December 2019
Vol. XXX, No 11

KEYSTONE MacCentral

printout

Keystone MacCentral Macintosh Users Group ❖ http://www.keystonemac.com

December Program

It time for our annual Christmas party. Bring some goodies to share.
Wendy has promised to bring her chili.
There will be a short program and more roundtable discussions.

Meet us at

Bethany Village Retirement Center

Education Room
5225 Wilson Lane, Mechanicsburg, PA 17055

Tuesday, December 17th 2019 6:30 p.m.

Attendance is free and open to all interested persons.

Contents

Keystone MacCentral is a not-for-profit group of Macintosh enthusiasts who generally meet the third Tuesday of every month to exchange information, participate in question-and-answer sessions, view product demonstrations, and obtain resource materials that will help them get the most out of their computer systems. Meetings are free and open to the public. The *Keystone MacCentral printout* is the official newsletter of Keystone MacCentral and an independent publication not affiliated or otherwise associated with or sponsored or sanctioned by any for-profit organization, including Apple Inc. Copyright © 2019, Keystone MacCentral, 310 Somerset Drive, Shiresmanstown, PA 17011.

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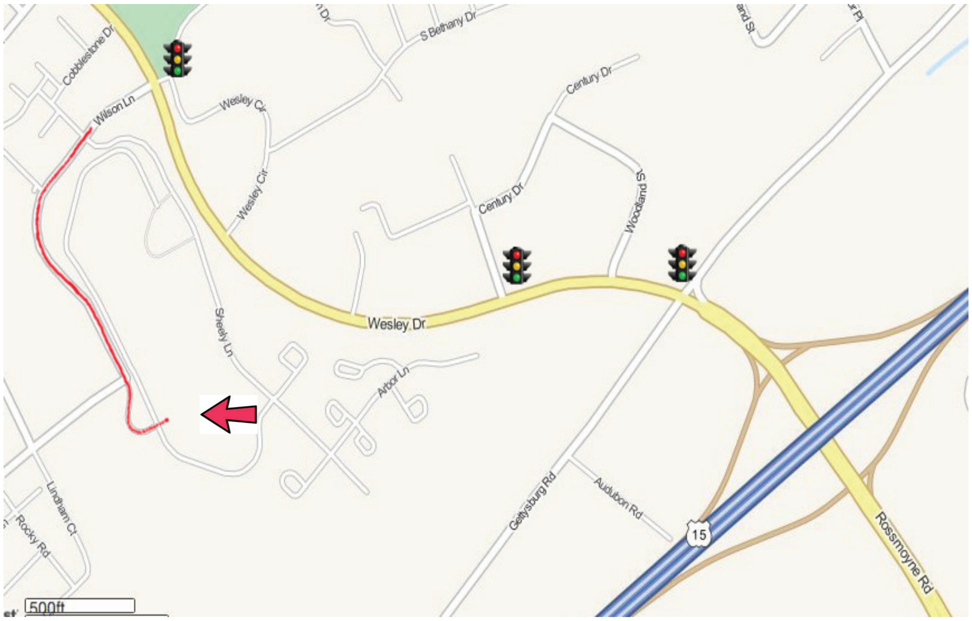

Keystone MacCentral Essentials

Meeting Place
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5225 Wilson Lane
Mechanicsburg, PA 17055

Web Site
http://www.keystonemac.com

Mailing Address
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Shiresmanstown, PA 17011

By Josh Centers

iOS 13.2.2 Stops Killing Background Apps

To address complaints about apps quitting unexpectedly in the background after the iOS 13.2 and iPadOS 13.2 updates, Apple has released iOS 13.2.2 and iPadOS 13.2.2. (Confusingly, iOS 13.2.1 was an update exclusively for the HomePod — see “iOS for HomePod 13.2.1 Resolves Bricking,” 4 November 2019.) You can install the updates, which weigh in at 588.2 MB on an iPhone X and 534.3 MB on a 10.5-inch iPad Pro, in Settings > General > Software Update, through the Finder in macOS 10.15 Catalina, or through iTunes in earlier versions of macOS.

