a lower priced but less powerful alternative?

Devices like the Meta Quest 2 come in at less than \$300, which is affordable enough to satisfy even if you only use it occasionally. We doubt a Vision Lite could ever reach this price point, but it needs to be no more expensive than around \$1,200.

When watching the room as well as content, your eyes are shown on the goggles.



It could prove great for entertainment too. As we've already said, it provides a real immersive experience when watching TV or movies (including 3D movies), and as the Music app is included in visionOS, you can listen to your tunes too. On launch we're promised over 100 Apple Arcade titles that can be played with Vision Pro, which offers full controller support, and games that make full use of its augmented and virtual reality capabilities will surely follow.

But will Vision Pro last long enough to achieve its goals? Two main challenges stand between Vision Pro v1 and the sort of mass adoption it needs to succeed: price and battery life.

A PRICEY PROPOSITION

When Vision Pro is released early next year (or so we're promised — there may be delays), it will cost \$3,499 in the US. That's more than most Apple notebooks. Even if it's worth the price, people

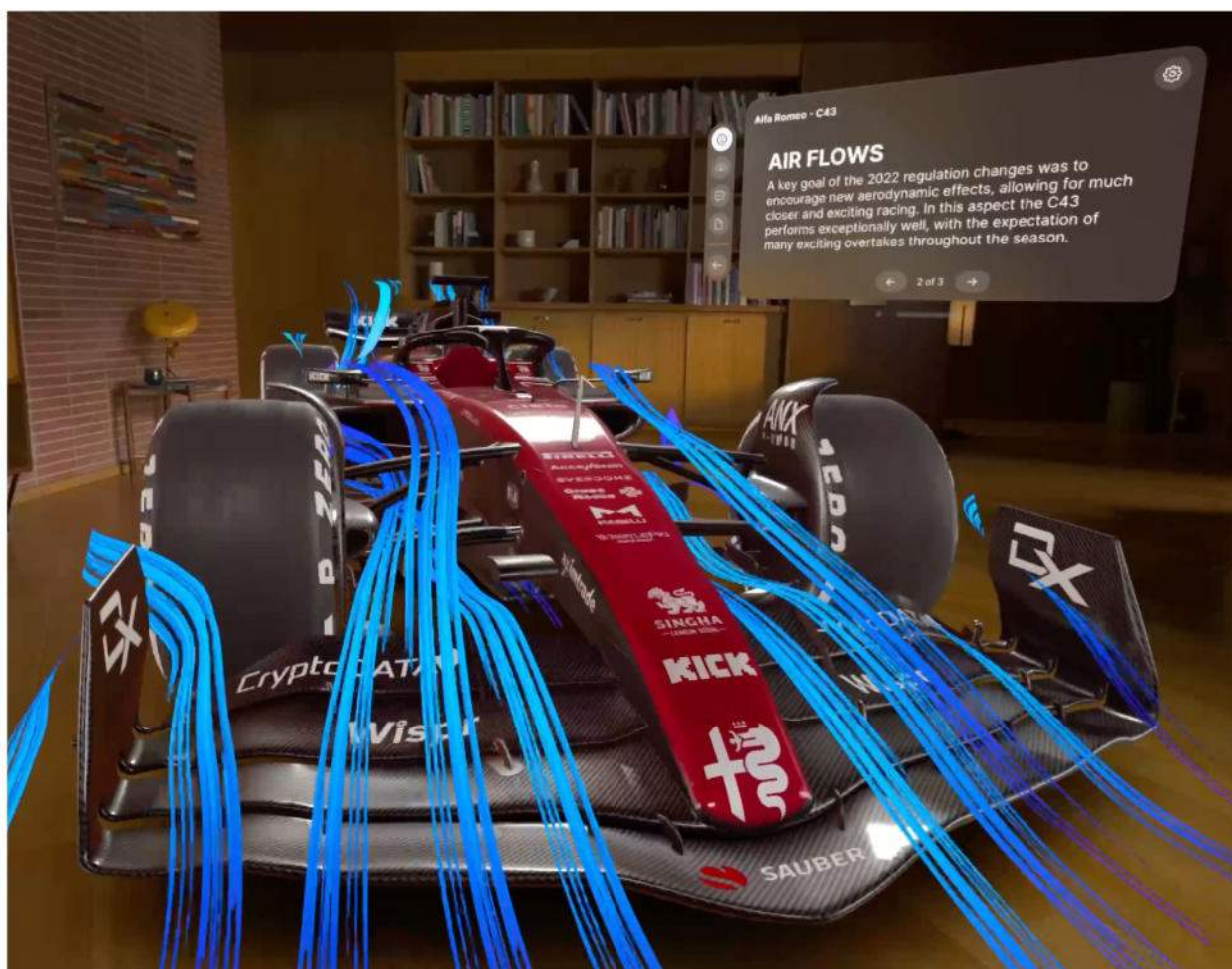
FACETIMING WITH VISION PRO

Although visionOS is a completely new platform, its frameworks and tools are already familiar to Apple mobile developers. So despite being new, it shouldn't be a major challenge to program visionOS apps for the headset.

visionOS apps can include one or more windows, which are built with SwiftUI. As well as traditional controls, developers add depth with 3D

content. Apple's 3D rendering engine, RealityKit, is used for 3D content, animations, and visual effects. ARKit understands your surroundings and powers core system capabilities that apps automatically benefit from when they're in the Shared Space. Games programmers can use Unity, which has access to the benefits of visionOS, making titles created on the platform look right at home.

This low entry bar should work in Apple's favor, reducing the commitment required, and therefore the cost, of developing apps for the new platform. Even so, making the best use of Vision Pro's technologies will still take time, effort and (most importantly) money. We expect early releases will be "shovelware", that is, created for other Apple platforms and tweaked for a visionOS release.



This visionOS app, built with an early development kit, monitors the air flow over a racing car.

THE APPLE TEAM SPEAKS...

“[Vision Pro] marks the beginning of a journey that will bring a new dimension to powerful personal technology.”

TIM COOK, CEO



“Vision Pro lets developers reimagine existing apps and create brand-new ones.”

SUSAN PRESCOTT, VP, WORLDWIDE DEVELOPER RELATIONS



“Apple Vision Pro allows us the freedom to imagine and experience unlike anything we’ve created before.”

ALAN DYE, VP, HUMAN INTERFACE



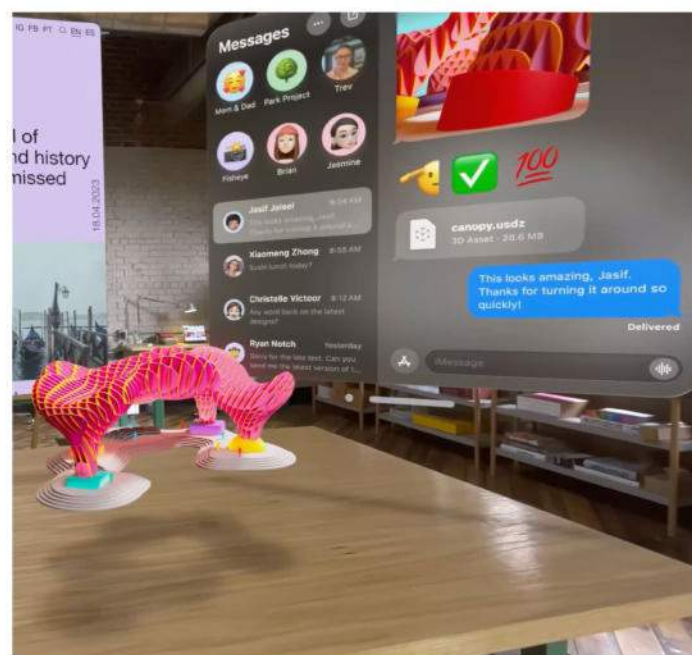
won’t spend that much — especially on a new and untested piece of tech — without careful consideration. Potential purchasers might well hesitate, watching the Vision Pro scene develop and mature before joining it. If initial sales are slow, developers and content providers might do the same, reluctant to invest resources on a platform with a limited user base. This could create a vicious circle where the public and the industry alike adopt a “wait and see” attitude, with developers waiting for more sales before getting on board and users waiting for more content before buying, preventing Vision Pro from achieving the early market penetration it needs to become a success.

RESTRICTED FREEDOM?

The other major challenge is battery life. Putting the power supply in an external unit you can keep in your pocket was a good move; much better than housing such a heavy component in the headset. But it lasts just two hours! That’s not enough to watch most movies. You can plug it in, of course, fine when you’re sat down for instance, but otherwise you’re tethered to a single spot, without the freedom advertised in the Apple keynote.

No doubt when Vision Pro is released spare batteries will be on sale in the Apple Store, with third party devices to follow. And hopefully, you can unplug the dead one and connect a new cell without turning off the headset. Even so, battery life is a key element that Apple will have to address going forwards.

There can be no doubt that Vision Pro is an exciting piece of kit. We’ve seen augmented and virtual reality systems before, but is this the first device to get it right? Only time will tell.



You can send and receive 3D objects using Vision Pro, and look at them from every angle.

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CREATE

HOW TO DO ANYTHING ON YOUR MAC, iPhone & iPad

Master Split View in macOS

Work with two apps at the same time by slicing your Mac's screen in two

REQUIRES

macOS 13 or later

YOU WILL LEARN

How to work across two apps by having both displayed on screen

IT WILL TAKE

3 minutes



WHEN YOU'RE WORKING on your Mac, you can find that your desktop becomes cluttered with numerous windows, making it more difficult to focus on the task at hand. Many users will spend time resizing and moving those windows or making an app fill the screen. But there's thankfully another, more efficient way to manage your workflow: Split View.

As the name suggests, you can have two apps displayed side by side so that you're not constantly clicking back and forth across scattered windows. Each app automatically fills the screen from top to bottom, removing the Dock and hiding the menu bar to ensure that the important parts are on display. This also saves lots of time — there's just a single way of adjusting how much you see of each app.



You're not restricted by the apps you use either. In fact, you can even place two windows of the same app next to each other; for example, you can have two instances of Safari open if you want to refer to two different websites at once. **DAVID CROOKES**

HOW TO Use Split View on Mac

GENIUS TIP

Can't get Split View to work? Then go to Apple menu > System Settings > Desktop & Dock and activate "Displays have separate Spaces".



1 Select an app

For Split View to work, you'll need at least two apps open on your desktop. Select one app that you want to work with but, rather than mess around dragging and positioning it, hover over the top-left green button.



2 Left or right

The Split View menu shows three choices but, in this instance, you only need to consider two of them. Simply decide whether you want this particular app window to appear to the left or right of your Mac's screen.



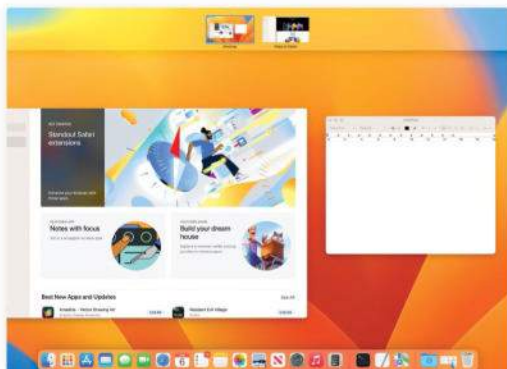
3 Select second app

The app will move into position, taking up exactly half of the screen space. You will see any other apps that were open on the Desktop in the other half. Just click the second open app that you'd like to work with.



5 Swap them over

Click an app in Split View to work with it, or move the pointer to the top of a window to see its menu. Windows can also be swapped around by selecting and holding the top of one and dragging it left or right.



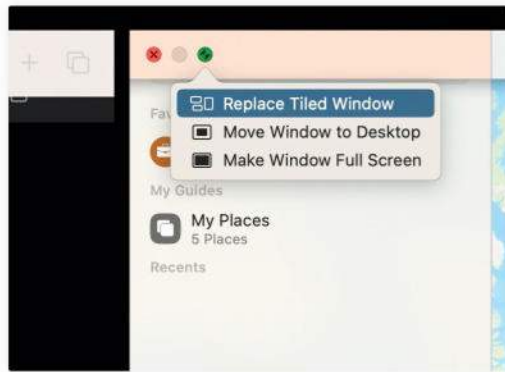
7 Use Mission Control

You can also switch to other apps via Mission Control. Either press the Mission Control key (F3), swipe up with three fingers on a trackpad, or double tap the Magic Mouse with two fingers, and the desktop appears.



4 Make more room

The second app will then fill the other half of the screen, sitting side by side. You can adjust the width of the windows, giving more space to one and less to another, by dragging the vertical line that runs between them.



6 Replace a window

Want to work with a different app? Hover over the green button of the window you wish to remove and select Replace Tiled Window. Then select any other open app on the Desktop. The other two options end Split View.



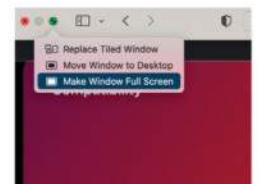
8 Drag an app

Use Mission Control to switch between the desktop and an existing Split View. You can create a Split View from scratch too; just drag an app onto a full-screen app thumbnail in the Spaces bar of Mission Control.



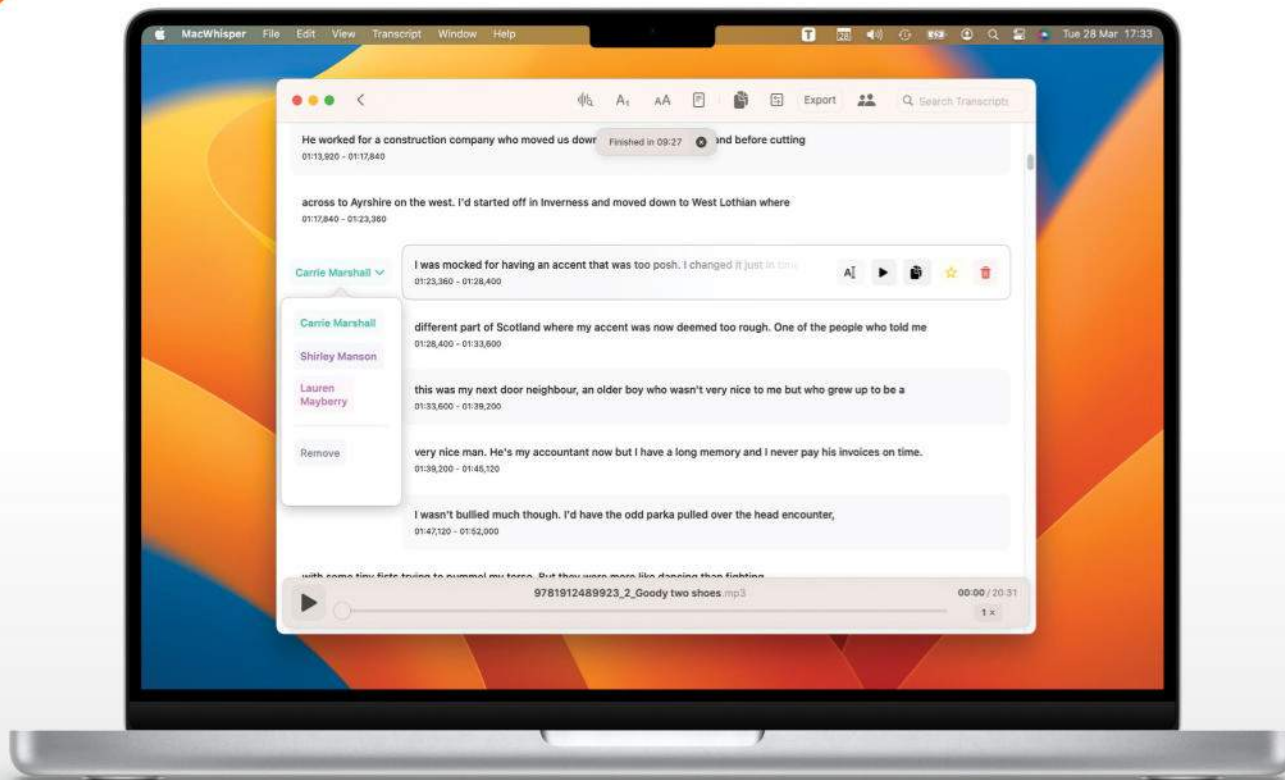
GENIUS TIP

Tiling on a Mac refers to two apps running simultaneously. They're different from Microsoft Windows Live Tiles which once represented apps in the Start menu.



JARGON BUSTER

To exit Split View, you can just click the green full-screen button on the app window you don't want to keep using. The other app will fill the screen.



Turn audio into text

Transform spoken audio into editable, searchable, usable text with MacWhisper

REQUIRES

MacWhisper, macOS 12 or later (M-series Mac recommended)

YOU WILL LEARN

MacWhisper can turn spoken audio into usable text

IT WILL TAKE

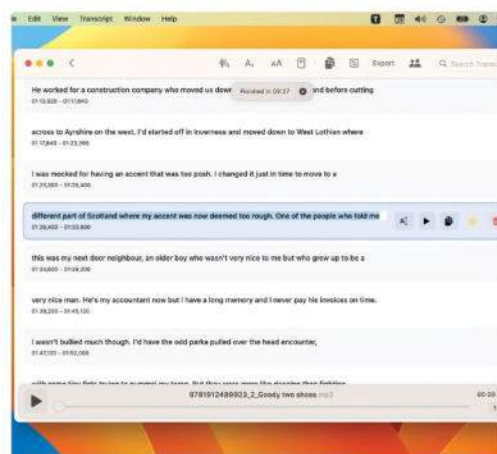
Depends on task

GENIUS TIP

If the app you want to transcribe from doesn't save or export audio, Rogue Amoeba's Piezo (rogueamoeba.com) — a simpler, cheaper version of Audio Hijack — will do it for you.



MACWHISPER IS A clever AI-powered app for Mac that quickly and accurately transcribes spoken text from live audio, recordings, and videos. It has been trained on nearly 700,000 hours of audio data, and unlike online transcription services it runs natively on Mac so it's always available. Unusually for a free app,



Transcribed text appears as it's recognized, and you can edit it in place or quickly play the original audio to work out what's being said.

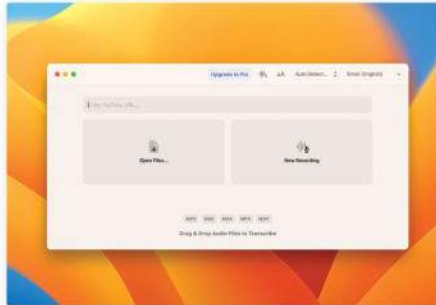
MacWhisper (goodsnooze.gumroad.com) doesn't keep its best features locked away or blast you with ads. It simply gets on with the job, and the only real limitation is that you don't get its very best language models, and text and subtitles output doesn't include HTML or PDF.

CLEVER RECOGNITION

There's lots to like here, including in-place text editing and the ability to separate your transcript by speaker if there's more than one person in it — great for transcribing meetings, podcasts, and other potentially confusing multi-speaker setups.

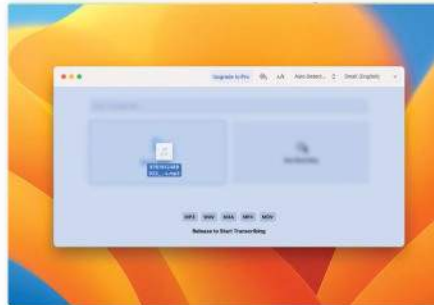
Given that it's free and ad-free, this app is superb value — but its paid-for incarnation, MacWhisper Pro (currently around \$20), is great value too. It enables you to use even more accurate recognition models, using larger speech databases. The more accurate the transcription, the slower the recognition process — roughly two-and-a-half times slower — but the results are incredibly impressive. We threw a full chapter of an audiobook at it and it didn't make a single mistake. **CARRIE MARSHALL**

HOW TO Transcribe audio with MacWhisper



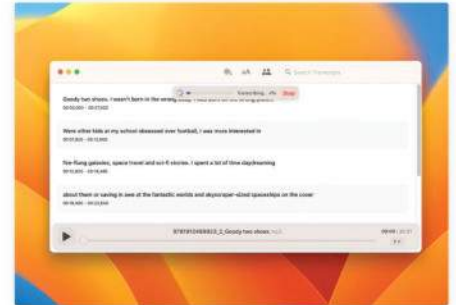
1 Choose your input

MacWhisper can work with two kinds of audio — live and recorded. To use the latter it needs to be in one of the formats MacWhisper recognizes: MP3 or WAV for audio-only files; or M4A, MP4, or MOV for videos containing audio.



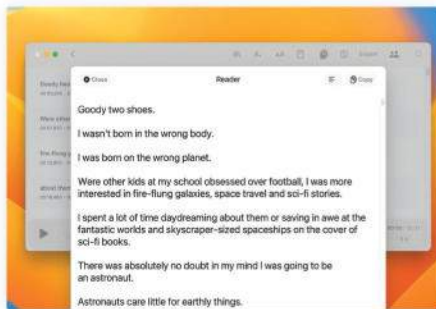
2 Drag your file

To use an existing audio file, drag it over the MacWhisper window. If it's in a non-English language the app will try to recognize it, but if you want to avoid possible confusion you can say exactly what it is in the Auto Detect drop-down.



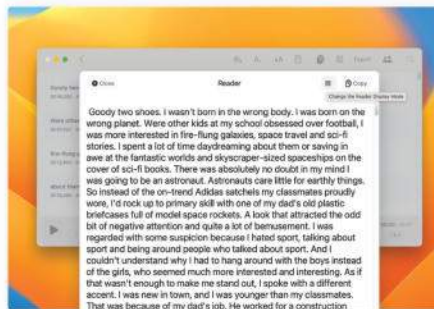
3 Let it listen

MacWhisper has to listen to your audio in order to transcribe it — but it does so very quickly. In this example, we dropped a 20-minute MP3 onto the app; it transcribed the whole thing on an M1 MacBook Pro in roughly three minutes.



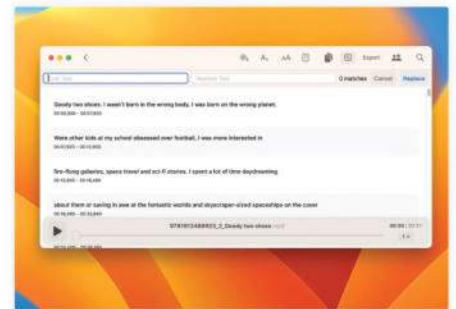
4 Display your document

Transcribed text will appear as the file is analyzed. Once finished, you can see the whole thing by tapping the Reader icon in the toolbar. MacWhisper will try to guess line and paragraph breaks.



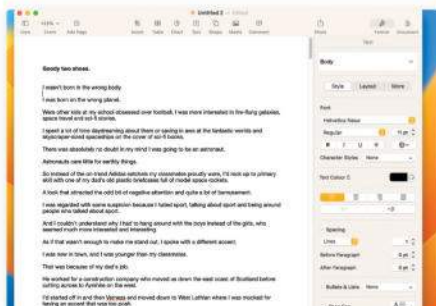
5 Change the breaks

If you'd rather get the text as one big block, simply click on the icon immediately to the left of Copy at the top-right of the Reader panel. This toggles between different layouts but leaves the transcribed text unchanged.