Although the problem with quitting background apps is the primary focus of these updates, they also address some obscure bugs that:

Caused replies to S/MIME encrypted email messages between Exchange accounts to be unreadable

Presented an authentication prompt when using Kerberos for single sign-on in Safari

Interrupted charging on Lightning-powered Yubikey accessories

On the iPhone side, however, iOS 13.2.2 provides important fixes for bugs with cellular service, including:

An issue where iPhones could temporarily lose cellular service after a call

A problem that could make cellular data temporarily unavailable

Neither update has any public security fixes.

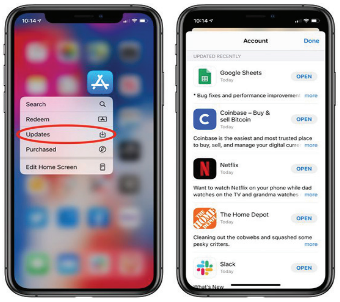
At the risk of sounding like a broken record, we recommend that if you haven’t yet upgraded to iOS 13, there’s little harm in holding off a little longer. But if you have jumped on the iOS 13 bandwagon, keep installing these updates and hold on tight, since it’s a bumpy ride.

By Josh Centers

Quickly Access App Updates in iOS 13

For those of us who like to keep track of iOS app updates, one of the more annoying changes to iOS 13 and iPadOS 13 is how Apple eliminated the Updates tab in the App Store app in favor of a special tab for Apple Arcade. To see what app updates are available or have been installed, you now have to tap your face in the upper-right corner and then scroll down, which isn’t something you’d guess. (It took us a little searching to find it.)

Thankfully, Apple has taken mercy on us and provided a faster way: on the Home screen, tap and hold the App Store icon and choose Updates from the contextual menu (thanks to Giovanni Mattei for the tip). You may still have to scroll down to see the updates. This trick used to work only on iPhones with 3D Touch, but in giving up on the 3D Touch technology, Apple extended its long-press replacement to all devices, including iPads.



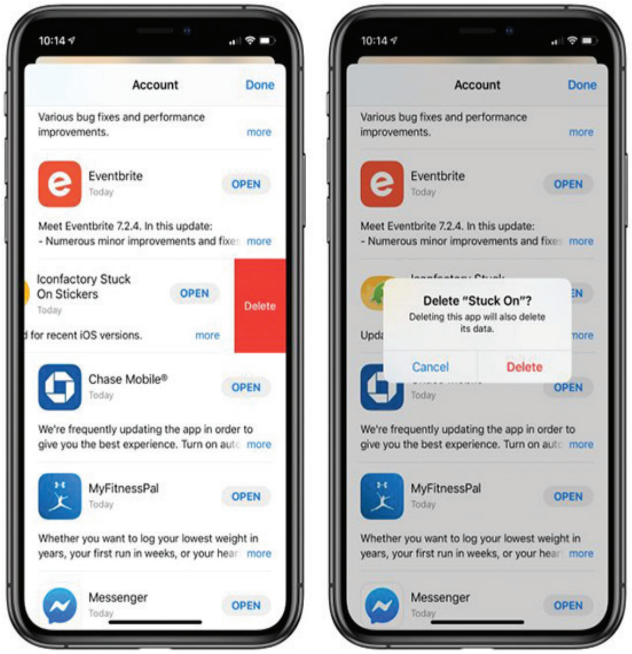
* Bug fixes and performance improvement

Coinbase is the easiest and most trusted place to buy, sell, and manage your digital curre

Want to watch Netflix on your phone while dad watches on the TV and grandma watches

Cleaning out the cobwebs and squashed some pesky critters.

Here’s a bonus tip I discovered: while viewing your app updates, you can swipe left on an app listing to delete that app. So if you see an update come through for an app you never use anymore, you don’t have to go hunting for it on your Home screens.



Various bug fixes and performance improvements.

Meet Eventbrite 7.2.4. In this update:
- Numerous minor improvements and fixe

for recent iOS versions.

We're frequently updating the app in order to give you the best experience. Turn on aut

Whether you want to log your lowest weight in years, your first run in weeks, or your hear

Delete "Stuck On"?
Deleting this app will also delete its data.

By Josh Centers

USB Storage with iOS 13: The FAQ

Can I use external USB drives with an iPhone, or does the feature work only on the iPad?