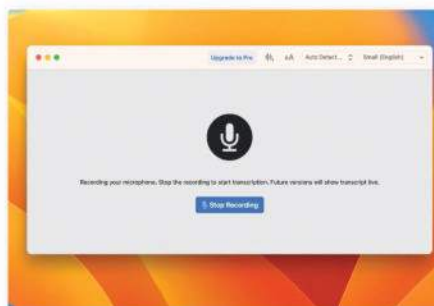
6 Fix the fluffs

You should expect to see the odd mistake, but if you encounter the same error multiple times, you can click on the Search and Replace icon in the toolbar to find and fix those mistakes throughout the transcription.



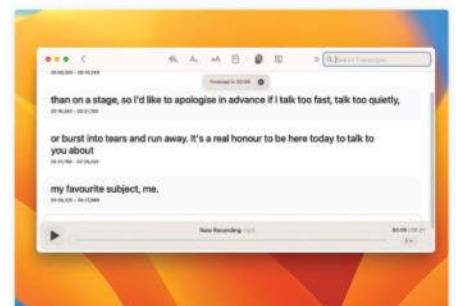
7 Export the text

You can export the transcribed text in two ways — using the Copy icon in the toolbar, or the Export one next to it. The latter offers various text formats; paying customers also get HTML and PDF. We've copied and pasted into Pages.



8 Transcribe in real time

You can automatically transcribe live audio from a mic or other connected audio device. You'll see a microphone icon as you record (future versions of the app will show the transcription on-screen as it's happening).



9 See what you said

The interface is the same when using live audio. Once you stop recording, the app will process the recording like it did with the MP3 file (at the same speed). You can then perform search and replace before copying/exporting your text.

Use live mask edits

How to apply non-destructive live masking to your images

PART
3 of 3

REQUIRES

Affinity Photo 2
(affinity.serif.com), \$69.99

YOU WILL LEARN

How to modify adjustment
layers and filters using
live masks

IT WILL TAKE

15 minutes



THE FEATURE-RICH AFFINITY

Photo 2 now has a new collection of live masks that enable you to mask layer content based on an image's luminosity, hue, or frequency (color and tonal range).

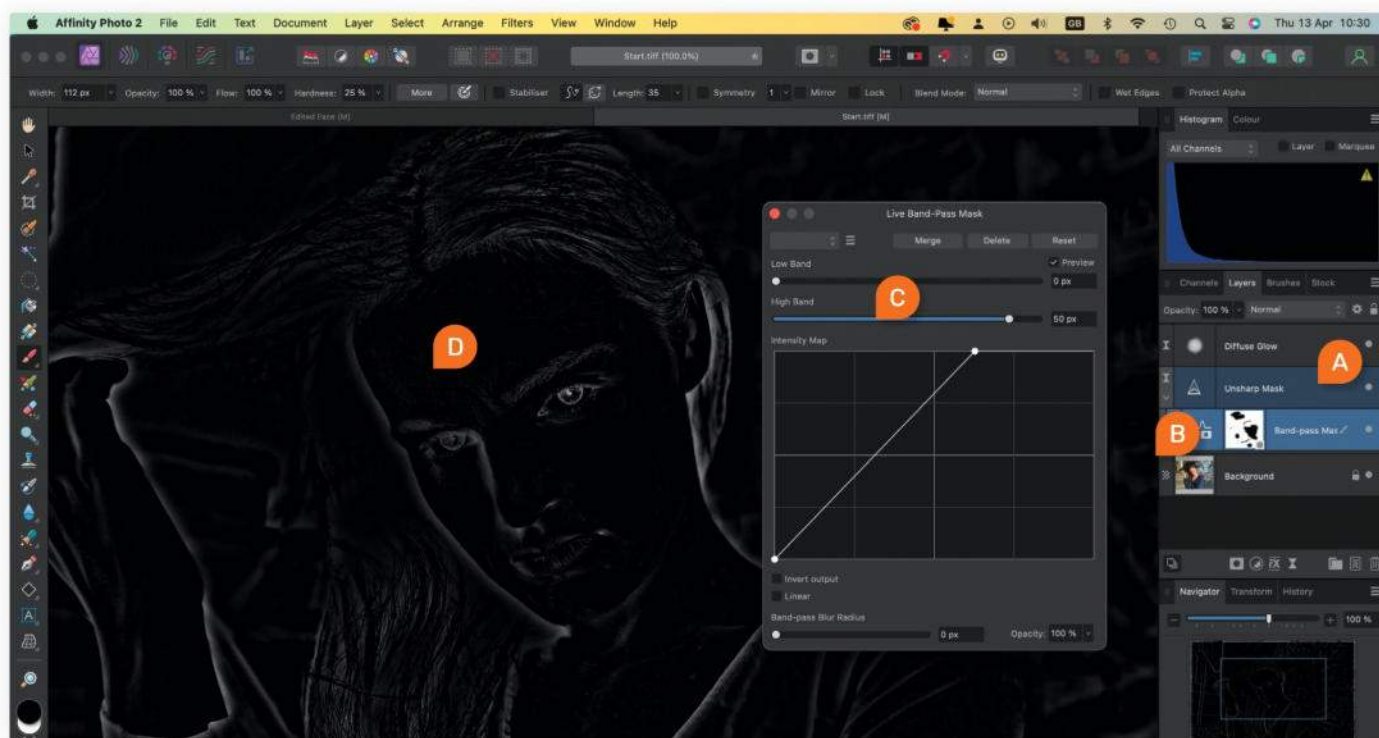
We covered the Live Hue Range Mask in part one of this series of tutorials, so here we'll focus on how the Live Band-pass Mask and the Live Luminosity Range Mask enable you to take more control as you work on an image. For example, when retouching a portrait you can use the Live Unsharp Mask to sharpen the shot. Sharpening

works by increasing contrast around edges, such as eyelashes, for more impact. However, this sharpening process also exaggerates textures, such as skin pores. Here, we'll show you how to use the new Live Band-pass Mask in conjunction with the live Unsharp Mask to get a satisfactory balance between sharpening details such as eyes while preventing features such as skin pores from being sharpened.

We will also utilize the new Live Luminosity Range Mask feature to make selective tonal adjustments to an image.

GEORGE CAIRNS

QUICK LOOK Understanding live masks



A

UNSHARP MASK

Despite its name, the Unsharp Mask filter actually sharpens image details by increasing the contrast around the edges.

B

LIVE BAND-PASS MASK

Fine-tune the adjustments of an attached filter by using a greyscale mask.

C

ADJUST CONTRAST

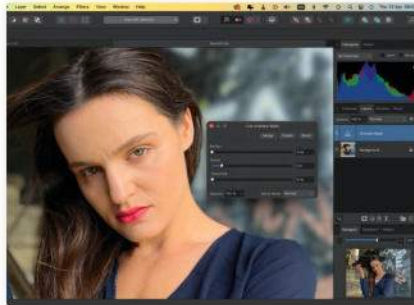
These sliders, and the control points in the Intensity Map, enable you to adjust the range of detail affected by the attached Unsharp Mask.

D

SELECTIVE SHARPENING

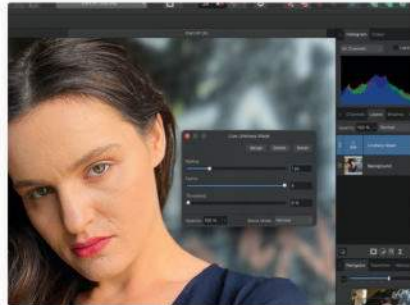
Lighter areas enable the attached Unsharp Mask to give features more impact. Black areas stop the mask from exaggerating pores.

HOW TO Use live masks to edit layers non-destructively



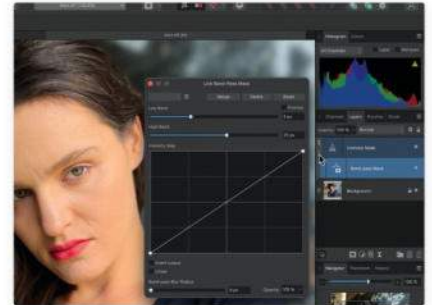
1 Summon Unsharp Mask

Click in a black area in the Layers panel to make sure the image layer is not selected. Choose Layer > New Live Filter Layer > Sharpen > Unsharp Mask. The Unsharp Mask filter will float above the image layer.



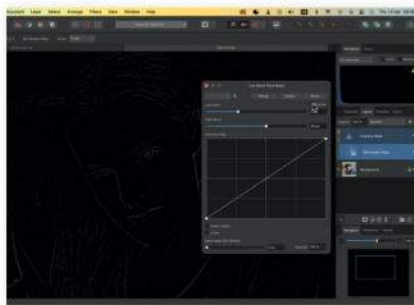
2 Sharpen the shot

In the Live Unsharp Mask box set Radius to 1. This spreads the increase in edge contrast by 1 pixel. Boost Factor to 4 for a higher-contrast change. This adds impact to eyes but also emphasises wrinkles and pores.



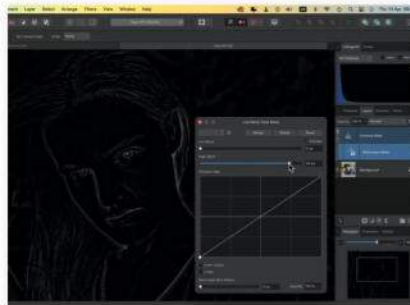
3 Add Band-pass mask

Click on the Unsharp Mask layer in Layers panel. Choose Layer > New Live Mask Layer > Band-pass. Click the Unsharp Mask layer's drop-down icon to toggle open the attached Live Band-pass Mask.



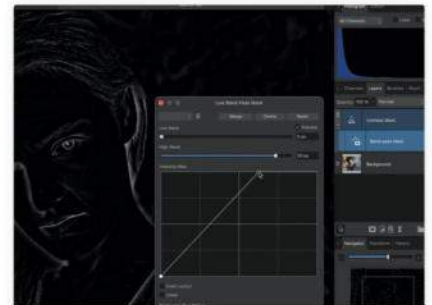
4 View the mask

In the Live Band-pass Mask window, select Preview. The black areas here stop the attached Unsharp Mask from exaggerating fine details such as pores. The white areas allow key features such as eyes to be sharpened.



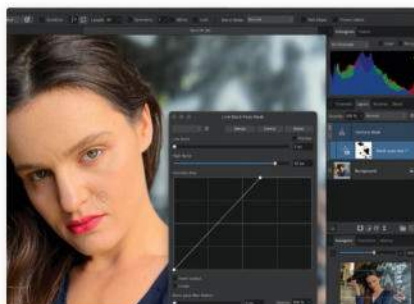
5 Adjust the mask

Drag the Low Band slider left to 0. Drag the High Band slider right to 50. This increases the contrast of the mask, allowing the Unsharp Mask to sharpen the brighter areas while stopping it from sharpening skin pores.



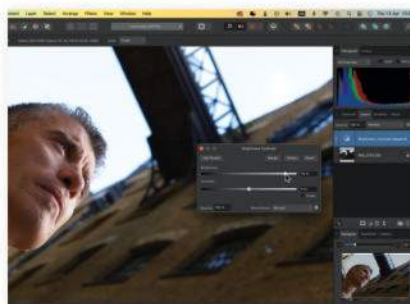
6 Increase intensity

The Intensity Map has a control point at the top-right. Drag this left to increase the brightness of the white areas. The increased contrast allows more sharpening in the whiter sections of the mask.



7 Edit the mask

Uncheck Preview to see the image. Choose the Brush tool. Click on the Live Band-pass Mask layer. Spray a black brush over any wrinkles, lines, and pores to manually mask the effect of the attached Unsharp Mask filter.



8 High-contrast scenes

A Brightness/Contrast adjustment layer brightens up underexposed shadows. However, the sky's become overexposed. We need to make selective adjustments with the new Live Luminosity Range Mask.



9 Edit Luminosity Range

In the Brightness/Contrast adjustment layer, choose Layer > New Live Mask Layer > Luminosity Range. Drag the curve downwards to restrict the brightness adjustments to the darker areas.

Master Apple Music Classical

If your musical tastes are more Mozart than Miley Cyrus, then start here

REQUIRES

Apple Music Classical app,
an Apple Music subscription

YOU WILL LEARN

How to use the Apple Music
Classical app for iPhone

IT WILL TAKE

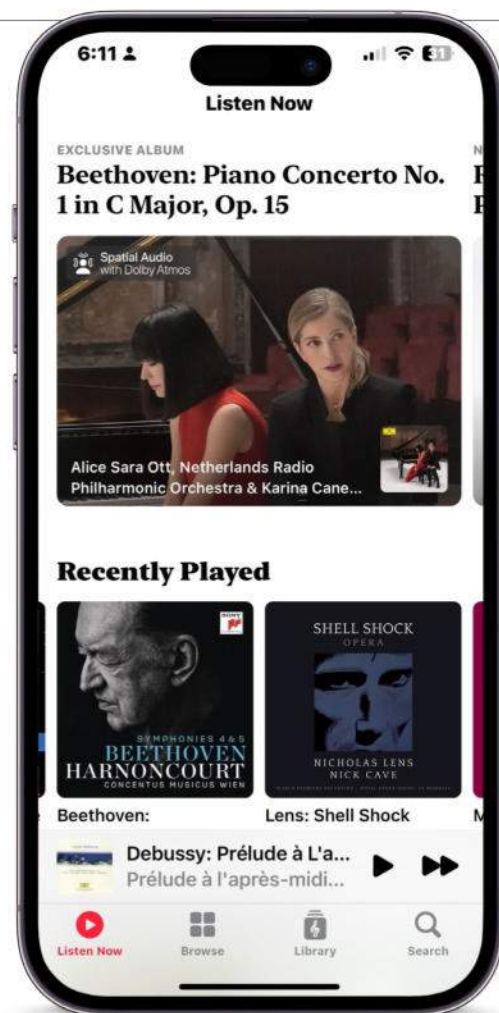
20 minutes

APPLE HAS TEAMED UP WITH LEADING CLASSICAL INSTITUTIONS TO OFFER EXCLUSIVE RECORDINGS

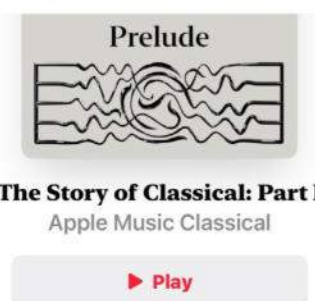


ARISING PHOENIX-LIKE from the ashes of Primephonic (which Apple bought in 2021), Apple Music Classical is a new app for iPhone that's solely dedicated to classical music fans. Available free to Apple Music subscribers (who pay \$10.99/month), it will both be instantly familiar to anyone who's used that service, while also offering several unique features — including improved search, 24-bit/192kHz audio, and a laser-like focus on genres ranging from Orchestral to Experimental Classical, with its catalog of five million tracks arranged by Composers, Conductors, and more.

While there's no Mac or iPad app yet, it's worth checking out, especially as Apple has teamed up with several of the world's leading classical institutions — including the Berlin Philharmonic and the London Symphony Orchestra — to offer exclusive recordings. Note: while you can add Apple Music Classical tracks to your library, you can't download music in the app. But, you can use the Apple Music app to download tracks and playlists added to your Apple Music Classical library. **ROB MEAD-GREEN**



HOW TO Get started with Apple Music Classical



1 The Classical interface

Apple Music Classical will be instantly familiar to anyone who's used the Apple Music app before, with four buttons along the bottom for you to tap: Listen Now, Browse, Library, and Search. First, let's start with Listen Now.

2 Listen Now

Here you'll be able to see all the latest Apple Music Classical releases at the top, with any tracks you've recently listened to available under the Recently Played section. If you're new to classical, scroll down to *The Story of Classical*.

3 The Story of Classical

This nine-part guide takes you on a journey through the history of classical music from the Middle Ages to the present day, with explanations and audio commentary to help you get oriented. It's a great place to start.

Browse



4 Start browsing

Tap Browse. At the top here you'll find three tabs: Catalog, Playlists, and Instruments. Tap each one to see how Apple Music Classical has been organized with each one containing sub-categories such as Genres or Composers.



7 Start listening

Here we've chosen "Yo-Yo Ma: Our Common Nature". Tap the Play button below the cover artwork to start playing the playlist. To add the playlist to your library, tap the "+" button in the top-right corner. Tap "..." to perform further actions.

Library



10 Visit the library

Now tap the Library button. Here you'll be able to see any of the works or tracks you've added to your library, arranged by Albums, Playlists and so on. Note you'll only be able to play these if you have an internet connection.



5 Choose a composer

In Browse > Catalog, tap Composers to reveal a list of classical composers. Tap any one of these to reveal a page for that composer with an Editor's Choice, collections of Popular Works, and even an artist biography.



8 More play controls

While a track is playing, tap the mini player at the bottom of the screen to reveal the full-screen player. From here you can access playback controls, adjust the volume, find out more info (tap the "i"), or send the track to an AirPlay speaker.



11 Go find something

Now tap the Search button, then type a search term in the field at the top. You can be quite specific in your search – for example, you can choose an artist, a composer, a work, and even a movement all at the same time. Clever stuff.

< Browse

Curated by Artists



6 Choose a playlist

Next, tap Browse > Playlists. Here you'll see playlists arranged by the likes of Composer, Artist, and Mood. Tap Curated by Artists to see playlists that have been specially created by classical artists such as Lang Lang and Yo-Yo Ma.



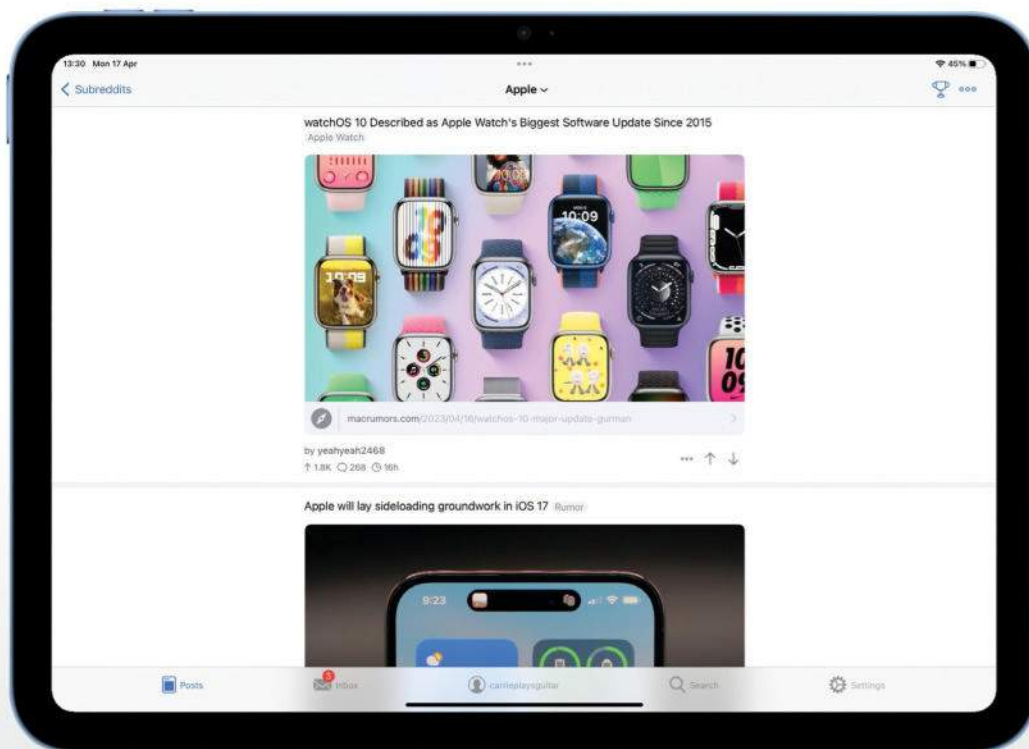
9 What's playing next?

Tap the "list" button on the right of the playback controls to see what's playing next. While you can't delete or reorder tracks (like you can in the Apple Music app), tapping another track will start that one playing instead.



12 Meanwhile...

One slightly odd element about Apple Music Classical is that it shares any tracks you've added to its library with your regular Apple Music library too. Hopefully an option to choose not to do that will appear in due course.



Make Reddit easier to use

See the most fun social network in a whole new way with Apollo

REQUIRES

Apollo (Free, offers IAPs),
iPadOS 15 or later

YOU WILL LEARN

How to join and view
Reddit in Apollo

IT WILL TAKE

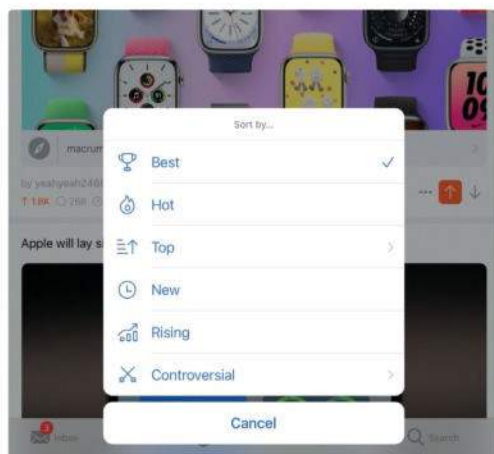
15 minutes

GENIUS TIP

If you're searching for unbiased product reviews on Google, add "reddit" to your search criteria to see what actual customers have to say.



REDDIT IS THE 10th most-visited website in the world. Whether you're looking for Logic Pro tips, air fryer advice or funny photos of dogs, there's a subreddit about it. But that sheer sprawl can make the main website intimidating. That's where Apollo comes in. It's designed for iOS, iPadOS and macOS, and it's here to make Reddit simpler and easier to use.



The little trophy icon at the top-right enables you to sort comments by date, popularity, or how controversial they are.

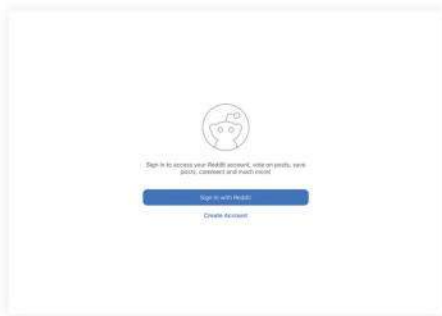
In this tutorial, we're going to use the free version of Apollo on iPad because that makes for the clearest screenshots, but it's actually best-suited to your iPhone where it doesn't have quite so much white space; the developers admit that the iPad version is "a work in progress".

It's easy to find and view all kinds of content, reply to others, change the way the app works and sort what you see, but there's one thing that Apollo's free version doesn't let you do — post new topics. That's reserved for the Ultra version (\$1.49/month), which also adds the ability to use multiple Reddit accounts from the same app.