Although Apple has marketed this feature primarily in relation to the iPad — specifically the iPad Pro — it works just the same in iOS 13 on an iPhone as it does in iPadOS.

What types of storage devices can iOS 13 read?

iOS 13 can read any standard USB storage device as long as it has been formatted with a compatible file system and has sufficient power provided (see the next two points). In short, most storage devices should work.

Niles Mitchell made a series of YouTube videos in which he connects obscure storage devices — including an Iomega Zip disk! — to an iPhone running iOS 13.

How do I connect a USB storage device to my iPhone or iPad?

It depends. Most iOS 13-compatible devices have a Lightning port, while 2018 iPad Pro models have a USB-C port:

- **Lightning options:** If your device has a Lightning port, you'll need a Lightning-to-USB adapter. I strongly recommend Apple's Lightning to USB 3 Camera Adapter because it supports USB 3 and offers a Lightning passthrough port for power, which will be necessary for some devices (see "Buy the Best Lightning to USB Adapter for iOS 13," 12 August 2019). If you have the older USB 2 adapter without power passthrough, you can use a powered USB hub to power your storage devices. You can also buy Lightning-based thumb drives that eliminate the need for the adapter and passthrough power.
- **USB-C options:** Your best bet for USB-C-equipped iPads is either a USB-C–based thumb drive or one of the multitude of USB-C hubs that offer a USB-A port.

What file systems does iOS support?

As far as I can find, Apple doesn't document what file systems iOS 13 can use: not in the support documents, nor in the most recent iPhone and iPad user guides. So I took matters into my own hands, repeatedly erasing and reformatting a thumb drive and plugging it into my iPhone to see if it would work. Long story short: iOS can read all non-encrypted file systems supported by the Mac's Disk Utility.

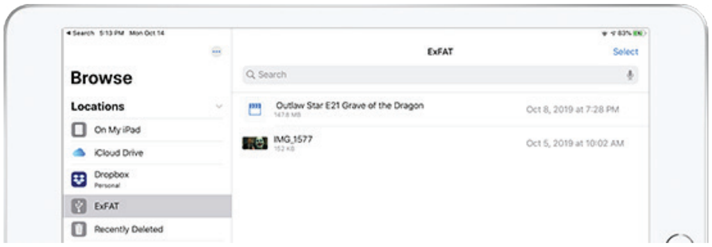
How should you format a storage drive for use with iOS?

Here are my recommendations:

- **MS-DOS (FAT): FAT** is the most compatible file system if you need to share your storage drive between iOS, macOS, Windows, and Linux. However, it comes with some irritating limitations: files must be smaller than 4 GB, filenames must be eight characters or less, and all filenames must be in capital letters with no spaces.
- **exFAT**: exFAT is a newer form of FAT and has fewer limitations. It's a good choice for portability between iOS, macOS, and Windows. Linux can also use exFAT, though you'll have to install some system extensions. (Microsoft has promised exFAT support in the Linux kernel but has provided no firm commitment to when that will happen.)
- **Mac OS Extended (Journaled)**: The classic Mac file system, also known as HFS+, works fine if you plan to share a drive only between iOS and macOS.
- **APFS:** There isn't much point to formatting a drive as APFS unless you're planning to boot from it or want to play with containers and volumes.

How do I access my USB storage from Files?

On the iPad in landscape orientation, the drive appears in the sidebar automatically.