PLENTY TO SEE

That doesn't mean the free version is severely limited, though. It contains an excellent media viewer for images and videos, shows previews of links inside comment threads, uses Markdown in comment writing, and supports Dark Mode too. If you've ever wanted to use Reddit but been put off by its Wild West feel, Apollo will make everything much more welcoming. **CARRIE MARSHALL**

HOW TO Join and use Reddit in Apollo



1 Sign in or up

If you already have a Reddit account, sign in here and Apollo will bring in your current subscriptions, messages, and settings. If you're new to Reddit, tap on the Create Account link and you'll be taken step-by-step through the process.



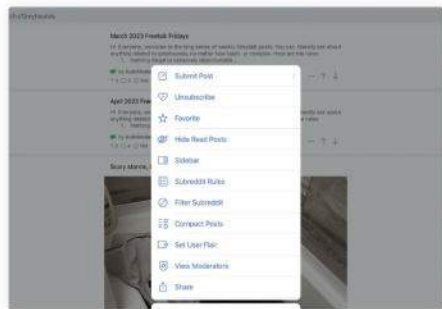
2 Pick your topic

Tap on Posts to choose from three options: Home, for posts from subreddits (topic-specific posting areas) you've subscribed to; Popular Posts (what's currently trending); or All Posts. Tap on the "+" button to find specific subreddits.



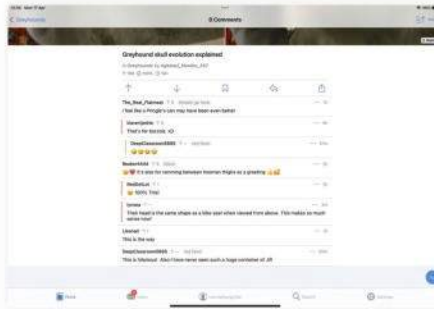
3 See your selection

In this example, we've searched for greyhounds, which takes us straight to the r/greyhounds subreddit. As you can see, it's simple — posts appear in an infinite scrolling window and you just click on the ones you want to read in full.



4 Adjust the options

If you tap on the "... options icon at the top-right of the screen you'll see a selection of options such as hiding posts you've already read, showing posts in a more compact view, viewing the subreddit's rules, and so on.



5 Read the chat

Reddit shows comments on its posts, which you'll see when you click on a post title. Here you can read what other people are saying, and you can also tap on the "... icon next to a comment to upvote (like) or downvote (dislike) it.



6 Get the look

Apollo enables you to change the appearance in many different ways, including applying new color themes, changing text size, reducing or increasing the size of posts, and showing or hiding icons and usernames.



7 Make it yours

If you get bitten by the Reddit bug, these features give lots of personalization power. There are lots of options, ranging from whether videos should unmute on playback to which apps links should open in and videos should play in.



8 Place your hands

Apollo also features gesture support, which works on touchscreens and trackpads alike. In the free version you can't customize which gestures do what, but the presets are all pretty straightforward and useful.

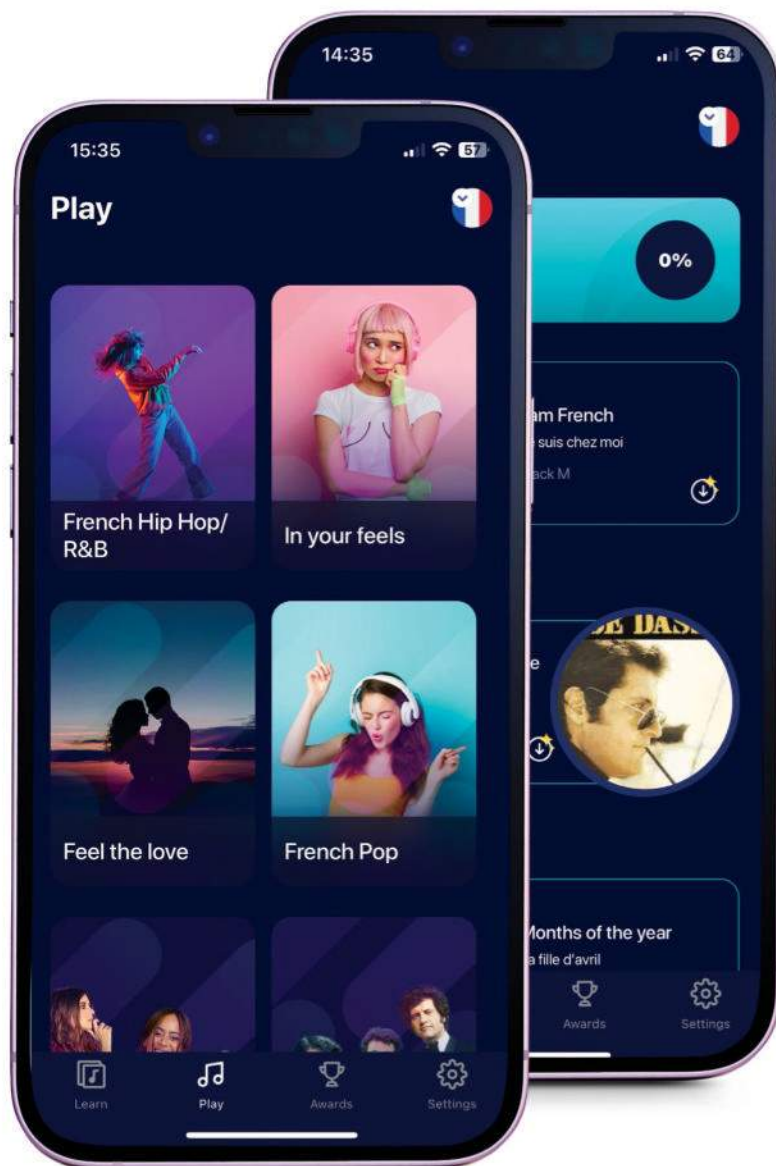


9 Upgrade to Ultra

The free version is packed with features, but the Ultra version offers more including the ability to protect your account with Touch ID or a passcode, multiple account handling, customizable gestures, and custom app icons.

Learn a foreign language through song

Lirica uses pop songs to teach European languages



REQUIRES

Lirica (Free, offers IAPs),
iOS 11 or later

YOU WILL LEARN

A European foreign
language via major
pop songs

IT WILL TAKE

5-10 minutes



WE'VE ALL HAD those moments when an international song has got stuck in our heads. Ever thought how that could help improve your foreign language skills? The team behind the Lirica app has. Lirica aims to teach you French, German, Spanish (and English) using the power of song. Don't worry, though, you do not need to be particularly musical to benefit!



As well as being a catchy way to learn how to speak another language, Lirica also offers tips for writing in it too.

Lirica is easy to use. Pick the language you want to learn, and you're guided through every stage. To start, you listen to a song, read the lyrics, and learn key phrases by tapping on them. After that, the app tests you through a variety of challenges. Each one of these gets a little more difficult as you build up your skills. It's not just about learning vocabulary and grammar either, there are audio tests too, so users learn how to pronounce words and phrases accurately.

LEARNING VIA SONG

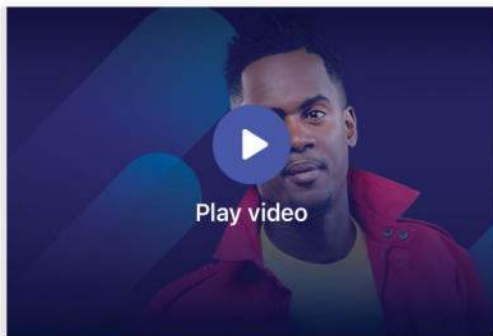
You can change what language you are being taught at any point — so, if you're feeling adventurous, you can brush up your skills in any of the languages that the app offers at the same time. If one of the levels is too easy, you can up the difficulty. Lirica is free, but some songs, lessons, and features require a subscription. A one-year Premium subscription costs \$29.99 (there's a seven-day free trial). There are also one-, three- and six-month options. **CHARLOTTE HENRY**

HOW TO Use Lirica to learn a language



1 Pick your language

When the app is first opened, you are asked to pick which language you would like to try first. This can be changed at any time. You also clarify your native language so the lesson is the right language for you to learn in.



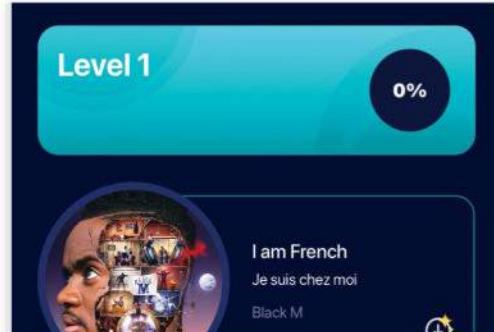
3 Watch the music video

With the lesson open, tap Play Video to watch and listen to the music video you will be tested on. You can watch the video as many times as you like to get used to the lyrics... or if you are enjoying it!



5 Learn from your mistakes

We can't all get it right first time so any mistakes are highlighted in red. The app shows the correct answer, but you lose a heart — you have three for each challenge. Don't worry, you can always try again to improve your score.



2 Start your first lesson

To start the first lesson, click on its title (top of the page). This example is "I am French." As you progress, Lirica tells you what to expect from each lesson. For now, open up your first song and get used to how things work.



4 Time for a challenge

Once acquainted with the song, it's time to take your first challenge. Tap "1. vocab challenge" to begin. The app helps you through, firstly by tapping on the words highlighted in blue. You are then tested on these key words.



6 Keep going!

There are various types of tasks available. When you have finished one challenge, move on to the next. Once you've completed all the challenges for one song, go back to the Learn tab and start a new one.



JARGON BUSTER

The Awards tab enables you to keep track of your progress, including how many words you've learned, and any achievements the app gives you.



GENIUS TIP

The Play tab has a library of songs and challenges. You can share these with friends and family by tapping on a song and then the share icon on the right-hand side.



Get started with Agenda

Plan, keep track, and make notes in the same app with Agenda

REQUIRES

Agenda (Free, offers IAPs),
iOS 13 or later

YOU WILL LEARN

How to use Agenda for iPad
to make date-focused notes

IT WILL TAKE

30 minutes



THERE'S NO SHORTAGE of

note-taking apps for iPad, iPhone, and Mac. And there are plenty that sync on all three devices. But there were good reasons why Agenda: Notes Meets Calendar came top in our recent group test...

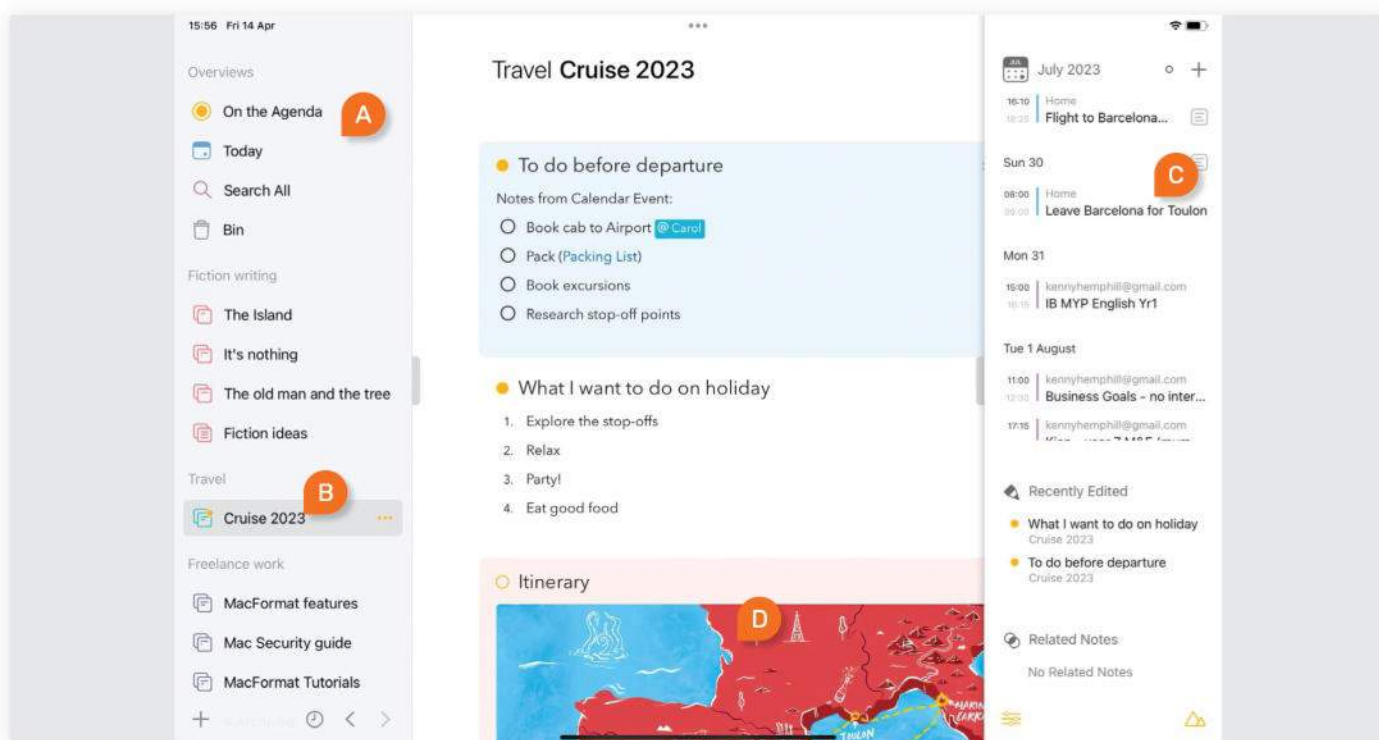
It's the only note-taking app that uses the date as a focus. That turns Agenda into a powerful tool for planning projects on your own or with others, for making notes and referring to them later, or collecting recipes from websites and assigning dates to try them.

Agenda uses colored tags to make it easy to find notes, and the app is deeply integrated with Apple's way of doing things so has Share extensions, Widgets, and Shortcut actions. It also syncs with Calendar and Reminders, so you can see entries alongside your notes.

Notes can contain images and URLs, and formatted text. Notes are organized in projects, but the real star of the show is the "On the Agenda" view which allows you to quickly see what you should be focused on.

Everything we cover here can be done with the free version. **KENNY HEMPHILL**

QUICK LOOK The Agenda interface



A ON THE AGENDA

On the Agenda enables you to more easily focus on the most pressing items that are on your to-do list.

B PROJECTS

Your projects are listed in the sidebar and can be grouped. Tapping on a project displays its notes.

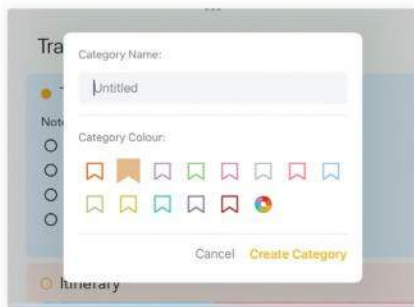
C CALENDAR

Calendar entries and Reminders are hidden by default, but can slide out from the right.

D IMAGES

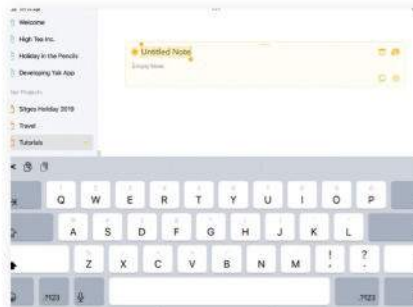
Notes can have thumbnail images, but full-width versions are a premium feature.

HOW TO Get started with Agenda for iPad



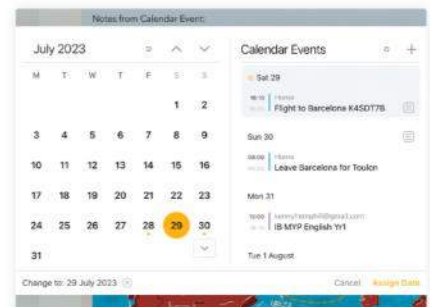
1 Create a project

Tap the "+" at the bottom left of the screen, then tap New Category. Give this category a name and a color. The category will appear with Untitled next to it. Touch and hold Untitled, then type a new name for the category in the box.



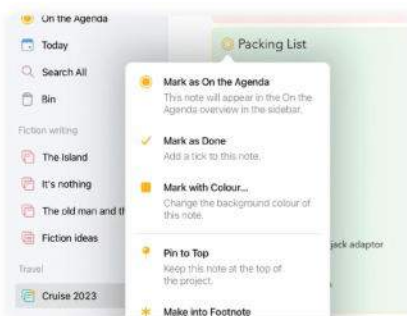
2 Create a new note

When you create a project, it already has an empty note in it. Tap and hold on Untitled Note and rename it. To create a new note thereafter, tap the "+" at the top right of the screen and replace Untitled Note with a name.



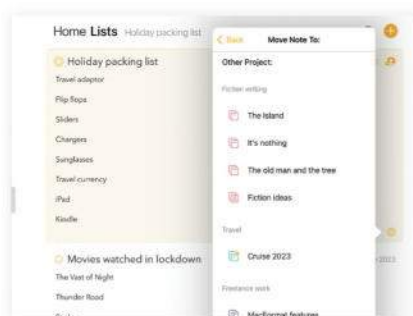
3 Assign a date to a note

Tap on a note then the calendar icon at the top right of the note. A window with a calendar in it will open. Go to the date you want and tap it. Tap Assign Date to make the note appear in Today on that day.



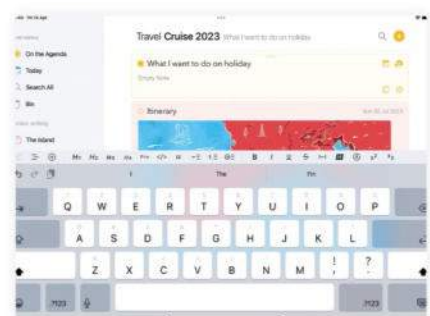
4 Add to your agenda

To make a note appear in On the Agenda, tap it then tap the dot at the top left corner and choose Mark as On the Agenda. If the dot is filled with orange, the note is already on the agenda. You can remove it the same way.



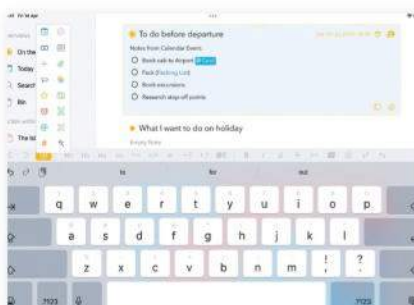
5 Move a note

You can move a note to a different project or to a new project. Tap the note then the gear icon at the bottom right and choose Move To. Scroll down to the project you want and tap it, or scroll to the bottom and tap New Project.



6 Write a note

To start writing in a note, tap the project in the sidebar, then tap in the note. It will open and you can now start typing. You'll see formatting tools along the top of the keyboard. Just select text and tap a tool to format that text.



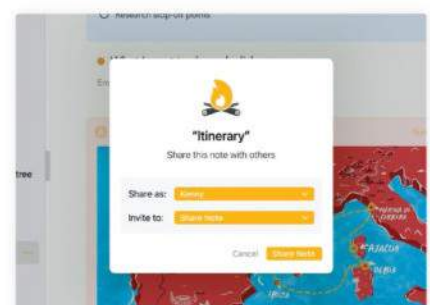
7 Insert a link

You can insert links to other notes, or to anywhere on the web. Tap inside the note where you want to add the link, then tap the "+" in the keyboard toolbar. Tap the link icon, then choose Add Web Link or tap on a note.



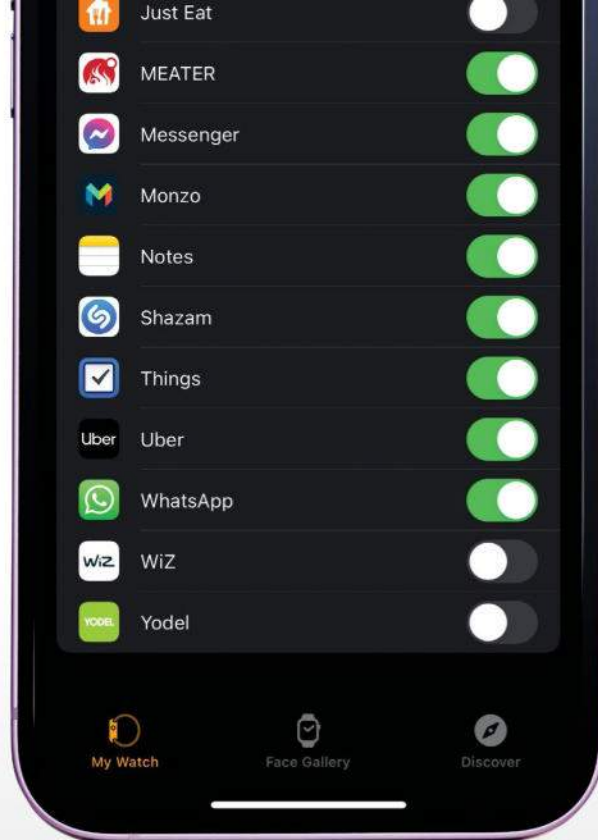
8 Add an image

To add an image to a note on iPad, it needs to be in your Photos Library. Tap the "+" in the toolbar, then tap the flower icon. Navigate or search in the Photos window that opens, then tap the photo you want to add.



9 Share a note

In the note you want to share, tap the head-and-shoulders icon at the top right. In the "Invite to" menu, choose Share Note. Then Tap Share Note at the bottom. Choose how you want to share it, or Copy to copy a link to it.



Master Watch notifications

Here's how to ensure your Watch doesn't waste your time

REQUIRES
watchOS 8 or later

YOU WILL LEARN
How to control notifications
on your Apple Watch

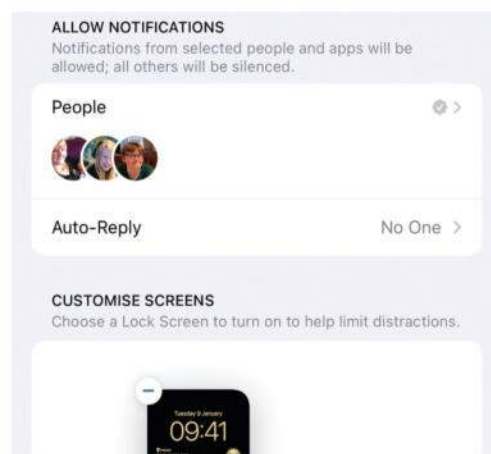
IT WILL TAKE
10 minutes


GENIUS TIP

If a notification interrupts you but you don't want to silence it forever, tap on the "..." icon and select Mute For 1 Hour, or Mute For Today.



MANY OF US have a love/hate relationship with notifications on Apple Watch. We love them because they ensure we never miss messages from our friends and family, and because they're really useful when we're using an app such as Maps. And we hate them because it seems that every app we put on our iPhone wants to notify us of



Don't forget about combining these tips with Focus modes (Settings > Focus on your iPhone); they can limit notifications to specific apps or people.

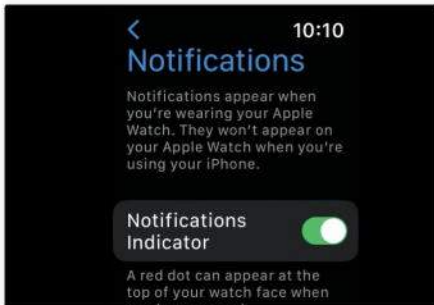
everything everywhere all of the time, usually at the worst possible moment. So it's a good job Apple makes it easy to control notifications in lots of different ways.

CONTROL AND IMPORTANCE

As you'll discover, the control you have varies from app to app — so, for example, in Calendar you don't just have a yes/no choice for notifications. You also have the ability to silence all notifications apart from new invitations or changes to shared calendars. Similarly in the Mail app you can limit notifications to specific accounts so you don't get updates about work emails when you're chilling out at home, and so on.

You can also make some notifications more important than others, such as ensuring your Watch notifies you of health-related events or if you're somewhere that could lead to damage to your hearing. In addition, you can also use Focus modes specified from your iPhone. These enable you to organize your notifications in each mode — for example, you might want different notification settings when you're at home or at the gym. **CARRIE MARSHALL**

HOW TO Control Apple Watch notifications



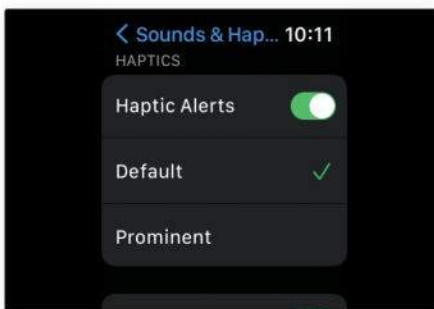
1 Enter Settings
Go into Settings > Notifications on your Apple Watch to change how notifications work on your wrist. The first option is whether your Watch should display a red dot at the top of the current face to let you know of new notifications.



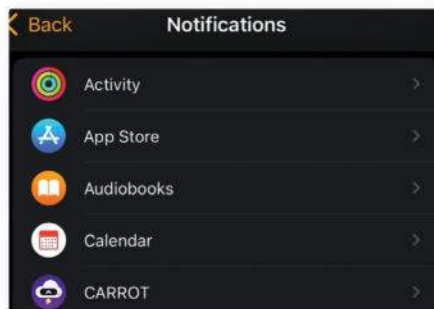
2 Ask for more
If you scroll down the Notifications page, you'll see these options. These enable you to show a tappable summary of a new notification or to display notifications even if your Apple Watch doesn't think you're currently looking.



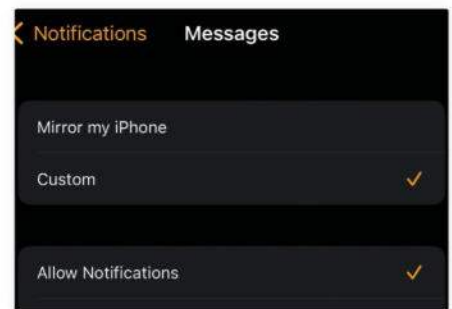
3 Make Siri speak
When you're wearing headphones, you can get Siri to tell you about new notifications. With AirPods, AirPods Pro or AirPods Max, Siri will then wait for you to respond, so you don't have to say "Hey, Siri" first.



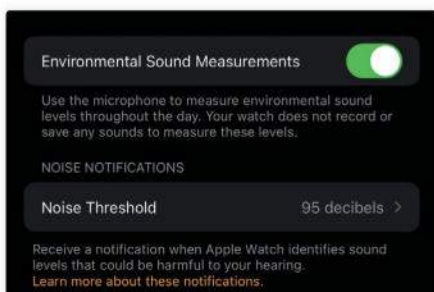
4 Feel the news
Go to Settings > Sounds & Haptics. By default, your Apple Watch will give you a little vibration whenever there's a new notification. You can turn that off here, or turn it up; selecting Prominent makes the vibration alerts stronger.



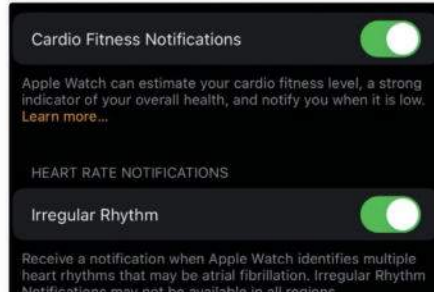
5 Adjust every app
You don't have to have the same settings for every app. If you go into the Watch app on your iPhone and select Notifications, you'll see a list of all the apps on your Watch — first the Apple ones, and then third-party ones.



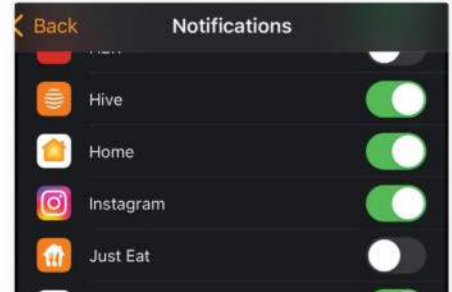
6 Change the settings
Mirror My iPhone is the default for most apps, but you can override that. For example, here you can adjust how many repeat alerts Messages gives you, and whether you should get an audible alert, a haptic one, neither, or both.



7 Bring the noise
With health-related apps, you'll find more detailed settings when you tap on them. In the Noise app, you can adjust the noise threshold so that you're notified if the sound around you is louder than the level you specify — here, 95 decibels.



8 Have a heart
The Heart Health settings are even more personal, enabling you to set cardio fitness options such as the level beyond which your Watch will warn of high or low heart rates, whether it should notify you of irregular heart rhythms, and more.



9 Eliminate annoyances
If you've ever installed an app only to be constantly interrupted by unwanted notifications, you can control that here. Tap on the toggle next to the app from which you want to silence notifications.



IP ratings

The IP rating is a crucial piece of information for any outdoor device



YOU WILL LEARN

What IP ratings mean, and how they can help you to protect your digital devices



JARGON BUSTER

The second digit in an IP rating refers to protection against water — but it doesn't cover other liquids, such as acids, which can corrode many electrical components. Humidity and salt can be a problem too — salty sea air can be a real killer for all sorts of digital devices. That's where the MIL-STD standard comes in (see Tough tech to the right).



EVERY NEW TECHNOLOGY has its own assortment of jargon and technical terms that we all have to try to learn and understand.

Computers have CPUs and GPUs, headphones have “decibels” and “frequency response,” and Wi-Fi routers have truly mind-boggling jargon like “orthogonal frequency division multiple access” — which is kind of the Wi-Fi equivalent of “everything, everywhere, all at once.”

However, the term “IP” is one that cuts right across different product categories and technologies, and can be applied to a wide range of different devices. In fact, those two letters — IP — actually have multiple meanings, ranging from Internet Protocol to the Intellectual Property involved in so

many legal battles these days. However, the version of IP that we're looking at here refers to Ingress Protection, and it's a term that applies to everything from hard drives to headphones, smartphones, and even “ruggedized” laptops that are designed for outdoor use.

Ingress Protection refers to the casing, or enclosure, of any electrical device, and how well it protects against water and dust, or other small particles, that might penetrate the device and damage its internal electrical components. Manufacturers of electronic devices will often say that their products are “waterproof” or “dust-proof,” but those terms are pretty vague.

After all, your waterproof AirPods may be able to cope with a spot of rain or sweat

> TOUGH TECH

There's another rating standard that is often used when talking about “ruggedized” technology, such as laptops, smartphones and hard drives that are designed for use in harsh conditions. It's known as MIL-STD-810 (although manufacturers often just shorten it to MIL-STD) to imply “military standard” ruggedness. This includes protection against harsh climates with high or low temperatures, high humidity, or corrosive salt. It can also indicate shock or pressure resistance — being run over by a car, for example — but manufacturers can be quite vague with their use of this term, so always check the details when any product is described as providing MIL-STD protection.

FIRST DIGIT – PROTECTION AGAINST DUST/SOLID PARTICLES

0	No protection
1	Protects against particles/objects larger than 50mm
2	Protects against particles/objects larger than 12.5mm (ie, fingertips)
3	Protects against particles/objects larger than 2.5mm (ie, tools, wires)
4	Protects against particles/objects larger than 1mm (ie, wires, screws)
5	Dust-protected – some particles may enter, but won't damage the device
6	Dust-tight – complete protection against dust and other particles for up to eight hours

SECOND DIGIT – WATER PROTECTION

0	No protection
1	Protects against vertically dripping water (ie, rain)
2	Protects against water dripping at an angle of 150°
3	Protects against water spraying (10 litres per min)
4	Protects against water splashing/spraying
5	Protects against water jets (12.5 litres per min)
6	Protects against strong water jets (100 litres per min)
7	Protects against immersion in water (up to 1m depth)
8	Protects against immersion in water (up to 3m depth)

when you're jogging around your local park, but they probably won't survive being dropped into the deep end of a swimming pool. However, an IP rating gives you a precise numerical value that indicates how well your new earbuds, hard drive, or other devices will cope when they're exposed to the elements.

DOUBLE DIGITS

The IP rating gives you two numerical values that you need to know about. The iPhone 14 has a rating of IP68, with the first digit – the 6 – indicating the level of protection against solid particles such as dust, dirt, or sand. The second digit – the 8 – indicates protection against water, and this is what manufacturers refer to when they say that a product is “waterproof.” In both cases, a rating of 0 (zero) indicates no protection at all. Sometimes, though, manufacturers will use an “X” instead, which means that the device hasn't been tested for that particular type of protection.

For instance, the AirPods Pro are rated IPX4, which means that they haven't been tested for protection against dust (the first digit). However, they do provide level 4 protection against water (the second digit), which means that they're “splash resistant” but can't survive total immersion in water.

Protection against dust and solid particles goes from 0 (zero protection) to a maximum score of 6, which means the device is sealed “dust-tight” and can prevent any particles, such as dust on a construction site or sand on a beach, getting into the device for up to eight hours. The second digit, for water protection, goes all the way up to 9, which indicates complete protection against both very high water pressure and high-temperature water too. Very few devices score “9” for water protection, but many devices, particularly smartphones, provide a rating of 8, which means they can survive complete immersion in water to a depth of up to 3m. The iPhone 12, 13, and 14 are all rated IP68, which means that they are dust-tight and can survive total immersion in water. And, in fact, these models go beyond the standard 8 rating for water protection, as Apple states that they can survive under water in depths of up to 6m too.

We've focused on Apple devices here, such as AirPods and the iPhone, but remember that IP ratings can apply to a wide range of different devices. Always look out for the IP rating whenever you buy other devices, such as hard drives or solid-state drives (SSDs), or even keyboards and mice, that are designed for use in harsh environments. **CLIFF JOSEPH**

**KEY FACT**

The IP rating system is officially known as International Standard EN 60529, and is defined by the International Electrotechnical Commission (IEC). Based in Switzerland, the IEC works with more than 170 countries to establish international standards for electronic devices.

Version numbering changes



WHEN APPLE RELEASED

Big Sur in 2020 it took us by surprise, changing macOS version numbering from the chaos of “10.14.6 Supplemental Update 2” to a rational system of three numbers. When your Mac is running 13.3.1 you know it’s the first patch of minor version 3 of

major release 13, whereas that version of Mojave was really the third “Supplemental Update” not the second.

Then came the first Rapid Security Response to shatter the peace with its appended letter in parentheses, taking 13.3.1 to 13.3.1 (a). Software expecting to see just

numbers and full stops broke immediately, and those wondering how yet another version numbering system works have been left baffled.

Don’t even try to make sense of the build number, with three extra digits and the letter a, to go from 22E261 to 22E772610a.

> Remove an RSR update

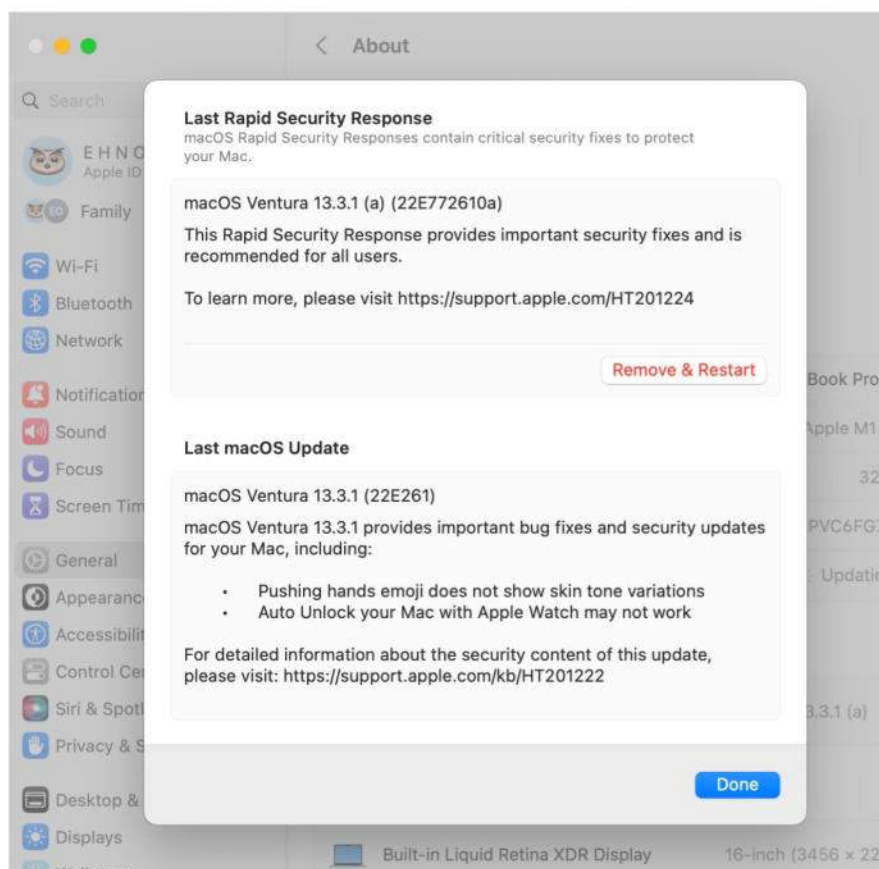
After installing a Rapid Security Response (RSR) for Ventura, Safari won’t connect to some of my key websites. How can I remove that RSR?

RSRs are hot fixes that aren’t as thoroughly tested as regular macOS updates, so do carry a risk that they could cause problems for some. To counter that, Apple makes them easily uninstallable.

Before deciding that’s your best solution, see if you can settle those problems. If your Mac hasn’t started up since installing the RSR, restart it, as that can make some issues vanish. If they persist, start your Mac up in Safe mode, leave it running for a couple of minutes, then restart back into normal mode.

If after trying those the problems remain sufficiently obstructive that you still want to remove the RSR, open System Settings > General > About and locate the box giving the macOS version, which now has a letter after the version number. Click on the Info tool to the right of that number, and in the dialog click on the Remove & Restart button. Your Mac should then revert to its former self, with the whole of that RSR removed, once it has restarted.

As the fixes provided in RSRs will be incorporated into the next macOS update, be extra vigilant until Apple releases that and it’s installed on your Mac.



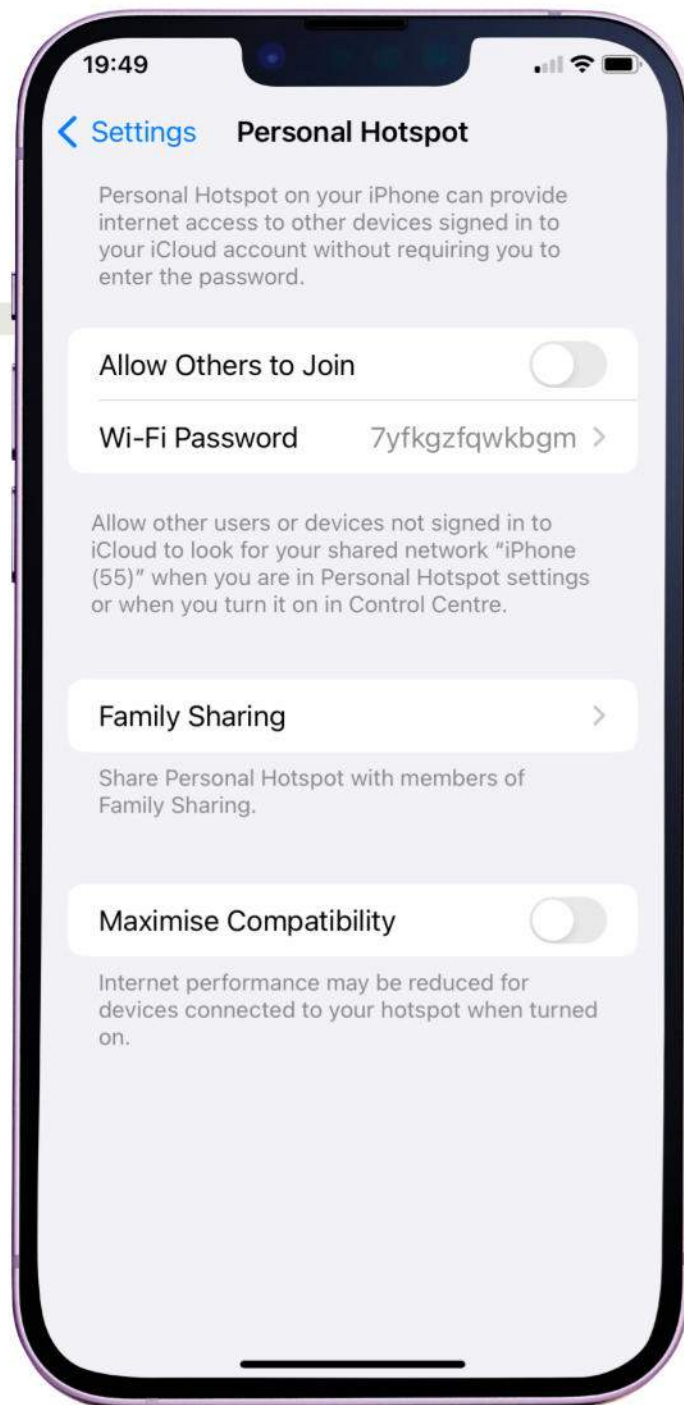
Removing an RSR is made straightforward in this pane in System Settings > General > About, but first ensure it’s the only solution.

> Unscramble and share Wi-Fi passwords

The saved Wi-Fi passwords on my iPhone got muddled when updating to iOS 16.4.1. How can I set them right and then share them with others?

Apple devices manage their Wi-Fi passwords separately from those used in Safari as shown in Settings > Passwords, and normally hide those for networks the device can't currently see. To view and manage all those your device has remembered, open Settings > Wi-Fi then tap Edit at the top right; that requires either Face ID or Touch ID. If you share your keychain in iCloud, that list should give access to those known to other devices and Macs that are sharing that keychain.

Recent versions of iOS and iPadOS offer a neat way to share the password of the Wi-Fi network your device is currently connected to, provided both are signed in to iCloud, have one another's Apple ID email addresses saved in Contacts, have Bluetooth turned on, and



Tap an obscured password to reveal it and the command to copy it.

Personal Hotspot disabled. This is explained at <https://apple.co/3r4ZFSY>.

Alternatively, you may find it a simpler process just to send the password to someone using Messages. Open the network settings, either for a network available locally, or one on the list of all networks. Tap on the obscured password to reveal the Copy command,

then switch to Messages and paste it in your message there. Once the recipient has inserted that password, you should both then delete that message for security.

If your devices share their keychain with a Mac, you can use Keychain Access from Applications > Utilities to look for AirPort Network Passwords and manage and edit them there.

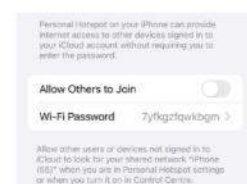
Quick-fire questions & answers

HOW TO UNINSTALL A TROUBLESOME SECURITY RESPONSE?

Firstly, shut your iPhone down, leave it a minute, and start it up again, in case that fixes things. To remove the RSR, go to Settings > General > About > iOS Version, and tap Remove Security Response. Once it's gone, your iPhone should restart automatically.

HOW TO SHARE MY IPHONE'S HOTSPOT WITH MY FAMILY?

This is controlled not in Settings > Family, but through Personal Hotspot > Family Sharing instead. It only applies to those in your iCloud Family, and gives you the option for each share request to require your approval, or simply to share the hotspot with them automatically, without them having to enter the hotspot password each time.





Mac Hardware

We're here to help solve your hardware hassles

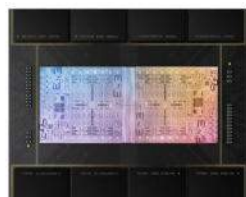
Quick-fire questions & answers

WHICH EXTERNAL GPU WORKS WITH APPLE SILICON MACS?

None, because its GPU is integrated into the chip, where it shares Unified Memory with the processor. As an eGPU can't share that memory, Apple would need to design in support for that. Even with Intel Macs, there are limits to support detailed at <https://apple.co/3NtoBLI>.

CAN I UPGRADE MY MAC STUDIO M1 MAX TO M1 ULTRA?

Apple shows no sign of offering such hardware upgrades. With the introduction of self-repair in many countries, it could be possible to order a replacement Ultra logic board and fit it yourself. However, parts are ordered against the Mac's serial number, so cheating doesn't look possible, and would be expensive and difficult.



> Prepare an internal drive for recycling

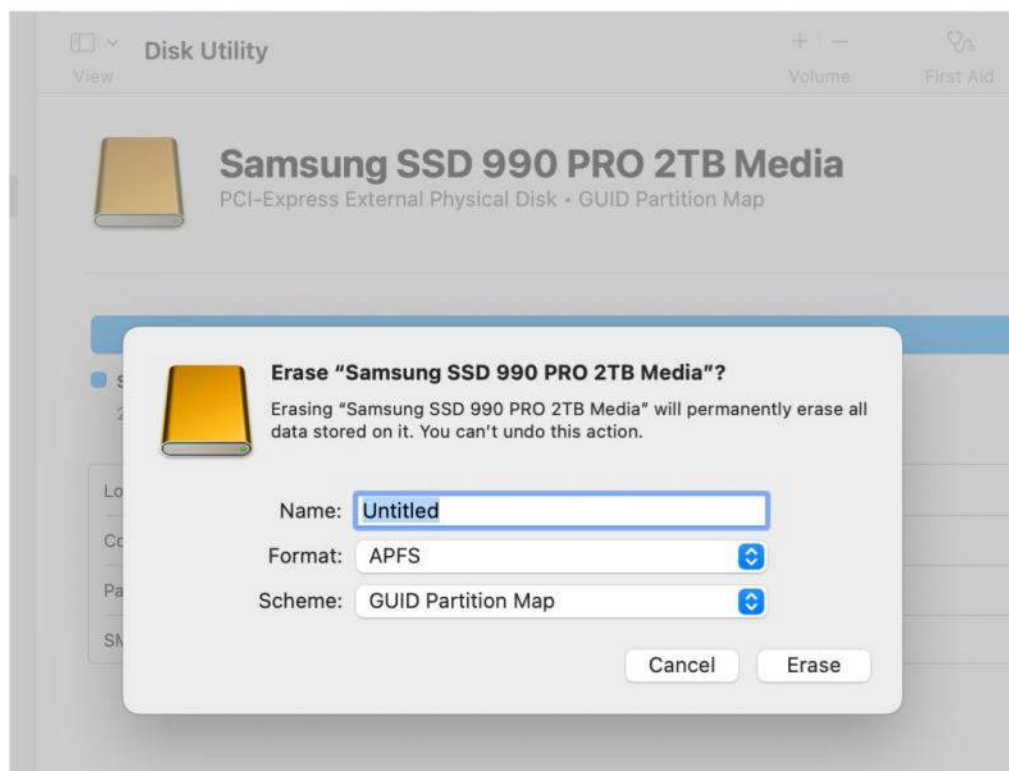
How should a friend dispose of his old iMac, to ensure that there's no data available from it when it goes for recycling?