Outlaw Star E21 Grave of the Dragon — 147.8 MB — Oct 8, 2019 at 7:28 PM

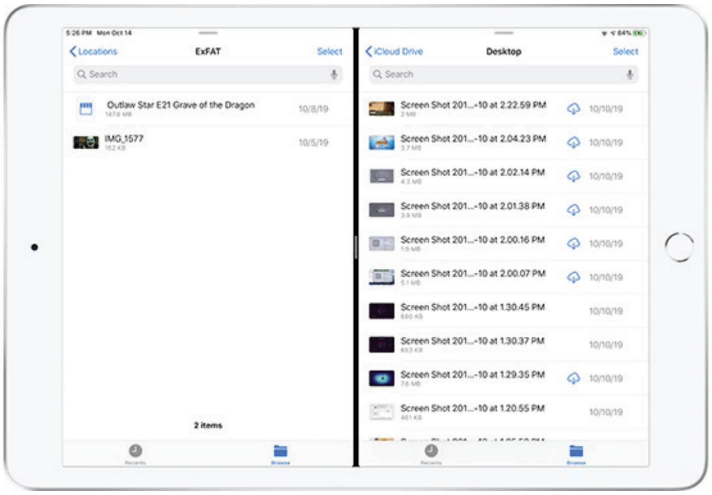
IMG_1577 — 152 KB — Oct 5, 2019 at 10:02 AM

On an iPhone or an iPad in portrait orientation, tap the Browse icon on the bottom of the screen to jump to the Browse screen, which lists all of your locations.

How do I copy files to and from USB storage?

The easiest method is to tap and hold a file until the contextual menu appears and choose Copy. Then navigate to the destination, tap and hold a blank spot in the directory, and choose Paste from the contextual menu. To move a file, choose Move instead of Copy and choose a destination from the browser.

On the iPad, you can use drag-and-drop to copy the file where it needs to go. The easiest way is to split the Files window, pull up the location in the split, and then drag the file from the original window (see "Here's What Sets iPadOS Apart from iOS," 25 September 2019). You might find this handier than the above method if you have a lot of files to copy.

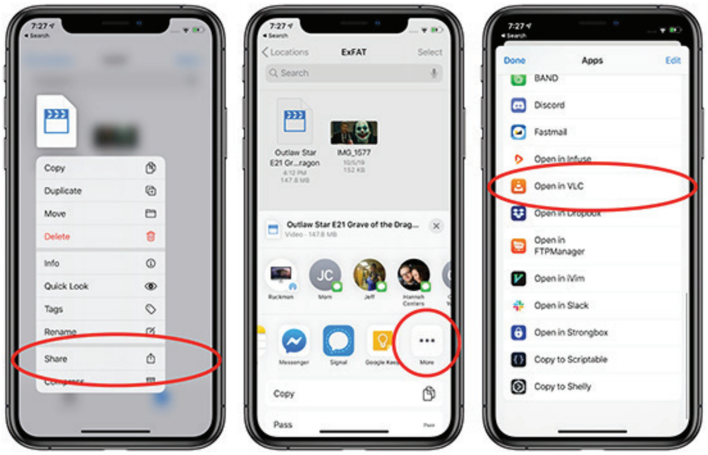


Outlaw Star E21 Grave of the Dragon 147.8 MB 10/8/19
IMG_1577 152 KB 10/5/19

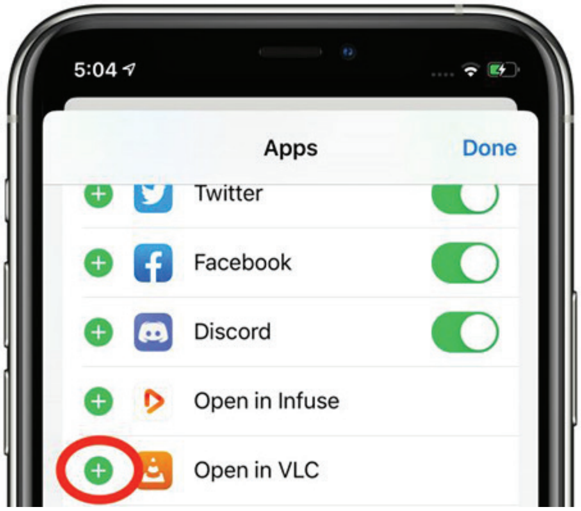
Screen Shot 201...-10 at 2.22.59 PM 2 MB 10/10/19
Screen Shot 201...-10 at 2.04.23 PM 3.7 MB 10/10/19
Screen Shot 201...-10 at 2.02.14 PM 4.3 MB 10/10/19
Screen Shot 201...-10 at 2.01.38 PM 3.9 MB 10/10/19
Screen Shot 201...-10 at 2.00.16 PM 1.9 MB 10/10/19
Screen Shot 201...-10 at 2.00.07 PM 5.1 MB 10/10/19
Screen Shot 201...-10 at 1.30.45 PM 660 KB 10/10/19
Screen Shot 201...-10 at 1.30.37 PM 653 KB 10/10/19
Screen Shot 201...-10 at 1.29.35 PM 7.6 MB 10/10/19
Screen Shot 201...-10 at 1.20.55 PM 461 KB 10/10/19

Can I play media from USB external storage?

Yes, you can, which is an effective way to store movies without taking up valuable on-device space. I tested media playback with the open-source VLC, but other apps might work too. Tap and hold a media file until the contextual menu appears, tap Share, and then tap VLC or your desired app. VLC appears in the second row of the activity view — you may have to swipe left and tap More to reveal it.



If you plan to do this regularly, you can pin VLC to the Files activity view. On the rightmost screen pictured above, you can tap Edit in the upper-right corner and then tap the plus button to the left of Open in VLC.



When you tap the VLC icon in the Files activity view, be patient since it may take a few seconds before the video or other media file starts playing. I found that sometimes it didn't play on the first try, requiring a second pass at opening the file in VLC.

Do I have to eject a drive before removing it, like on the Mac?

No, and in fact, that's not even an option. Just use common sense and don't pull a drive when it's reading data or having data written to it.

By David Shayer

Six Reasons Why iOS 13 and Catalina Are So Buggy

iOS 13 and macOS 10.15 Catalina have been unusually buggy releases for Apple. The betas started out buggy at WWDC in June, which is not unexpected, but even after Apple removed some features from the final releases in September, more problems have forced the company to publish quick updates. Why? Based on my 18 years of experience working as an Apple software engineer, I have a few ideas.

Overloaded Feature Lists Lead to Schedule Chicken

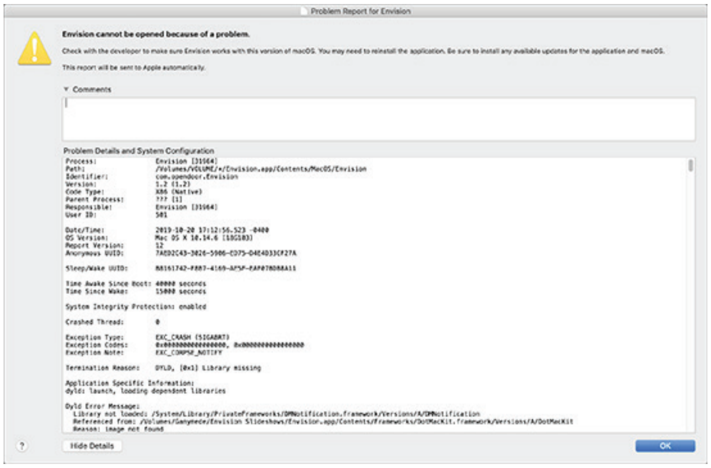
Apple is aggressive about including significant features in upcoming products. Tight schedules and ambitious feature sets mean software engineers and quality assurance (QA) engineers routinely work nights and weekends as deadlines approach. Inevitably some features are postponed for a future release, as we saw with iCloud Drive Folder Sharing.

In a well-run project, features that are lagging behind are cut early, so engineers can devote their time to polishing the features that will actually ship. But sometimes managers play "schedule chicken" since no one wants to admit in the departmental meeting that their part of the project is behind. Instead, they hope someone else working on another aspect of that feature is running even later, so they reap the benefit of the feature being delayed without taking the hit of being the one who delayed it. But if no one blinks, engineers continue to work on a feature that can't possibly be completed in time and that eventually gets pushed off to a future release.

Apple could address this scheduling problem by not packing so many features into each release, but that's just not the company culture. Products that aren't on a set release schedule, like the AirPods or the rumored Bluetooth tracking tiles, can be delayed until they're really solid. But products on an annual release schedule, like iPhones and operating systems, must ship in September, whatever state they're in.

Crash Reports Don't Identify Non-Crashing Bugs

If you have reporting turned on (which I recommend), Apple's built-in crash reporter automatically reports application crashes, and even kernel crashes, back to the company. A crash report includes a lot of data. Especially useful is the stack trace, which shows exactly where the code crashed, and more importantly, how it got to that point. A stack trace often enables an engineer to track down the crash and fix it.