Before he starts cleaning its internal storage, there's a list of essential tasks to work through once that Mac has been thoroughly backed up and its contents preserved reliably. Apple silicon Macs and those with T2 chips can do those quickly and cleanly using the "Erase All Content and Settings" feature that's found in System Settings > General > Transfer or Reset, but they have to be performed manually on older models.

First disable Find My Mac and Activation Lock, and deauthorize it for iTunes. Next sign out of iCloud and iMessage. Disable any firmware password, reset the NVRAM, unpair all Bluetooth devices, and finally remove that Mac from the list of hardware in the Apple ID

pane on the owner's other Mac, or its equivalent in a device's Settings. Those steps are detailed at <https://bit.ly/3Pwk3GI>.

Once those have been done, an internal hard drive should be securely erased using Disk Utility in Recovery mode, or when started up from an external drive. It's normally only necessary to use either of the two faster options for that. Unfortunately, SSDs aren't suitable for that and should just be erased normally. Then shut the Mac down, disconnect it from all power, and open it up to remove its internal storage. Physically destroy that using a hefty hammer, nail, drill, or whatever. They can prove quite tough, but it's a wonderful feeling and well worth the effort.



Try to erase an SSD and Disk Utility won't offer any Secure Erase options, as they're only available for hard disks.



> Diagnose a flashing display

The display of my M1 MacBook Pro 13-inch has begun flashing during startup, but then works fine. How can I tell whether it's faulty?

With their integrated graphics processing, Apple silicon Macs are less prone to hardware problems than older Macs with separate graphics cards. Test this using Diagnostics from Recovery mode.

Ensure your Mac has a good Wi-Fi connection, as it may need to download the diagnostics software from Apple, then shut it down. When you press its Power button to start it up, keep pressing until it shows its loading Options. Once that has loaded, press

and hold Cmd+D until you're told that Diagnostics is loading, then select your language for the loader app to run and offer Diagnostics.

Once it has finished, you'll get a code you can look up. You could also run extended diagnostics by pressing Cmd+E, but that's undocumented and may not provide different tests. If those fail to find a hardware problem, then it's most probable this is just a quirk of the startup process.

> Fusion Drive reports errors

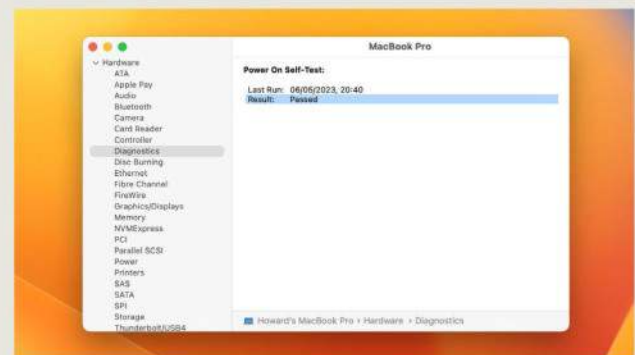
The Fusion Drive in my iMac keeps throwing errors, as if it's about to fail. Can I split it and carry on using its SSD, or should I get it replaced?

When you suspect a Mac's internal storage might be failing, keep good backups without putting any more stress on the drive. While macOS Diagnostics and third-party disk health apps could provide more details, errors are a good reason for taking early action to replace any Fusion Drive before it gives up the ghost.

Fusion Drives consist of a smaller SSD alongside a larger hard disk, held together using Core Storage software. Splitting them can only be performed using the diskutil command in Terminal, and destroys all the data on both of them. As the SSD is also likely to be showing signs of age, it's normally better to have them both replaced, ideally with a new SSD if you can afford it. In most Macs that involves plenty of tricky

disassembly and is best left to an experienced technician.

As your iMac doesn't have a T2 chip, another option is to replace the Fusion Drive with a small hard drive just for emergencies, and to start up and run your Mac from an external SSD, which is still likely to perform better than its original internal storage.



It's best to replace the whole of a Fusion Drive when it looks as if it might be about to fail.

Quick-fire questions & answers

WHICH APPLE POWER ADAPTORS WORK WITH MACS?

Check out <https://apple.co/3JzA9vD>. You can interchange recent USB-C adaptors, picking the newest when available. MagSafe is more complicated, as versions 1 and 2 can be interchanged using an adaptor, but not MagSafe 3.

DO MACS CHECK THEIR MEMORY WHEN THEY POWER UP?

Yes, all Macs complete a power-on self test (POST) before starting to boot, although only Intel models report results of the test in System Information, in Diagnostics under Hardware. If you suspect a memory problem, running full Diagnostics is more thorough.



macOS

Shine a spotlight on the solutions to your most irritating Mac problems

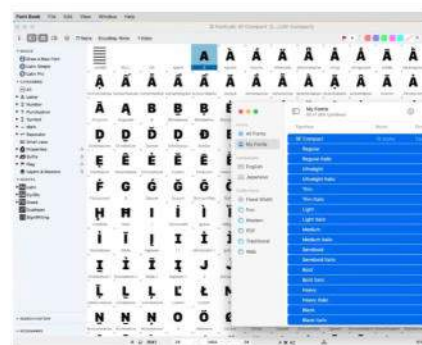
> Put fonts into a family

I tried to install two font families, but they appear in Font Book as individual fonts instead. How can I turn them into the families I want?

For a group of fonts to be recognized by macOS as a family, they need to be structured and installed as one, although normally spread across multiple files. If Font Book doesn't recognize them as a family, then all it can do is put them into a collection, which works differently. Key to any font family is its common typographic name, and within each family, individual style names. If those fonts haven't come as a family, then you will need a proper font editor in order to build them into one.

Try FontLab's TransType from <https://bit.ly/3phh36B> for \$97 — it does have a trial period, so you should be able to test the app out first. The way that it builds individual fonts into families is explained in full at <https://bit.ly/3Pz3vhk>.

Once you've made the families, uninstall the existing single fonts and install the families. To rebuild font caches, start your Mac up in Safe mode, leave it a couple of minutes, then restart it into normal mode.



Font Book can't assemble individual fonts into a family. You'll need one of FontLab's font editors.

> Deduplication may not free space

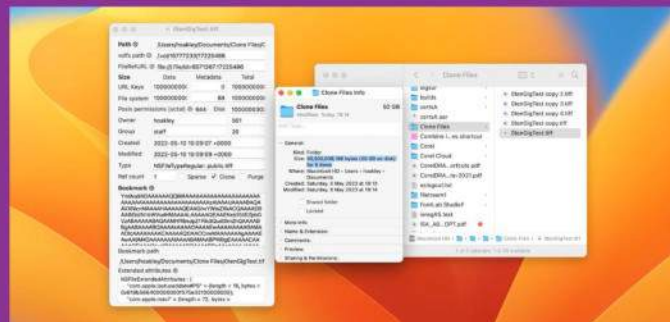
I've tried using various apps to find and remove duplicate files, but they seldom seem to free up much space as a result. Why not?

The success of what's known as deduplication depends on whether the files are actually copies of one another, or are clones. Before Apple File System (APFS) arrived in High Sierra, such clone files didn't exist in macOS: when you duplicated or copied any file, a copy of the original was made, meaning that twice the disk space was required.

APFS now tries to make a clone file whenever it can, although that can't work across different volumes. Instead of two clone files occupying twice the space of one, they share the same data at first, so take no additional space at all. As they're changed, they take up more storage until they eventually become completely separate and require their full size.

Because of this, if a third-party utility removes one of a pair of clone files, no disk space is recovered. Some replace a pair of identical files with clones, but if the originals were already cloned, that doesn't change the amount of space they occupy either.

When you first check a drive that's come from an older Mac and wasn't used much in APFS, deduplicators can save significant amounts of space. But the more that drive has been used in APFS format, the more duplicates will be clones, and the quantity recovered falls until the procedure is no longer worthwhile.



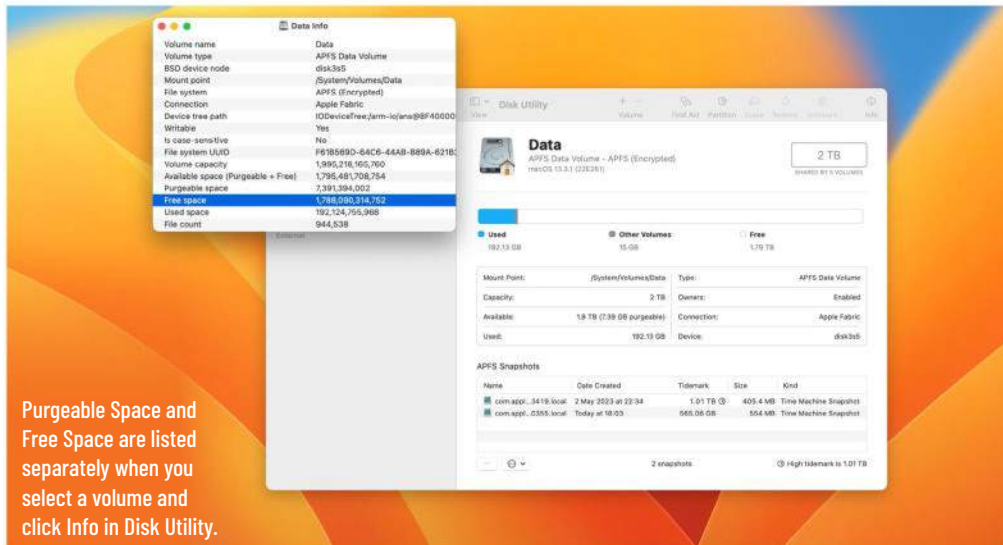
Although the Finder claims this folder of APFS clone files takes 50GB, it takes no space at all, as they share data.

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How much space is really free?

My M1 Mac mini is running short of internal storage. With free space at a premium, the Finder and Disk Utility often differ on what they claim is available. Which should I believe?

If you need to know accurate figures for free or used disk space, trust those provided by Disk Utility, not the Finder, because of the way they obtain them. Select any disk or volume in Disk Utility, and the app gets a fresh estimate from macOS for each of the figures it displays.

The Finder, on the other hand, merely tells you the last figures it was updated with, which could be from ten or more minutes ago, and there's no way you can force it to update them with more recent info.

The figures themselves aren't as straightforward as they appear: what's shown as Available isn't actually free at that moment, but what macOS could make available if it

really needed to. To achieve that, it would need to free all that is shown as being Purgeable, largely by clearing out hidden caches. That can sometimes include space being used for the storage of data for snapshots, but doesn't normally include what could be freed by evicting iCloud files and data from local storage, which macOS can do if Optimize Storage is enabled in iCloud settings.

A more reliable estimate of the minimum free space available is given as Free Space when you select a volume and click on the Info tool in Disk Utility, as that doesn't include Purgeable space, so is usually significantly less than that given as Available.

Quick-fire questions & answers

WHY HAS EFICHECK STOPPED WORKING IN MACOS VENTURA?

eficheck should still run its silent weekly check on the integrity of your Mac's firmware, but because of security changes in macOS 13, it may not work when you run a check in Terminal yourself. This should be fixed in the macOS 13.5 update.

DOES SAFE MODE CHECK THE BOOT DISK FOR ERRORS?

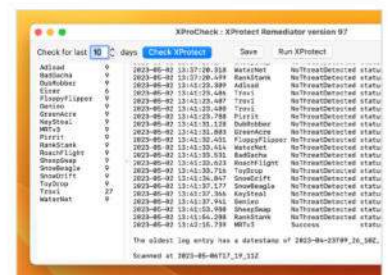
According to Apple it runs a quick check of volumes in the current boot volume group, although it doesn't report the result anywhere accessible, and doesn't check snapshots. You're better off doing this yourself in Disk Utility in Recovery mode.

HOW TO CHANGE THE PASSWORD OF A SPARSE BUNDLE?

A bug was introduced around macOS 13.3 that stopped changing passwords of sparse bundles using "hdiutil chpass", although it still works fine with other types of disk image. Until a fix, the only way to change a password is using "hdiutil" in a virtual machine running 13.2 or earlier.

DOES MACOS BIG SUR CHECK ITSELF FOR MALWARE?

Yes. On-demand checks are run as part of Gatekeeper on quarantined apps; it also runs anti-malware scans at least once a day using new XProtect Remediator software. Although the checks are the same as in Ventura, the newer macOS runs on-demand checks more frequently than in Big Sur.



BREATHE NEW LIFE INTO YOUR OLD MAC

Does your Mac sigh when it starts or creak when it calculates? We're here to help

WRITTEN BY CARRIE MARSHALL

WITH THE WEEKLY shop costing more than a car and everything from energy to entertainment suppliers charging eye-watering prices, many of us are choosing to hang on to our Macs for a little bit longer. And that's a wise choice, because with a little bit of TLC, Macs can last for a very long time. With some Macs, inexpensive hardware upgrades can deliver a serious speed boost — and with all Macs, a bit of tinkering and a few alternative apps can make a massive difference too.

It's important to be realistic, of course. macOS Ventura won't run on a Power

Mac G4, and you won't get M2-beating performance from the 667MHz processor of a 2006 aluminum MacBook Pro. But pretty much any Mac of relatively recent vintage can be tweaked, given extra storage, and in many cases given more memory too.

In this feature, we'll breathe new life into all kinds of Macs. We'll discover how to safely install the macOS versions Apple doesn't want your Mac to run, and we'll also take a look at the apps you can use if Apple's own are no longer being updated for your system — in most cases, without you having to spend any money at all. And we'll

discover the tools you can use to access files from long-gone apps too.

That's not all. We'll show you how to make a clean installation of macOS to clear out the electronic lint that every computer accumulates, and we'll take you through the process of swapping out your storage or boosting your RAM — something that's pretty much impossible on the most modern Macs but pretty straightforward and very affordable for older ones.

Plus, discover the emulators that enable you to experience or revisit the Macs, the apps, and even the games of the 80s and 90s. ■



Breathe new life into your old Mac



Patch your Mac

Keep your Mac up to date, even when official support stops

One of the most important things you can do with your Mac is keep it up to date, and for current versions of macOS and Mac apps that's usually straightforward: just ensure automatic software updates are available for both your operating system and your apps, and you're good to go. But things become more complex with older software, such as operating systems that Apple no longer

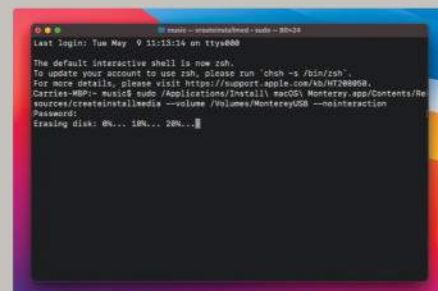
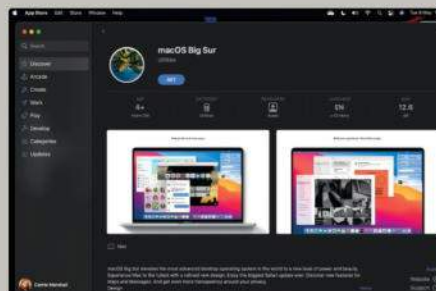
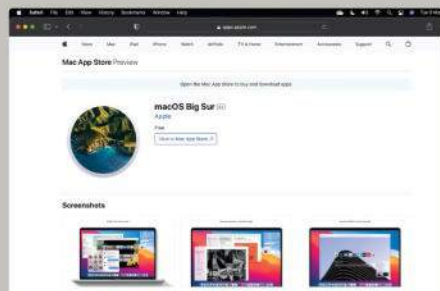
supports or apps that the developer doesn't. In some cases, you can find an alternative to now-defunct apps, but what if you need to access files made in an app that Apple no longer lets you run?

Apple locked out 32-bit apps in macOS 10.15 (Catalina), but you can still run them in emulators such as Parallels, VirtualBox or Retroactive (<https://bit.ly/3qX125S>). That last one's particularly great for creative types who need to open files from apps such

as Logic Pro 9, iPhoto, or Aperture on modern Macs.

If you really want to kick it old school, you can emulate old Macs on modern ones via Mini vMac (www.gryphel.com), which emulates a Mac Plus, or emulate other PowerPC Macs in SheepShaver (<https://sheepshaver.cebix.net>) or QEMU (www.qemu.org). As for the old apps, you can get them from the Macintosh Repository (<https://macintoshrepository.org>). ■

HOW TO Create a clean install of macOS



1 Back up your Mac

We can't stress this enough: make sure that you have a full backup of everything you want to keep on your Mac, because we're going to do what's called a clean install — that's when you create a factory-fresh version of macOS.

2 Download macOS

We need the macOS installer from the Mac App Store. Unfortunately, a bug means the download often fails for Big Sur. To get around that, launch Terminal and enter: `softwareupdate --fetch-full-installer` to download the installer.

3 Plug in USB

Now make a USB bootable installer. For that, you need a 16GB or larger USB flash drive and the macOS installer. The latter must be in your Applications folder. Plug in the USB flash drive; if you've closed Terminal, open it again.

Top 10 apps for older Macs

Firefox

>Free> mozilla.org



The free Firefox browser is one of the most powerful, privacy protecting, and flexible web browsers on any operating system, and it's available for every macOS from Sierra onwards. Its available extensions and add-ons massively outnumber Safari's ones.

Thunderbird

>Free> thunderbird.net



This fast, free alternative to Mail works with macOS going back to Sierra and has very small system requirements. It looks and feels pretty retro but it's a very powerful app with lots of customization options and add-ons.

GIMP

>Free> gimp.org



It's a little harder to learn than Photoshop or Affinity, but GIMP delivers serious photo and image editing power for zero money. Versions since 2.8.2 run natively in macOS without additional software, and they're made for Macs running Sierra onwards.

LibreOffice

>Free> libreoffice.org



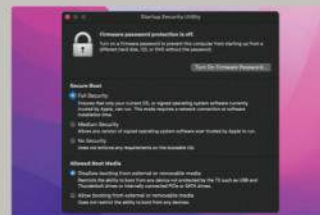
If you have Mojave or later, you can run this free alternative to Microsoft Office, which is based on the solid (if fairly dated-looking) foundation of OpenOffice and delivers an impressive collection of writing, spreadsheet, and productivity features.

VOX Player

>Free> vox.rocks



This hi-res music player works on macOS El Capitan onwards and supports all the key formats including FLAC, Apple Lossless and more. It works with your iTunes music library and also provides thousands of online radio stations. It's a great Music alternative.



4 Make a bootable drive

You now need to enter the appropriate code into a new Terminal window. The commands vary according to each macOS version; the different commands are all helpfully listed on the Apple website at <https://tinyurl.com/macbootusb>.

5 Time to wait

Press Enter, and now you can step away for a bit: this part takes some time. Terminal will keep you updated about its progress until the bootable USB drive has been created. You can then quit Terminal and shut down your Mac.

6 Reboot your Mac

Restart your Mac and if it's an Intel one, hold down Opt until you see the boot options menu; on an M-powered Mac, press and hold the Power button until the menu appears. On either kind of Mac, you should see the macOS Utilities screen.

7 Change the security settings

On some M-powered Macs you may get a security error. Reboot your Mac, hold down Cmd+R for Recovery mode, select Utilities > Startup Security Utility, and enable Allow Booting From External Media. Retry step 5.



8 Erase your Mac

Select Disk Utility from the options, choose Macintosh HD (or whatever you want your main drive to be called) as the disk name and select APFS as the file system. Now choose Erase. Note: This removes everything from your drive.



9 Install macOS

Once Disk Utility has finished formatting your main drive, you can quit Disk Utility. This will take you back to the macOS Utilities screen. You can choose the Install macOS option by selecting the bootable USB drive from the options.



10 Start from scratch

Congratulations: you now have a pristine copy of macOS, free from the chaff that accumulates in any operating system over time. All you need to do now is restore your apps and files from your backup and pick up where you left off.

SimpleNote

> Free > simplenote.com



Made for macOS Mojave or later, this streamlined note-taking app is more powerful than it looks: it supports Markdown formatting so it's as much a writing environment as a Notes alternative. SimpleNote also offers an iPhone/iPad app with built-in syncing.

VLC Media Player



> Free > videolan.org

The free VLC Media Player is much more flexible than either Apple's own TV app or QuickTime Player: it supports almost every kind of media file and has a dizzying range of audio and video filters. It's very fast, even on very modest Macs.

VueScan

> \$24.95 > hamrick.com



Has Apple stopped supporting your scanner in macOS? Don't worry: VueScan will almost certainly have it in its massive library, even if it's ancient. It supports over 7,100 scanners from 42 manufacturers and makes it easy to scan documents and photos.

Alfred

> Free > alfredapp.com



Spotlight is great, but Alfred can do even more than finding things and launching apps. It's available for Mojave onwards (version 4 is available for El Capitan) and enables you to do all kinds of things including automating everyday tasks and actions.

1Password

> From \$2.99/month



> 1password.com
Apple's iCloud Keychain app is great for storing your logins, but it doesn't work with non-Apple apps. 1Password does, and it supports not just non-Apple browsers like Firefox but also non-Apple devices, so you can take all your passwords to PCs too.



Beef up your hardware

Giving older Macs a speed boost isn't as hard as you might think

Today's Macs aren't very upgradable, especially if they run Apple silicon: on an M1 or M2 chip, the graphics, memory and processor are all on the same, non-replaceable chip and the SSD is not user accessible or replaceable. But older Macs are much more accommodating and Intel-based Macs are relatively easy to upgrade.

With memory upgrades you'll need to know not just the supported maximum memory but the type of RAM too and what

configurations your particular Mac supports. Many manufacturers will help you with this, so for example www.crucial.com has a good memory finder for Macs.

As you'll see from these examples, upgrading your Mac requires a bit of work, but it's not too difficult providing you have the right tools. These will typically include a small Phillips screwdriver and, for later model Intel Macs, a selection of small Torx screwdrivers. Keep the tools away from your Mac until you've unplugged it from the wall. ■

Can iFixit? Yes you can!

We love www.ifixit.com: its upgrade kits don't just give you the part(s) you need, but also the myriad screwdrivers and other tools required to make your Mac upgrade or repair as effortless as possible. And you don't need to buy their upgrade kits to benefit from their Mac hardware expertise — their excellent online guides are free to read or to watch.

HOW TO Upgrade your memory



1 Remove the cover

Every Mac is different but, for example, here on a mid-2012 13-inch MacBook Pro, there are ten external screws of differing sizes to remove before you can prize open the lower case of your Mac.



2 Disconnect the battery

A very important next step: you know not to open up a Mac without first unplugging it from the wall, but with portable Macs such as MacBooks you also need to disconnect (or remove, on older Mac laptops) the battery.



3 Replace the RAM

The memory chips on this Mac (and on iMacs of similar vintage) are held in place by little retaining arms that you'll need to gently pull apart before you can slide out the RAM, swap in the new chips, and reconnect the battery.

HOW TO Upgrade your storage drive



1 Keep the battery clear
As with RAM replacement, step one is to open up your (disconnected) Mac and unplug the battery connector. It's a good idea to gently bend the battery connector back on models such as this 13-inch MacBook Pro so it won't reconnect.



2 Extract the old drive
On this Mac, the hard drive is secured by two Phillips screws and then a bracket, shown here. You'll need to take that out and gently lift out the hard drive by its pull tab; disconnect its cable and remove the drive completely.



3 Take the posts
There are four retaining posts on the hard drive, two on either side, with T6 Torx screws. You'll need to transfer them across to your new drive or it won't sit properly inside your Mac. Once everything's in place, install macOS.

HOW TO Upgrade your SSD



1 Open it up
Early Mac SSDs were fast but limited in storage space, so many of us quickly ran out of room. Don't worry, you don't need to carry a selection of external drives around; simply pop open your Mac and swap the SSD for something more roomy.



2 Unplug the battery
Retina MacBooks aren't hugely accessible, but it's easy enough to locate and unplug the battery connector shown here. Don't do anything else until the battery has been disconnected and moved gently out of the way.



3 Swap the SSD
The SSD is held in with a single Torx screw. Unscrew it, then gently lift the free end of the SSD about 0.2"; you should be able to pull it out of its socket. The new SSD goes in the same place, secured with the same screw.



Think outside the box

If you can't upgrade your Intel Mac's hard drive to the size or speed you want, don't worry: just go outside. By booting from a fast external solid-state drive (SSD) instead of a relatively slow hard disk, you can make a real difference to your Mac's performance.

The important thing here is the connection and file format. USB 2.0 connections just aren't fast enough — you need USB 3.2 or Thunderbolt and a

compatible drive — and you need to choose the right format. For macOS Sierra onwards, APFS is the fastest option; for older Macs, go for Mac OS Extended, aka HFS+. You can format the drive in Disk Utility, then select it as your destination disk during the macOS installation. You can change your startup disk by going to the Apple menu; choose System Settings > General > Startup Disk. Apple has more details at apple.co/42LxLbJ.



Run the latest macOS on older Macs

No support? No problem. OpenCore Legacy Patcher is here to help

Have a 2017 MacBook Air and want Ventura on it? Sorry, you're out of luck: it, and all Macs made before 2017, aren't supported. So why does Apple end operating system support for perfectly good computers?

Part of the answer is undoubtedly to sell new Macs. But there are more important factors here. Operating systems can encounter issues with new software or newly discovered security flaws, and fixing those issues costs money. And then there are device drivers, the little

bits of code that enable your Mac to talk to crucial components that are often made by third parties — AMD or Intel for GPUs, Broadcom for Wi-Fi radios and so on. Those third parties don't keep updating their drivers forever, and when their updates stop that threatens the stability and safety of macOS. Few manufacturers will happily pay to patch their operating systems in perpetuity. Some Android firms only promise OS updates for two years from launch, so Apple's six-ish years is positively generous by comparison. ■

What is OpenCore?

OpenCore is a boot manager, a piece of software that sits between your Mac hardware and your macOS software and performs clever tricks to enable officially forbidden versions of macOS to load and run properly on your computer. It does that by injecting and patching data to deliver as close to a fully native macOS experience as possible.

HOW TO Create the macOS installer



1 Get the patcher

The first thing you need to do is download OpenCore-Patcher (GUI) from <https://bit.ly/3N9AwnQ>. Once it's downloaded, run the app and you should now see a window like this one.



2 Create the installer

Click on "Create macOS Installer" and you'll be given a choice of using an existing installer or downloading it. Go for the download option as this will ensure you get the most up-to-date version of macOS for your Mac.



3 Pick your macOS

As you can see, we have three choices here. We want the most recent one, which is the one with the highest version number; at the time of this screenshot that means the latest Ventura build, which was 13.3.1.

HOW TO Download and install macOS Ventura



1 Get downloading

This is another big download: this installer is nearly 12GB, and it can be very slow to download. Wait until you're sure the download has started – the MB downloaded number will start to rise – and then go and do something else.



2 Add your USB

You'll need a 14GB or larger USB drive for this next bit, so insert that into your Mac's USB port once the installer has downloaded. You'll now see a list of available USB drives – in this case, we just have the one.



3 Flash the drive

OpenCore-Patcher will now turn your USB stick into a bootable macOS installation drive. You can't skip or speed up this step, so unfortunately that means another wait – especially on older, slower USB flash drives.

HOW TO Get Ventura up and running



1 Install OpenCore to disk

At the moment all you have is a macOS installer. You also need OpenCore to trick your Mac into letting it run when it's not officially supported, so you need to click on "Install OpenCore to disk" here. If you don't, your installation won't work.



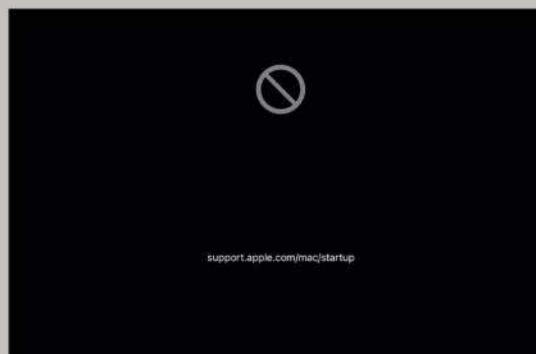
2 Reboot your Mac

Restart your Mac with the Opt key held down until you see this boot screen. Don't click on "Install macOS Ventura" just yet; you need to use the next option, EFI Boot. That's the bit that persuades your Mac to let Ventura on board.



3 Install Ventura

Running the EFI Boot option moves OpenCore into memory, so now you can choose the Install macOS Ventura option. This will work like any normal macOS installation. If you encounter issues, there's help on the OpenCore site.



Brickbats and caveats

It's very important that you understand the limitations of a bootloader such as OpenCore. The first and most obvious one is that it comes without a warranty or support, so if it goes horribly wrong – something that's unlikely but still possible – and bricks your Mac, you're on your own. The second is that

Apple may (and likely will) decide to block it. And the third is that you're letting someone else play god with your Mac, and that someone else doesn't have Apple's resources to find and fix any security issues or massive bugs that might occur. If that sounds a bit scary, then a bootloader is not the right solution for you.



Give your Mac a second life

Don't just dump an old Mac: Think Different!

There's a trope in TV dramas where doctors or paramedics battle off-screen to save a beloved character before returning to break the bad news to their loved ones: "We did everything we could," they'll say, "but it just wasn't enough." It's a bit like that with some Macs, albeit with less tears or cheesy acting. But just because

an old Mac is on its way out doesn't mean it can't live on in our hearts, or as part of our home decor. It turns out there's an awful lot you can do with an old Mac, even if it's completely stopped working.

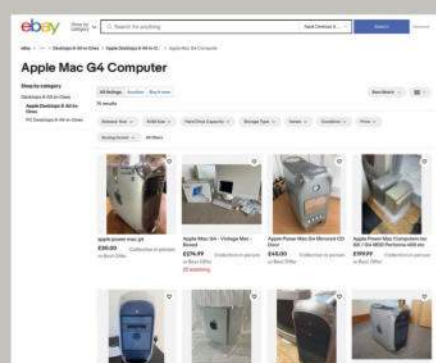
If your Mac is old rather than broken, one thing you can do is run a different operating system on it — either through emulating an

old macOS or by installing, say, Chrome or Linux. A lot of old Macs are doing sterling service today as networked drives and/or media streamers, and others have gone on to new lives thanks to computer charities. If all else fails, you can even make your Mac into a clock, coffee table, or makeup mirror. All you need is a little bit of imagination. ■



Stream from it

Streaming on a home network isn't particularly demanding, and that means old Macs can easily be redeployed as streaming servers. One of the simplest options is the free, polished and popular Plex Media Server. It can turn any Mac running macOS 10.13 (High Sierra) or later into the hub of your home entertainment, streaming from a variety of online services as well as from your own digital library of music and video.



Sell it

> www.ebay.com

Don't expect to make huge sums unless you're selling an unopened first-gen iPhone. But there are still plenty of Mac enthusiasts who'll be happy to buy your old Mac. Don't forget about shipping costs, though: a Power Mac is going to need more than a few stamps to get it to its destination. We'd recommend trying Facebook Marketplace, Craigslist and other local marketplace services first before going with eBay.



Donate it

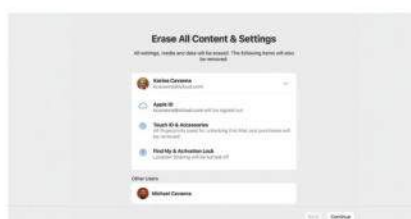
If you're a power user, a Mac that's no longer powerful enough for what you do might still be perfectly powerful for less demanding tasks: you don't need to have an M2 processor for a bit of word processing, letter writing, or online shopping. There are lots of charities that'll take working computers, but make sure you wipe all your personal data before you hand it over — "Erase it" on the next page tells you how.



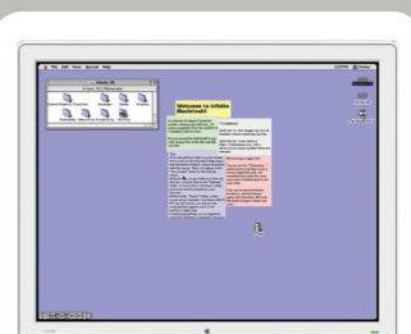
Erase it

Many of the suggestions here involve passing your old Mac on to somebody else, whether that's to a friend, to a marketplace or auction buyer, or to a charity. If you're doing any of those things, or getting rid of your Mac via recycling, it's crucial that you wipe your Mac first to ensure that your personal data and documents can't be accessed by anybody else.

Although there are third party apps to do that for you, Apple silicon Macs running macOS Monterey or Ventura have built-in tools under System Preferences / System Settings. For Intel



Macs it's a bit more complex: you'll need to sign out of every service you use on your Mac, de-authorize accounts, unpair Bluetooth, and then restart your Mac in Recovery mode. You can then erase your Mac and reinstall a clean copy of macOS.



Run old macOS on it

> <https://infinitemac.org>

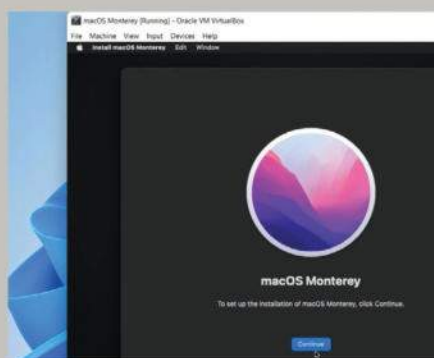
macOS Ventura doesn't let you run older apps that long predate your hardware — but **infinitemac.org** does, and it does it in your web browser. It's the latest in a series of web-based Mac emulators and it can load/save files from a local drive as well as from its own Infinite HD of apps and games. You can even network with other copies of it. If you'd rather run something locally, Basilisk II (<https://basilisk.cebix.net>) is available for Intel and PowerPC Macs and can emulate a Mac Classic running up to Mac OS 7.5 or a Mac II running up to Mac OS 8.1. They're great fun and, because by modern standards they have tiny system requirements, they're speedier than old Macs ever were.



Run another OS

> <https://linuxmint.com>

Have you always wanted to turn your Mac into a Chromebook or a Linux computer? It's easier than you might think. Chrome Flex is a super-light Chrome OS from Google, and Linux Mint is arguably the most Mac-like and definitely one of the most welcoming Linux options. Both have good alternatives to the apps you're used to on your Mac, and both have detailed installation instructions online.



Run its apps elsewhere

> www.virtualbox.org

If your hardware needs to be put out to pasture but you still need to run certain apps or access files, you can run macOS very well in a virtual machine on a Windows PC: Oracle's VirtualBox and VMware's Workstation Player can run a full version of macOS inside Windows so you can still access your stuff even if you've left the Mac behind. If the PC's relatively recent it should run fairly quickly too.



Transform it

> www.etsy.com/shop/mactechnology

If you look on Etsy, you'll see old Macs made into all kinds of things: keyboards turned into wall clocks, ancient iMacs working as aquariums and in the case of MacTechnology, Power Macs turned into coffee tables and flat-screen iMacs made into mirrors. There's even an iMac makeup mirror with its own integrated LED lights.



The source for tech buying advice

techradar.com



BEGINNER'S GUIDE TO

Time Machine

Time Machine is built into macOS, so there's no excuse for not backing up your Mac

WRITTEN BY KENNY HEMPHILL



APPLE FIRST LAUNCHED

Time Machine 15 years ago in an attempt to make it as easy as possible for Mac users to back up regularly, and be able to restore anything from a single file to their entire Mac with the minimum of fuss.

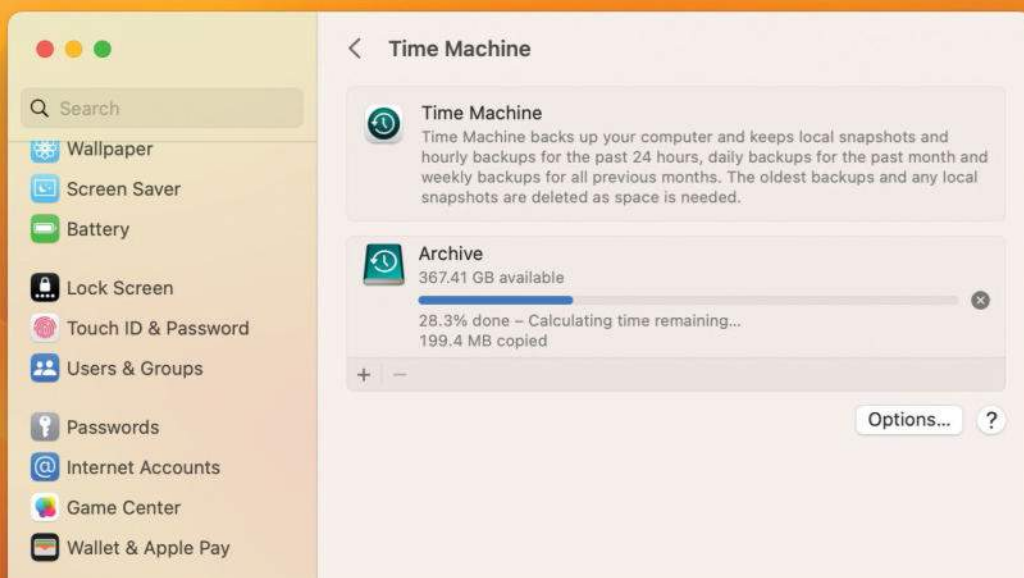
Time Machine was launched alongside a neat piece of Apple hardware known as Time Capsule, which combined an AirPort router and

a hard drive. The idea was that you would use the networked hard drive with Time Machine to back up portable Macs wirelessly. Time Capsule was discontinued in 2018, but Time Machine lives on and was overhauled following the introduction of the Apple File System (APFS) in macOS Sierra.

You can use any locally connected hard drive or SSD as a destination for Time Machine

backups. You can also use a folder on a Mac connected to the same network, or a network-attached storage (NAS) device. Not all NAS work with Time Machine, though; the device must support either a recent version of SMB or the now-deprecated Apple Filing Protocol (AFP). To use a NAS, you'll need to consult the manufacturer's instructions on how to set it up for use with Time Machine.

Time Machine backs up your Mac at hourly intervals, copying only those files that have changed since the last backup.



How to use Time Machine

Set it and forget it – once done, you won't even know Time Machine is running

TIME MACHINE CREATES incremental backups of your Mac. This means that every time a backup runs, it copies only the files that have changed since the previous backup. It saves snapshots of your data once every hour for the previous 24 hours, once a day for the past month, and once a week for all previous months. That way, you can roll your Mac back to the state it was in at any point in

the previous 24 hours, as well as recover files that were deleted a month ago. Time Machine keeps monthly backups until it runs out of storage space, at which point it deletes the oldest. As well as using Time Machine to recover files, you can use it with macOS Recovery when you reinstall macOS to recover settings from your previous install.

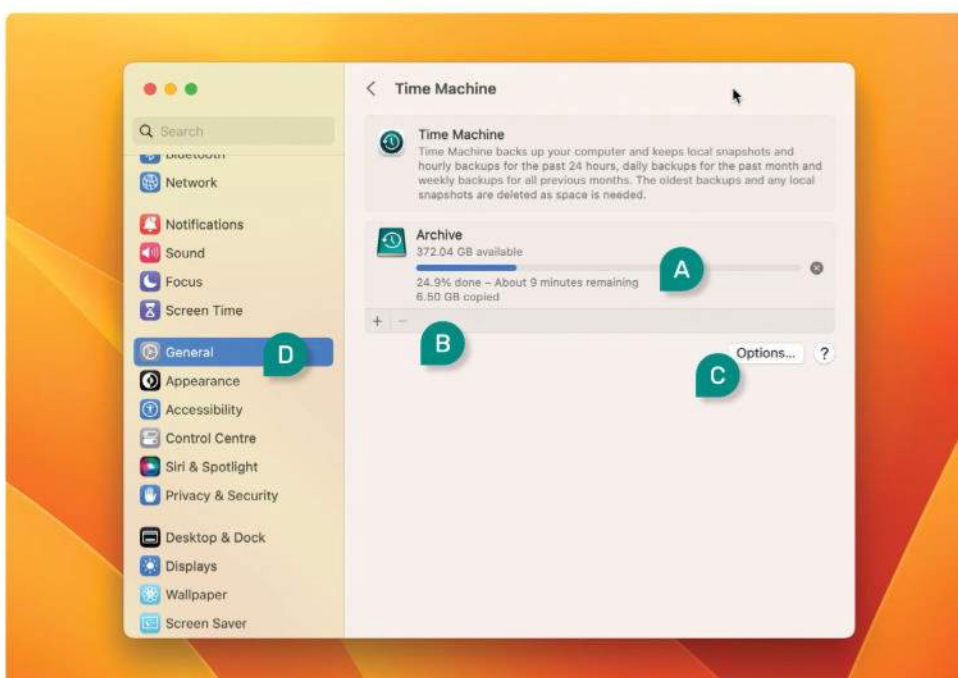
Time Machine stores snapshots on your startup drive, so you can restore

from them even if your Time Machine backup drive isn't available. It stores hourly snapshots for the previous 24 hours, as well as a copy of the last successful backup. Local snapshots are only saved if space is available, and the space they occupy is marked as available by macOS, so they don't reduce the available capacity of the drive. Restoring from local snapshots is automatic when your backup disk is not available. ■

QUICK LOOK Time Machine's interface

A
CONTROL PANEL
When a backup is running, this progress bar tells you how long it has left to run.

B
QUICK LINKS
The "+" allows you to add another disk as a Time Machine destination and the "-" to remove one.



C
HELP
Options allows you to choose backup frequency, set maximum disk usage, and exclude folders.

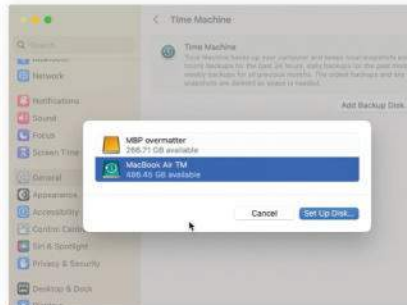
D
APPEARANCE
Having had its own pane in System Prefs, Time Machine is now found in System Settings > General.

HOW TO Set up Time Machine



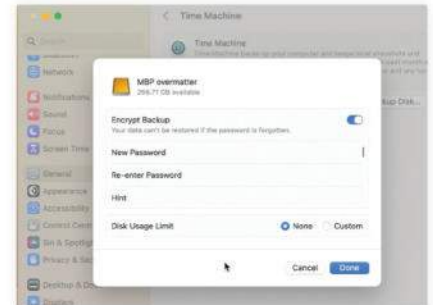
1 Choose a drive

Pick a drive to use as a backup destination. You can use any volume on a locally connected drive. But if there is data on it, Time Machine will wipe it before it starts the first backup. You may also be able to use NAS.



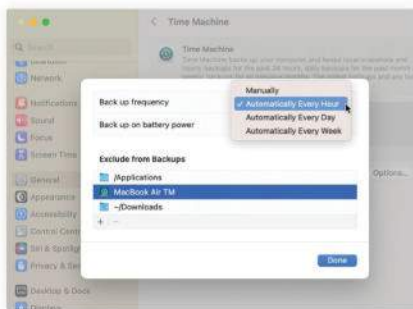
2 Select the disk

Connect the drive to your Mac and wait for it to mount. From the Apple menu, choose System Settings. Click General, then Time Machine. Click Add Backup Disk, choose the volume you want to use, then click Set Up Disk.



3 Finish setting up

If you want to encrypt your backups, leave Encrypt Backup set to On and type in a password, re-enter the password, and type a Hint. To set a disk usage limit, select Custom and set a limit. Click Done to finish setup.



4 Choose options

Time Machine schedules backups automatically. You can change that. Click Options and make a selection from Backup Frequency. If you want to back up a MacBook even when running on just battery power, turn that on.



5 Exclude folders

You can choose to exclude folders, like the Applications folder, from backups. To choose what to exclude, click the "+" in Options, navigate to the folder and select it, or drag a folder onto the window. Click Done to finish.



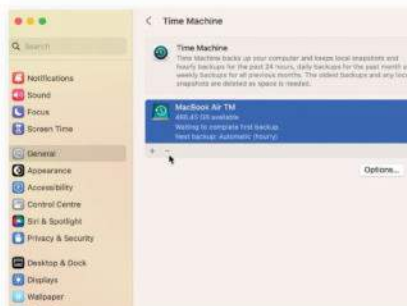
6 Manually start backup

If you set Time Machine to only back up manually, or if it hasn't backed up for a while and you want to start a manual backup, click the Time Machine icon in the menu bar and choose Back Up Now.



7 Stop a backup

If you need to stop a backup for any reason, click the Time Machine menu bar item and choose Stop This Backup. You can restart a backup when you're ready by clicking the menu bar item again and choosing Start Backup.