Problem Report for Envision

Envision cannot be opened because of a problem.

Check with the developer to make sure Envision works with this version of macOS. You may need to reinstall the application. Be sure to install any available updates for the application and macOS.

This report will be sent to Apple automatically.

▼ Comments

Problem Details and System Configuration

```
Process:               Envision [31564]
Path:                  /Volumes/VOLUME/*/Envision.app/Contents/MacOS/Envision
Identifier:            com.opendoor.Envision
Version:               1.2 (1.2)
Code Type:             X86 (Native)
Parent Process:        ??? [1]
Responsible:           Envision [31564]
User ID:               501

Date/Time:             2019-10-20 17:12:56.523 -0400
OS Version:            Mac OS X 10.14.6 (18G103)
Report Version:        12
Anonymous UUID:        7AED2C43-3026-5906-E075-D4E4D33CF27A

Sleep/Wake UUID:       88161742-F887-4169-AF5F-EAF07BD88A11

Time Awake Since Boot: 40000 seconds
Time Since Wake:       15000 seconds

System Integrity Protection: enabled

Crashed Thread:        0

Exception Type:        EXC_CRASH (SIGABRT)
Exception Codes:       0x0000000000000000, 0x0000000000000000
Exception Note:        EXC_CORPSE_NOTIFY

Termination Reason:    DYLD, [0x1] Library missing

Application Specific Information:
dyld: launch, loading dependent libraries

Dyld Error Message:
  Library not loaded: /System/Library/PrivateFrameworks/DMNotification.framework/Versions/A/DMNotification
  Referenced from: /Volumes/Ganymede/Envision Slideshows/Envision.app/Contents/Frameworks/DotMacKit.framework/Versions/A/DotMacKit
  Reason: image not found
```

Crash reports are uniquely identified by the stack trace. The same stack trace on multiple crash reports means all those users are seeing the same crash. The crash reporter backend sorts crash reports by matching the stack traces, and those that occur most often get the highest priority. Apple takes crash reports seriously and tries hard to fix them. As a result, Apple software crashes a lot less than it used to.

Unfortunately, the crash reporter can't catch non-crashing bugs. It's blind to the photos that never upload to iCloud, the contact card that just won't sync from my Mac to my iPhone, the Time Capsule backups that get corrupted and have to be restarted every few months, and the setup app on my new iPhone 11 that got caught in a loop repeatedly asking me to sign in to my iCloud account, until I had to call Apple support. (These are all real problems I've experienced.)

Apple tracks non-crashing bugs the old-fashioned way: with human testers (QA engineers), automated tests, and reports from third-party developers and Apple support. Needless to say, this approach is as much an art as it is a science, and it's much harder both to identify non-crashing bugs (particularly from reports from Apple support) and for the engineers to track them down.

Less-Important Bugs Are Triaged

During development, Apple triages bugs based on the phase of the development cycle and the bug severity. Before alpha, engineers can fix pretty much any bug they want to. But as development moves into alpha, and then beta, only serious bugs that block major features are fixed, and as the ship date nears, only bugs that cause data loss or crashes get fixed.

This approach is sensible. As an engineer, every time you change the code, there's a chance you'll introduce a new bug. Changes also trigger a whole new round of testing. When you're close to shipping, a known bug with understood impact is better than adding a fix that might break something new that you'd be unaware of.

Bugs that generate a lot of Apple Store visits or support calls usually get fixed. After all, it costs serious money to pay enough support reps to help lots of users. It's much cheaper to fix the bug. When I worked on Apple products, we'd get a list of the top bugs driving Apple Store visits and support calls, and we were expected to fix them.

Unfortunately, bugs that are rare or not terribly serious — those that cause mere confusion instead of data loss — are continually pushed to the back burner by the triage system.

Regressions Get Fixed. Old Bugs Get Ignored.

Apple is lousy at fixing old bugs.

Apple pays special attention to new products like the iPhone 11, looking for serious customer problems. It jumps on them quickly and generally does a good job of eradicating major issues. But any bugs that are minor or unusual enough to survive this early scrutiny may persist forever.

Remember what I said about changes causing new bugs? If an engineer accidentally breaks a working feature, that's called a regression. They're expected to fix it.

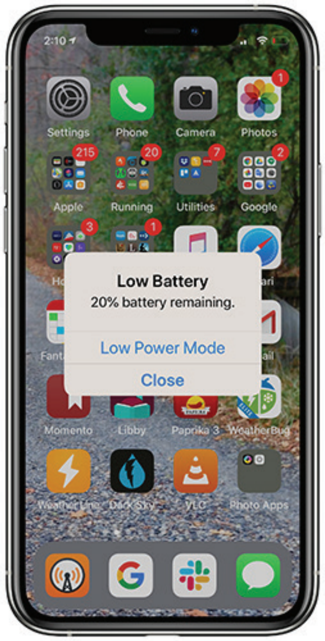
But if you file a bug report, and the QA engineer determines that bug also exists in previous releases of the software, it's marked "not a regression." By definition, it's not a new bug, it's an old bug. Chances are, no one will ever be assigned to fix it.

Not all groups at Apple work this way, but many do. It drove me crazy. One group I knew at Apple even made "Not a Regression" T-shirts. If a bug isn't a regression, they don't have to fix it. That's why the iCloud photo upload bug and the contact syncing bug I mentioned above may never be fixed.

Automated Tests Are Used Sparingly

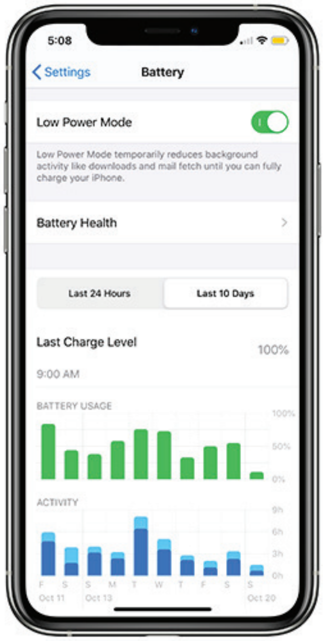
The software industry goes through fads, just like the fashion industry. Automated testing is currently fashionable. There are various types of automated testing: test-driven design, unit tests, user-driven testing, etc. No need to go into the details here, except to say that, apart from a few specific areas, Apple doesn't do a lot of automated testing. Apple is highly reliant on manual testing, probably too much so.

The most significant area of automated testing is battery performance. Every day's operating system build is loaded onto devices (iPhones, iPads, Apple Watches, etc.) that run through a set of automated tests to ensure that battery performance hasn't degraded. (Of course, these automated tests look only at Apple code, so real-world interactions can — and often do — result in significant battery performance issues that have to be tracked down and fixed manually.)



Low Battery

20% battery remaining.



Settings | Battery

Low Power Mode

Low Power Mode temporarily reduces background activity like downloads and mail fetch until you can fully charge your iPhone.

Battery Health

Last 24 Hours | Last 10 Days

Last Charge Level 100%

9:00 AM

Beyond batteries, a few groups inside Apple are known for their use of automated tests. Safari is probably the most famous. Every code check-in triggers a performance test. If the check-in slows Safari performance, it's rejected. More automated testing would probably help Apple's software quality.

Complexity Has Ballooned

Another complication for Apple is the continually growing complexity of its ecosystem. Years ago, Apple sold only Macs. Processors had only one core. A program with 100,000 lines of code was large, and most were single-threaded.

A modern Apple operating system has tens of millions of lines of code. Your Mac, iPhone, iPad, Apple Watch, AirPods, and HomePod all talk to each other and talk to iCloud. All apps are multi-threaded and communicate with one another over the (imperfect) Internet.

Today's Apple products are vastly more complex than in the past, which makes development and testing harder. The test matrix doesn't just have more rows (for features and OS versions), it also has more dimensions (for compatible products it has to test against). Worse, asynchronous events like multiple threads running on multiple cores, push notifications, and network latency mean it's practically impossible to create a comprehensive test suite.