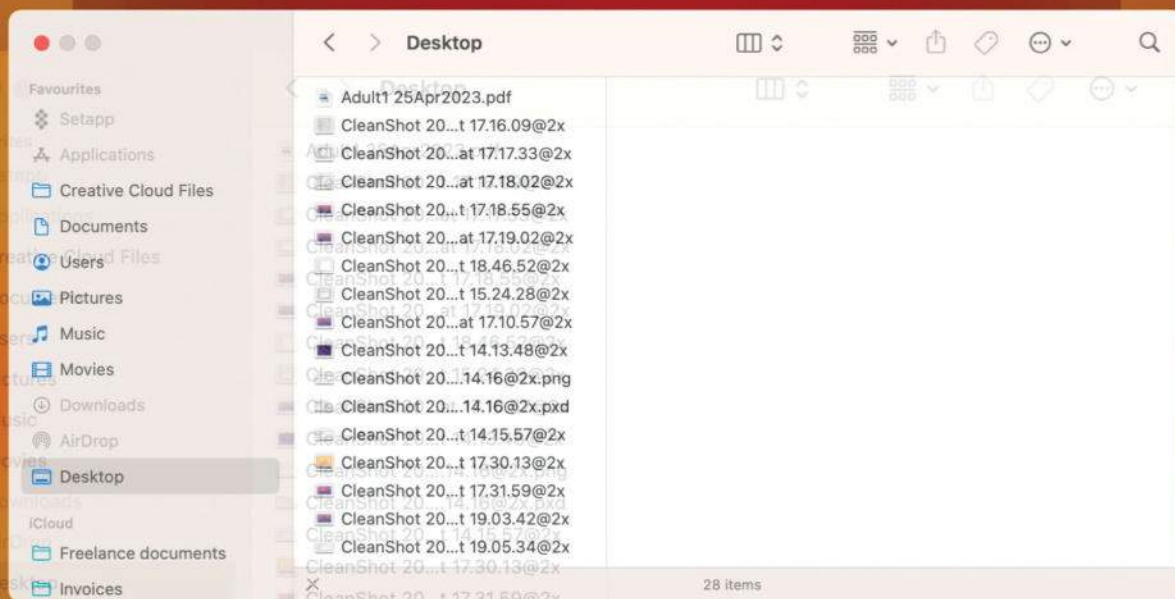
8 Remove a backup drive

If you no longer want to use a drive, go to System Settings > General > Time Machine. Click "X" next to the progress bar if a backup is running. Click "-" and confirm to remove the drive.



9 Fix a problem

Backups sometimes fail to complete, for a number of reasons. If this happens, click Time Machine in the menu bar, choose "Open Time Machine Settings" and click the red "i" to find out what caused the failure and resolve it.



Time Machine gets its name from the way its interface allows you to roll back to previous days and weeks.

Recover your data

Whether you need just one file, or to restore an entire Mac — find out how



WHEN APPLE FIRST

launched Time Machine, it pitched it as a way to roll your Mac back to an earlier point in time, before you made changes to, or deleted, files. With a skeuomorphic interface typical of Apple at the time, invoking Time Machine seemed to enable you to travel back in time via

Finder windows from an earlier age, or at least a few days ago. The skeuomorphic time travel has gone, but Time Machine's interface remains much the same, displaying stacked Finder windows and arrows to “travel” back and forth. When you find the date you want, you can then navigate the Finder as if you were back

to that date, then find and restore the files you have changed or deleted.

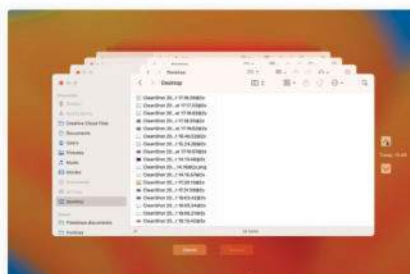
Time Machine is now integral to the process of recovering from a software catastrophe. It's the first option in the list when you boot into Recovery mode and launch macOS Utilities. And, if you reinstall macOS, you can use Time Machine to restore files and settings. ■

HOW TO Recover files in Time Machine



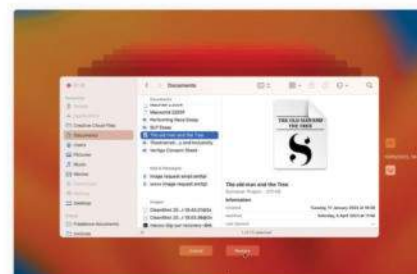
1 Launch Time Machine

If you've deleted a file or need an earlier version of one, click the Time Machine icon in the menu bar and choose Browse Time Machine Backups and wait for stacked Finder windows to appear.



2 Locate a backup

Navigate through the backups by using the up and down arrows to the right of the Finder window. Note the date and time displayed between the arrows and keep going until you find the date and time you want.



3 Restore a file

When you find the backup you need, search for the file required or navigate around the Finder window as you normally would. When you locate the file, click Restore to make that version replace the current version.

HOW TO Use Time Machine in macOS Recovery



- 1 Recovery mode**
On an Apple silicon Mac, shut down, then press and hold the Power button. Click Options from the startup options, then Continue. On an Intel Mac, boot while holding Cmd+R and release when you see the Apple logo.



- 2 Restore from a backup**
In the macOS Utilities window, choose "Restore from Time Machine" to recover all the files and settings from a recent backup. Follow the instructions on screen to choose a backup.



- 3 Restore macOS**
To reinstall macOS, choose that option from macOS Utilities. Follow the on-screen instructions. When Migration Assistant launches, choose "From a Time Machine backup or Startup disk", click Continue and choose the backup.

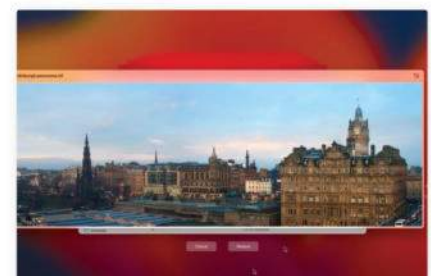
HOW TO Work smarter with Time Machine



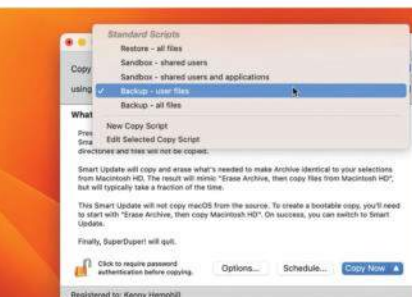
- 1 Navigate quickly**
If the file you want to restore is several days or weeks old, instead of using the arrows to find the backup, move the pointer to the bottom right of the screen, then up the notches that appear until you reach the date.



- 2 Set up a new Mac**
To set up a new Mac with a Time Machine backup of your current Mac, connect the backup drive to the new Mac the first time you boot it. Choose the first option in Migration Assistant and select the Time Machine backup.



- 3 Preview a file**
If you're not sure whether a file you find while using Time Machine is the one you actually want to restore, you can preview it using Quick Look. Just select it in the Finder window as normal, and press the Spacebar.



Carbon Copy Cloner and SuperDuper allow you to create bootable clones of your Mac.

> ALTERNATIVES TO TIME MACHINE

Third-party options for backing up your Mac

There are several third-party options for creating backups of your Mac. Tools like Backblaze (www.backblaze.com) and Carbonite (www.carbonite.com) have Mac clients for their proprietary service. Of the tools that back up your Mac to an attached disk, Carbon Copy Cloner (<https://bombich.com>) and SuperDuper (<https://shirt-pocket.com>) allow you to create bootable clones of your Mac, as well as schedule multiple backup routines. And ChronoSync (www.econtechologies.com) lets you schedule the synchronization of folders on your Mac with folders on an external drive.



**APPLE HAS TAKEN
EVERYTHING WE KNOW
ABOUT THE "WORLD'S
BEST-SELLING LAPTOP"
AND SUPER-SIZED IT**



The Apple silicon M2 chip inside the MacBook Air 15in comes with eight CPU cores.

MacBook Air 15-inch (2023)

Apple's best-selling laptop gets an upgrade

\$1,299 From www.apple.com

Features Apple M2 chip, 8GB unified memory (16GB/24GB available), 15.3in Liquid Retina display (2,880 x 1,864), 256GB storage (512GB/1TB/2TB available), Wi-Fi 6 (aka 802.11ax Wi-Fi), Bluetooth 5.3, 2x Thunderbolt/USB 4 ports, MagSafe 3 port, 3.5mm headphone jack

NOW HERE'S A SURPRISE: Apple has taken everything we know about the "world's best-selling laptop" and super-sized it, increasing the dimensions of its Liquid Retina display from 13.6-inch to 15.3-inch.

That's brilliant news for anyone who wants a big-screen laptop from Apple but can't afford the current 14-inch and 16-inch MacBook Pro (which start at \$1,999 and \$2,499 respectively).

The MacBook Air 15-inch starts at \$1,299. That entry-level price nets you a slim, stylish and beautifully built laptop equipped with an Apple silicon M2 chip comprising an 8-core CPU, 10-core GPU, 8GB of unified memory and 256GB of storage, while the step-up \$1,499 model gets 512GB of storage. To increase the specs from there, you'll need to delve into the build-to-order options, where

costs can rapidly ramp up — choosing 16GB of memory will add another \$200 to the purchase price, while 24GB will set you back \$400.

Likewise, increasing the amount of on-board storage costs \$200 for a 512GB SSD, \$400 for a 1TB SSD, and \$800 for a 2TB SSD. The version we're reviewing costs \$1,699 with 16GB of memory and 512GB of solid-state storage.

If any of the above is still too cost-prohibitive for you, you have options; choose an M2 MacBook Air 13-inch at \$1,099 to start, or buy the M1 version, which is still on sale for \$999. Or, of course, you could forego portability completely and get an M2-equipped Mac mini for \$599, though you'll need to add your own monitor, keyboard, and mouse or trackpad.

The MacBook Air 15-inch, though, is to a large extent the exact same machine as the 13-inch we looked at in our October 2022 issue (#198), albeit with a few welcome changes. The chief of these is the bigger 15.3-inch display, of course, which has super-narrow bezels, a cut-out (or notch) for the 1080p FaceTime HD camera at the top, and a resolution of 2,880 x

1,864 pixels. It includes True Tone for accurate colors in ambient lighting, and has a beefed-up audio system with six speakers instead of the 13-inch model's four.

Like the MacBook Air 13-inch, the 15-inch Air has a full-sized backlit QWERTY keyboard with Touch ID and an oversized trackpad on the top, plus a MagSafe 3 port and two Thunderbolt/USB 4 ports on the left, and a 3.5mm headphone jack on the right. And, since it has the same square-edge unibody design of the 13-inch Air, it's no surprise that it's also available in the same four color finishes — Midnight, Starlight, Space Gray and Silver. Midnight is actually a very dark blue and shows finger marks much more clearly than on other Apple laptops we've used.

The Midnight finish of the MacBook Pro 15in is a fingerprint magnet. You might want to consider another color instead.





The latest MacBook Air comes with a 15.3-inch Liquid Retina display, giving you more screen real estate to play with, without paying MacBook Pro money.

The MacBook Air 15-inch is heavier than its 13-inch cousin, but it's still one of the most luggable laptops around.



The other thing to note is that while the MacBook Air 15-inch is still much lighter than, say, the 14-inch MacBook Pro (3.3 vs 3.5 pounds), it's a chunk heavier than the 13-inch Air, which weighs in at just 2.7 pounds. That's the price you pay for a bigger screen and a larger battery.

Whichever MacBook Air model you choose, you can be assured of legendarily long battery life, with both the 13-inch and 15-inch models offering up to 18 hours of video streaming or 15 hours when surfing the web — something that was borne out by our testing, which we're coming to next...

PERFORMANCE

While the MacBook Air has never been a powerhouse laptop (that's not its *raison d'être* after all), its performance has come on leaps and bounds in recent years, most notably with the arrival of Apple silicon in 2020. The M1 MacBook Air then was a revelation compared to the Intel-powered MacBook Air before it, and while the M2 chip doesn't move the dial on from the M1 too much, it still makes a cast-iron (or should that be aluminum?) case for consideration as an everyday laptop for the rest of us (the MacBook Pro now being out of the reach of most). That's also been substantiated by our benchmarks, where we run a series of tests that put the machine through its paces.

In Geekbench 5, for example, the latest MacBook Air averaged 1,908 points in its single-core test, putting it a hair above last year's M2

MacBook Pro 13-inch on 1,903, and considerably ahead of the original M1 MacBook Air we tested in 2020, which achieved a score of 1,705. In Handbrake, the M2 chip inside the MacBook Air 15-inch converted our one-hour 4K video in around 30 minutes, seven minutes slower than the MacBook Pro 13-inch, but still some 14 minutes faster than the M1 MacBook Air from 2020.

Those scores were reflected, too, in our DaVinci Resolve benchmark, where we render an effects-laden video. Here, the M2 MacBook Air 15-inch performed the task in around 24 minutes vs the 13-inch MacBook Pro's sub-20 minute score, while the M1 MacBook Air took over 29 minutes to complete the task.

What's notable, though, is that there's quite a lot of variability in our scores. While the MacBook Pro's built-in fans keep scores consistent across multiple runs, the MacBook Air's fanless design can mean it slows down under heavy workloads. The area above the keyboard where the base of the laptop meets the display can also get pretty hot — not Intel "burn your legs" hot, but warm enough to be noticeable. None of this is that surprising — the MacBook Air is a lightweight laptop for everyday use. Creative pros who want to power through 8K videos all day every day should probably look elsewhere.

Our final benchmark is on the venerable *Rise of the Tomb Raider*, which runs under Rosetta 2 on Steam. As the game isn't optimized for Apple silicon, it maxes out at a reasonable 30 frames per

Benchmarks: Our analysis explained

> GEEKBENCH 5 SINGLE-CORE TEST

This tests the capability of a single processor core. Many more common tasks on a Mac will only use a single core at a time. Geekbench 5 is a universal app running on Ventura.

Index score (higher is better)

MacBook Air 15in 3.49GHz M2 (2023)

1,908

MacBook Air 13in 3.49GHz M2 (2022)

1,895

MacBook Air 3.0GHz M1 (2020)

1,705

> HANDBRAKE VIDEO ENCODING

We transcode a Blu-ray-quality video file into H.264 format using HandBrake to test the multicore processor performance. Handbrake is available as a universal binary.

Duration (lower is better)

MacBook Air 15in 3.49GHz M2 (2023)

29 mins, 35 secs

MacBook Air 13in 3.49GHz M2 (2022)

30 mins, 35 secs

MacBook Air 3.0GHz M1 (2020)

44 mins, 30 secs

> RISE OF THE TOMB RAIDER (1,920 X 1,200)

For a real-world gaming test, we use the benchmarking tool in this game, with the graphics quality set to High and the resolution set to 1,920 x 1,200. Not Apple silicon ready.

Frames per sec (higher is better)

MacBook Air 15in 3.49GHz M2 (2023)

30

MacBook Air 13in 3.49GHz M2 (2022)

25

MacBook Air 3.0GHz M1 (2020) (1,920 x 1,080 res)

30

> DAVINCI RESOLVE

In Blackmagic Design's editing tool for video professionals, we exported an effects-laden, 2.5-minute project to the H.264 format. The latest version of the app (Version 18) runs natively on Apple silicon.

Duration (lower is better)

MacBook Air 15in 3.49GHz M2 (2023)

24 mins, 53 secs

MacBook Air 13in 3.49GHz M2 (2022)

23 mins, 35 secs

MacBook Air 3.0GHz M1 (2020)

29 mins, 16 secs

FROM PHOTO-EDITING TO WEB SURFING, THIS MACHINE PROVES QUICK AND EASY TO USE, WHILE BATTERY LIFE IS PHENOMENAL

second during benchmark testing. That still puts this laptop's performance ahead of older Intel MacBook Air models, which could really struggle when gaming. Again, that should come as no surprise, but with Apple silicon-only games beginning to appear (plus the recently announced Game Porting Toolkit now available for developers), the number of recent AAA titles available for Mac should hopefully soon change — we'll see.

In everyday use, the M2 MacBook Air 15-inch, like its smaller sibling, is a joy to use. It starts quickly and most apps typically launch in a single bounce of their icons in the Dock. From photo-editing to web surfing, this machine proves quick and easy to use, while its battery life is phenomenal, easily matching Apple's claimed battery life figures. Even running our

benchmarks on battery didn't tax the MacBook Air 15-inch too much, forcing us only to reach for the power brick (which has two USB-C ports, incidentally) towards the end of the day.

So what's our verdict on the MacBook Air 15-inch? It handily plugs the gap between Apple's consumer-oriented MacBook Air 13-inch and the more pro-oriented MacBook Pro by delivering a reasonably affordable Apple laptop with a decent-sized screen. Sure, you can pick up laptop PCs for less, and sure, the cost of its build-to-order options can still make you wince, but its clever combination of screen size, long battery life and sheer ease of use makes it the Apple laptop you'll actually want to own.

ROB MEAD-GREEN



The Power button has Touch ID for faster logins, system authentication, and more.



The MacBook Air 15-inch comes with two Thunderbolt/USB 4 ports, plus MagSafe 3. All can be used to power the laptop.

THE BOTTOM LINE

The missing link in Apple's laptop line-up is everything you'd hope for. It's great.

- ➕ Big, beautiful display
- ➕ Incredible battery life
- ➕ Quick and efficient
- ➖ Some slowdowns under heavy workloads

AWESOME ■■■■■

Nothing Ear 2

Budget headphones that rival AirPods Pro

\$149 From <https://us.nothing.tech>

Features Adaptive active noise canceling, personal sound profiles, LHDC hi-res codec, USB-C or wireless charging, up to 36 hours of listening time (8 hours after 10 minutes of charge)

THE EAR 2 is the latest release by UK-based tech company Nothing which specializes in wireless audio, and represents an upgrade to its original Ear model. The first thing that strikes you is the design, with the case and in-ear headphones both using the same transparent plastic elements which lend it a unique look. It's also very lightweight yet well built, with the headphones offering IP54 and the case IP55 dust and water resistance, making them resistant to a light rain shower, for example.

The case charges over USB-C with a cable included and also has 2.5W wireless charging capability, which is a nice bonus. The headphones will give you up to 6.3 hours of playback with Active Noise Canceling (ANC) off and up to 36 hours in total from the case, or up to 4 hours and 22.5 from the case with ANC on. The headphones' capacity isn't stellar by modern standards, though a ten-minute fast charge of the case will give eight hours of total playback, which is handy when you're in a rush.

Pairing the headphones is as simple as opening the case and you will want to download the Nothing X app, which provides access to a wealth of customization features. The headphones have an unusual pinch-to-press system which you can set up in the app to control things like track skip, volume, ANC mode and answering calls. It works well and some people will prefer it to the touch surfaces used elsewhere, which can be too easy to press accidentally while securing the headphones in your ears. Three sizes of ear tips are provided and the headphones are comfortable and secure when worn.

The list of features continues with in-ear detection and dual device connection, and it's possible in the app to manage which two

devices will auto-connect. There's personalization available too, with the app offering multi-step processes to tailor both the playback and ANC profiles to your hearing. Three mics in each side help to power the highly effective environment-adaptive ANC and ambient modes, with variable strengths available. They also facilitate making calls, with voice clarity sounding very good in our tests.

JOYOUS SOUND

The headphones use 11.6mm dynamic drivers and support multiple codecs including LHDC for up to 24-bit streaming, as well as having the latest Bluetooth 5.3 version. While standard playback is good, this is an instance where you are well advised to run through the personalization process, since you get greater clarity and detail once you've done this. Crucially however once you have done the analysis you have more options – namely low, medium or high levels of enhancement and within each one a variable amount slider. So it's not simply on or off but you can really fine-tune the processing, even if the lack of a manual EQ is a shame.

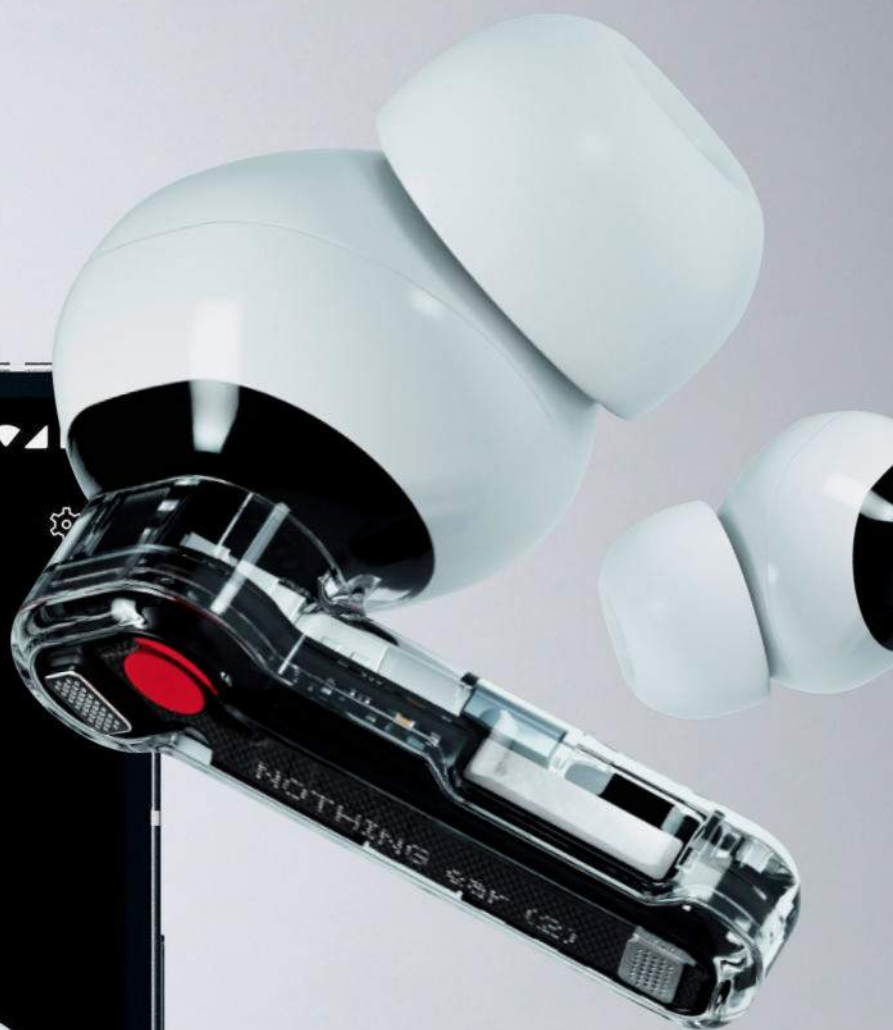
In our test we found that the medium setting with around a 50% enhancement level offered the perfect balance versus the unprocessed sound. The playback really is stunning, rich and expansive with powerful but balanced low end, clear mids and sparkling highs. Music sounds joyous, bursting with energy and bags of volume available. The fidelity and soundstage really are remarkable and easily rival headphones costing significantly more. While battery life in the headphones themselves could be a little better, these sensibly priced headphones remain an excellent choice and an easy recommendation. **HOLLIN JONES**

THE BOTTOM LINE

Superb-sounding headphones with a wealth of features at a very reasonable price.

- Wonderful, rich sound
- Excellent noise canceling
- Loads of features
- Headphones battery life a little short

EXCELLENT ■■■■■



**THE PLAYBACK IS
STUNNING, RICH AND
EXPANSIVE WITH
POWERFUL LOW END,
CLEAR MIDS AND
SPARKLING HIGHS**





The Go Link has a USB-C interface, with USB-A and Lightning adaptors also included.

iFi Audio Go Link

A high-quality portable DAC at a competitive price

\$59 From <https://ifi-audio.com>

Features USB-C interface, with USB-A and Lightning adaptors; Audio support – 32-bit/384kHz, MQA, DSD; Dimensions – 5.3" x 0.5" x 0.3", 0.4oz

IT'S TAKEN A few years, but more and more people are now opting to use a DAC — digital-analog converter — to get the best audio quality when listening to high-res or spatial audio. The iFi range of DACs provides high-quality sound at competitive prices, and its new Go Link is the most affordable — and most portable — DAC we've seen so far.

Small enough to sit comfortably in the palm of your hand, the Go Link is solidly built, with a magnesium alloy casing and braided cable that are sturdy enough to cope with being squashed into a pocket or bag when traveling.

There's a USB-C interface on one end of the Go Link for connecting to computers and mobile devices, with a USB-A adaptor included for older computers. There's even a Lightning adaptor for iPhones and iPads too — which, at this price, is excellent value for money.

The DAC provides a gold-plated 3.5mm audio socket for wired headphones, and is driven by a specialized audio chip — an ES9219MQ for hi-fi buffs — that provides

high-quality sound and also acts as an amplifier. It supports audio formats up to 32-bit/384kHz — compared to 16-bit/44.1kHz for standard CD quality — so it can handle the highest quality audio provided by Apple Music. It also supports the high-res MQA format that is used by rival services like Tidal, and the DSD format used by some specialist audio services.

Those technical details are pretty impressive for such an affordable device but, of course, everything boils down to sound quality. The Go Link doesn't disappoint, and copes admirably with the dense wall of sound on *The Big Sky* by Kate Bush, and deftly captures the dramatic sound of the ocean swirling in the introduction to Max Richter's *The Waves*. Admittedly, the compact Go Link doesn't have the sheer power of some of the more expensive DACs, but it's more than powerful enough for listening to music while you're traveling, or getting you motivated for your workout sessions, and at this price its high-quality sound is an absolute bargain. **CLIFF JOSEPH**

THE BOTTOM LINE

Useful connectivity features and great sound quality — simply a bargain for music lovers.

Great price

USB-C, USB-A and Lightning

Excellent sound quality

Not the most powerful DAC available

AWESOME ■■■■■



Anker 675

A versatile, all-in-one monitor stand

\$249.99 From www.anker.com

Features Dimensions — 21.26" x 8.66" x 3.54"; 3x USB-C, 3x USB-A, SD/micro-SD, 1x HDMI, 1x Gigabit Ethernet, 1x audio in/out, 1x Qi wireless charger **Needs** macOS 10.14 or later

AS STYLISH AS Apple's Mac designs are, they're often something of an ergonomic disaster, with monitors that don't allow you to adjust the height of the screen and many models suffering from a shortage of ports and connectors. Anker's new 675 dock is a little pricey, but it aims to solve all those problems by providing an impressive set of ports and other features, while also doubling up as a convenient monitor stand.

The Anker 675 is quite large and has its own chunky power supply unit as well, so you'll need a fair bit of desk space to get it set up. However, you've got room to tuck a few bits and pieces underneath it, and there's a holder on the underside of the dock for wrapping cables to keep them out of sight.

Underneath the 675 you'll find the power connector for the dock itself, and the main USB-C port that is used to connect your Mac or PC, and which can also provide up to 100W power to charge a MacBook or other laptop. There's a USB-A port under there too, along

with a Gigabit Ethernet port for wired networks, and an HDMI port that will allow you to connect a single external display, up to 4K resolution at 60Hz refresh rate.

There's a second set of ports located on the left-hand side of the dock, with two more USB-C and two USB-A ports, slots for SD and micro-SD memory cards, and an audio in/out connector. The top panel of the dock also houses a Qi charging pad for your iPhone or earbuds. It's a little odd that the USB-C ports can't be used to connect an external display — such as Apple's own Studio Display, which doesn't have HDMI at all. Even so, the Anker 675 will still be a really useful option for many people who simply want to connect their MacBook or desktop Mac to a single (non-Apple) external display, and also charge and connect a variety of mobile devices as well. **CLIFF JOSEPH**

The stand features a useful collection of built-in ports and connectors.

THE BOTTOM LINE

The reliance on HDMI for video output may deter some people, but the Anker 675 will be a good dock/stand for general office use.

- Lots of ports and connectors
- Provides a stand for your monitor
- Includes Qi charging pad
- Video output via HDMI only

GREAT ■■■■■



Photomator 3

In-depth photo editing on your Mac

Free; \$4.99/month; \$29.99/year; \$99.99 lifetime

From www.pixelmator.com **Needs** macOS 13.0 or later



THE TEAM BEHIND

Pixelmator Photo has used the update to version 3 to rebrand the app as Photomator, adding a bunch of new features at the same time. It syncs to your Photos library and stores edits nondestructively in the cloud, meaning you can always undo changes and your photos will be accessible to the app both on the Mac and on iOS. Your purchase also unlocks the iOS versions and while the Mac app is free to download and use, you only get three saves before you'll have to choose a purchase option to make any more.

It supports RAW files and is generally pretty snappy in operation even when working with large images. You get a selection of machine learning-based tools for making quick edits, from one-click enhancement to more advanced features like super resolution to intelligently increase canvas size, match colors between images, denoise and repair. There's also

ML-powered selection with subject, sky and background all able to be identified and masked very accurately. Unlike some similar non-Adobe photo editors, Photomator uses a basic layer system to help you manage your edits. This isn't for importing other graphics but for applying nondestructive edits like selectively changing color hues, altering the brightness of the sky, the clarity of your subject, and many other possibilities.

POWERFUL IMAGE EDITING

These edits are facilitated by masks, which appear in your Layer palette and can be easily inverted or modified using a brush, say for example to include or exclude an area that the auto-masking didn't pick up. All the things you can change using these tools can also be applied to the basic image of course, without using any special tricks. Most sections have a ML button you can hit to make auto-adjustments. So you can make the whole image sharper,

Many editing tools are available with a ML-powered one-click option.

brighter or darker, or edit the hue and saturation of its colors. Some handy presets are available too that let you punch in a "look", and these are subtle rather than outlandish. You can save your own presets, batch process images and even export your settings as a LUT (look-up table).

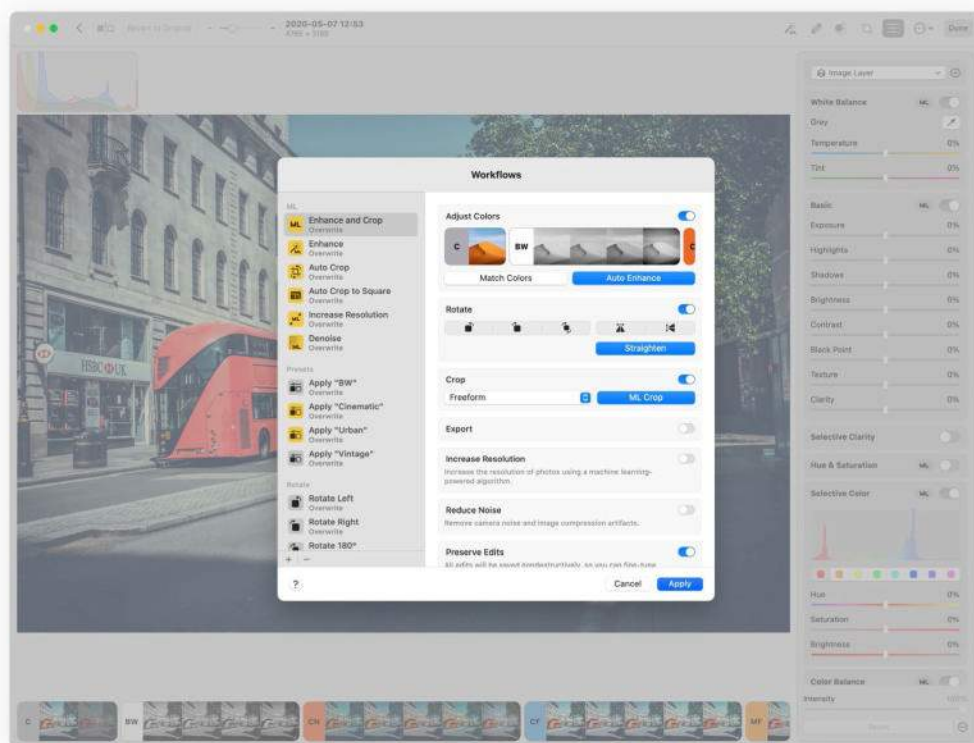
The image editing tools are powerful but easy enough for less experienced users to master after a little practice. They're arguably on a par with Lightroom, though Adobe's app is stronger when it comes to library management. Among the other features you will find cloning and a Repair tool that can remove objects from images. As is often the case, this is great with smaller items but can struggle a bit with larger ones. There are also some ML-powered workflows which are useful for batch processing. It can also intelligently crop images to make them more striking, though this is something that more experienced photographers would always do manually.

AN ADOBE ALTERNATIVE

Images are saved to your Photos library but remain editable from Photomator. You can also export images in a number of formats with variable quality settings, though curiously not Photoshop format. If you export a Photomator document it can be opened in Pixelmator Pro and

Subject, sky and background detection let you quickly change selective parts of an image.





retains its editable layers, which is useful if you want to add more graphical elements or text.

Photomator is a very adept tool for editing your pictures and the developers are working on support for features including file browser support, dehaze and video editing among other things. It all feels slick and friendly and moving effortlessly between Mac and iOS is a nice touch too. Not everyone likes the subscription model even though it's widely used nowadays and looks set to stay — you might

find that \$30 for a year is the sweet spot to see how this powerful editor fits into your photo life. **HOLLIN JONES**

THE BOTTOM LINE

A powerful and well-featured image editor that's easy to use and produces great results.

- Good depth of editing tools
- Layers are very useful
- ML features work well
- Catalog features limited

EXCELLENT ■■■■■

Workflows are actions you can quickly apply to batches of images for quick editing.

As well as selective editing, preset looks are available for quick application to photos.

"THE IMAGE EDITING TOOLS ARE POWERFUL BUT EASY ENOUGH FOR LESS EXPERIENCED USERS TO MASTER"

Match colors between images

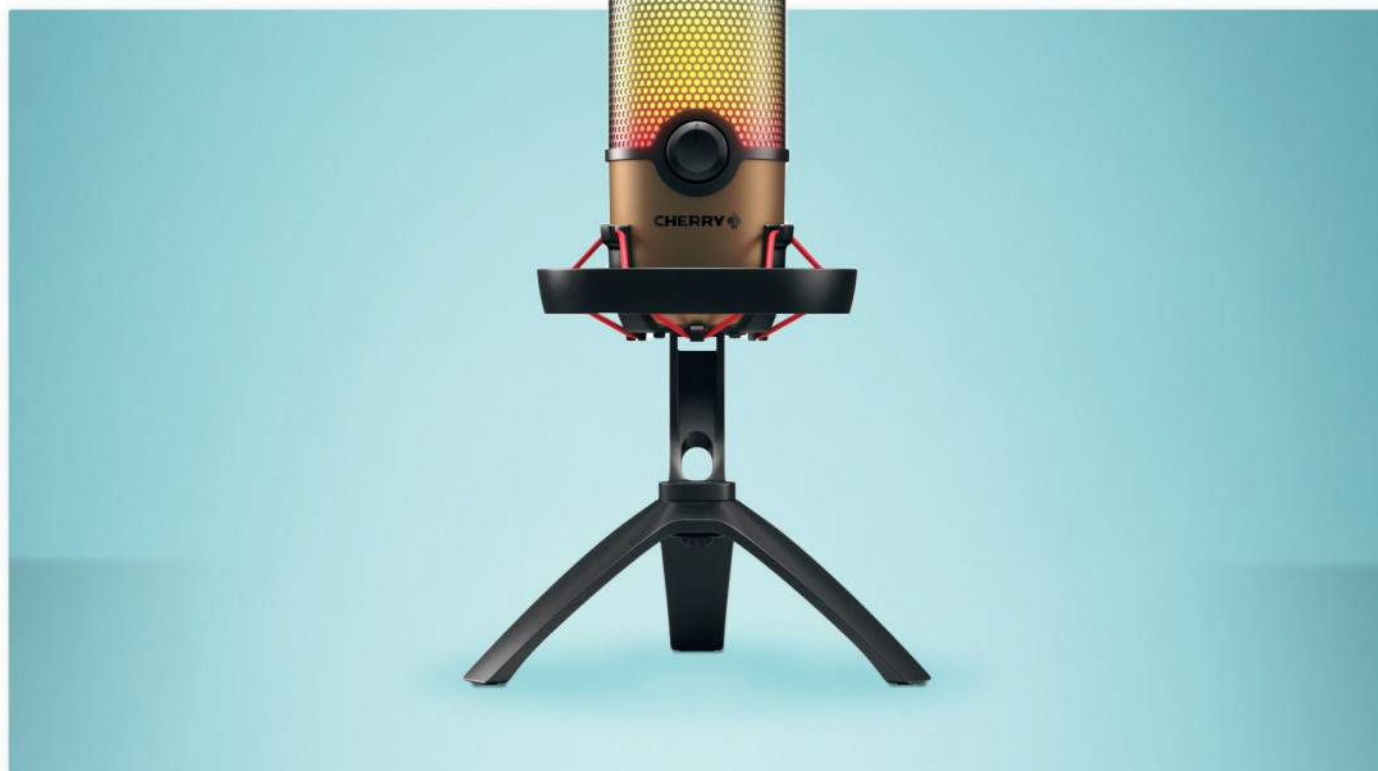
If you select Tools > Match Colors you can select an image to analyze and from which to transfer the color balance to your current photo. This is much quicker than doing it manually when you want two images to have the same feel.

Use workflows

Select one or more images in your library, right-click and choose Workflows and then More Workflows. Here you can access many automated tasks for batch processing images in multiple ways.

Change layer intensity

If you have used layers to nondestructively make changes to an image or parts of an image, you can use the Intensity slider for each layer to set a more moderate value than simply 0 or 100.



The mic has eight RGB lighting modes, but you can turn off the lights if you prefer.

Cherry UM 9.0 Pro RGB

Come for the RGB, stay for the audio

\$139.99 From www.cherry-world.com

Features Four polar patterns (cardioid, omnidirectional, bidirectional and stereo), included shock mount and tripod stand, RGB lighting, gain control, mute button, 3.5mm headphone jack with volume control, braided USB-C to USB-A cable

THERE AREN'T MANY RGB-infused USB microphones out there, but Cherry's new UM 9.0 Pro RGB microphone brings the light show to your desk. The Cherry's mouthful of a mic feels absolutely solid, with the easily adjustable stand being cast from sturdy metal. That said, Cherry's device trades portability for durability, and it's a pretty sizeable microphone that won't pack up small for travel. If you need a compact mic for the road, you might want to look elsewhere.

There's a built-in shock mount to help reduce unwanted noise and vibrations, which could make all the difference in your recordings. There's no pop filter, but plosives were a total non-issue in our tests. Speaking of recordings, Cherry's effort fares magnificently here. Our test recordings came out perfectly clear, with no hint of the muffled and tinny output that can often befall desktop mics. The quality was so good, it was like listening to someone sitting in the room next to us.

We had to turn up the gain to get the best results, but it didn't need to be maxed out. Even with the gain dialed all the way up to full, clarity was kept intact and there was no clipping anywhere within earshot.

There are four polar patterns to choose from: cardioid, omnidirectional, bidirectional, and stereo. Changing the mode requires pushing in the gain dial, which cycles through each setting; the pattern of lights on top of the device indicates which mode is selected. We would prefer a more obvious way to pick a polar pattern, such as a dedicated button with clearly labeled options. It's a relatively small complaint, like the fact that the mic only comes with a USB-A to USB-C cable and no USB-C adapter for modern Macs.

It is also on the pricey side for a USB microphone, but you absolutely get what you pay for. The superb audio output, included shock mount and rock-solid build quality make that money well spent. **ALEX BLAKE**

THE BOTTOM LINE

The RGB lighting may catch the eye, but this mic's audio quality is what you'll love most.

➤ Fantastic audio quality

➤ Built-in shock mount

➤ Robust construction

➤ USB-A cable

EXCELLENT ■■■■■

Roadwarden

Secure a harsh land in this superb RPG

\$10.99 From <https://moralanxietystudio.com>

Needs OS X 10.10 or later



ROADWARDEN IS THE kind of pure role-playing game (RPG) experience you don't see so much these days. There are no fancy 3D graphics and convoluted systems, but instead a heavy focus on storytelling and decision-making. It may look simple on the surface, but this text-based adventure is deep and complex, with huge replay value and branching storylines. As a roadwarden, you travel the lonely trails of a wild and inhospitable peninsula as a representative of a far-off land, attempting to ward off dangers, broker agreements, and generally keep the peace among disparate and distrustful people.

The game is deeply steeped in its own lore, history and culture, and playing for the first time feels like dropping into a living world that carries on with or without your input. The map is large and your time is limited, with 40 days to explore the peninsula before the clock runs out. You can't do everything, but that just encourages you to play again.

NO OBVIOUS ANSWERS

Every decision you make can impact the story. You can address the varied characters in multiple ways, with different responses and inflections, from friendly and joking to intimidating. Sometimes, lying is your best



Each corner of the map is filled with interesting characters, all struggling to survive in a cruel realm.



bet. Each choice you face feels weighty — there are no easy ways out. Certain situations come down to a dice roll, like deciding whether you survive a fight unscathed or take heavy losses, which imbues combat with a real sense of peril. Every interaction is interesting, and every encounter a chance to advance the story in unexpected ways.

Roadwarden is heavy on text. While its world is full of characters, the graphics are mostly reserved for environments and settlements. That's fine, though, because the game's pixel visual style is captivating. Its music, too, is enchanting, and at times leaves you feeling like you're sat in a medieval tavern as a fire crackles and your mug is filled with mead.

If you're not a fan of text-based games, *Roadwarden* might not have much appeal. But RPG enthusiasts will find much to love here. It's one of the most polished traditional RPG experiences on macOS.

ALEX BLAKE

Adopting the right tone can help your chances — or dash them.

THE BOTTOM LINE

With its complex lore and impressive writing, *Roadwarden* is a welcome gift for RPG lovers.

- ✦ Excellent writing & story
- ✦ Your decisions matter
- ✦ Attractive graphical style
- ✦ Drains your battery surprisingly fast
















EXCELLENT ■■■■■

Best of the best
















Can't find the hardware or app you're looking for in our reviews section? Then check in here — we've highlighted the best in every major category, as voted for by us

> HARDWARE				
CATEGORY	PRODUCT	WEB	PRICE	ISSUE
MESH ROUTER	ASUS ZenWiFi XT9	asus.com	\$449.99	#201
4K USB-C MONITOR	BenQ EW3280U	benq.com	\$799.99	#169
THUNDERBOLT DOCK	CalDigit Thunderbolt Station 4	caldigit.com	\$379.99	#199
KEYBOARD	Cherry KW 9100 Slim for Mac	cherry-world.com	\$59.99	#208
PORTABLE PRINTER	Epson WorkForce WF-110W	epson.com	\$299.99	#185
PORTABLE HDD	Toshiba Canvio Flex 2TB	storage.toshiba.com	\$79.99	#197
NAS DEVICE	Asustor Lockerstor 2 Gen 2 AS6702T	asustor.com	\$459	#205
WIRELESS CHARGER	Belkin BoostCharge Pro Portable	belkin.com	\$59.99	#197
DESKTOP SPEAKERS	Creative Pebble Pro	us.creative.com	\$59.99	#204
NEW! IN-EAR HEADPHONES	Nothing Ear 2	us.nothing.tech	\$149	#209
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CATEGORY	PRODUCT	WEB	PRICE	ISSUE
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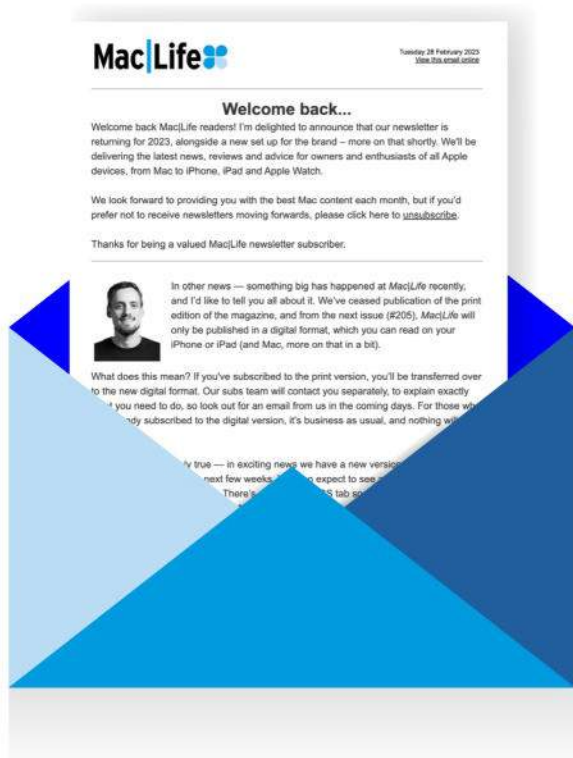
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EDITOR **Nick Odantzis**

PRODUCTION EDITOR **Rachel Terzian**

CONTRIBUTORS **Paul Blachford, Alex Blake, Matt Bolton, George Cairns, Andrew Cottle, David Crookes, Kenny Hemphill, Charlotte Henry, Hollin Jones, Cliff Joseph, Carrie Marshall, Rob Mead-Green, Howard Oakley, Ian Osborne, Matt Smith, Alex Summersby**

ART

ART CONTRIBUTORS **Apple Inc**

PHOTOGRAPHY **Bath Photo Studio – Neil Godwin, Olly Curtis, Phil Barker**

COVER IMAGE CREDITS **Apple Inc, Nothing**

Future US, LLC.

130 WEST 42ND STREET, 7TH FLOOR, NEW YORK, NY 10036, USA
WWW.FUTUREUS.COM

BUSINESS

MAJOR ACCOUNTS DIRECTOR **Victoria Sanders**, victoria.sanders@futurenet.com

VP: GAMES, TECH AND US MUSIC **Sheri Taubes**

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HEAD OF PRINT LICENSING **Rachel Shaw**

MANAGEMENT

SVP TECH, GAMES & ENTS **Kevin Addley**

MANAGING DIRECTOR, TECH **Paul Newman**

HEAD OF ART & DESIGN **Rodney Dive**

GROUP EDITOR-IN-CHIEF **Graham Barlow**

GROUP ART DIRECTOR **Jo Gulliver**

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