Looking Forward

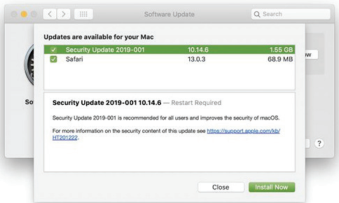
In an unprecedented move, Apple announced iOS 13.1 before iOS 13.0 shipped, a rare admission of how serious the software quality problem is. Apple has immense resources, and the company's engineers will tame this year's problem.

In the short term, you can expect more bug fix updates on a more frequent schedule than in past years. Longer-term, I'm sure that the higher-ups at Apple are fully aware of the problem and are pondering how best to address it. Besides the fact that bugs are expensive, both in support costs and engineer time, they're starting to become a public relations concern. Apple charges premium prices for premium products, and lapses in software quality stand to hurt the company's reputation.

By Adam Engst

Don't Interrupt Security Update 2019-001 (Mojave)'s Installation

Over on the MacAdmins Slack, in the #mojave channel, there was a lengthy discussion of problems that some admins saw after users installed Security Update 2019-001 (Mojave). The topic is also discussed in a thread on the Jamf Nation site — thanks to reader Bruce Carter for the initial pointer.



Updates are available for your Mac

☑	Security Update 2019-001	10.14.6	1.55 GB
☑	Safari	13.0.3	68.9 MB

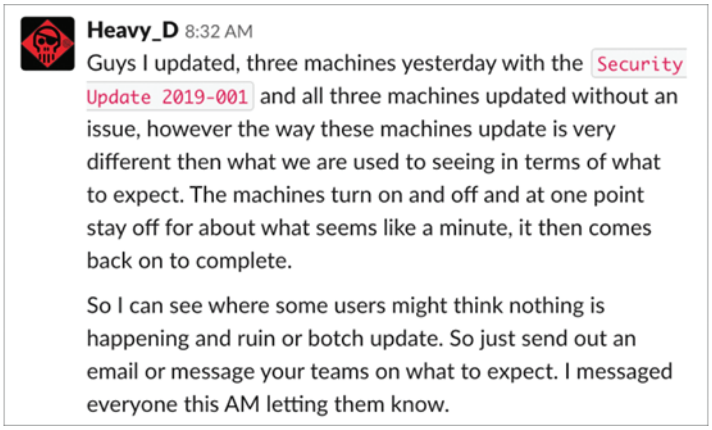
Security Update 2019-001 10.14.6 — Restart Required

Security Update 2019-001 is recommended for all users and improves the security of macOS.

For more information on the security content of this update see https://support.apple.com/kb/HT201222.

The details vary, but all revolve around problems at boot, with complete lockups, accounts not available, current passwords not working, the login window reappearing after the user enters the password, or a crash screen after login. So far, it seems that only Macs with the T1 or T2 security chip are affected — that includes the MacBook Pro with Touch Bar (2016 and later), iMac Pro, MacBook Air (2018), and Mac mini (2018).

As far as I can tell, no one has actually seen the problem happen in person; users are always reporting it after the fact. (And in the admin world, user reports are taken with a very large grain of salt.) But in at least some cases, the users are admitting that they interrupted the update because it seemed to be taking too long. That's key, because as user James Dean suggested on the MacAdmins Slack, for at least some users, this update appears to install itself in an unusual way, seemingly turning the Mac off and back on, and at one point keeping it off for what he says feels like a minute. (On Tonya's T1-equipped MacBook Pro (2016), the installation took about 10 minutes, and I didn't notice any particularly unusual behavior, though I wasn't watching all that closely.)



Heavy_D 8:32 AM

Guys I updated, three machines yesterday with the `Security Update 2019-001` and all three machines updated without an issue, however the way these machines update is very different then what we are used to seeing in terms of what to expect. The machines turn on and off and at one point stay off for about what seems like a minute, it then comes back on to complete.

So I can see where some users might think nothing is happening and ruin or botch update. So just send out an email or message your teams on what to expect. I messaged everyone this AM letting them know.

While the Mac appears to be off, I suspect that the security update is upgrading BridgeOS, which is a modified version of watchOS embedded on the T1 or T2 chip that runs things like the Touch Bar and the FaceTime HD camera. Mr. Macintosh reports that Security Update 2019-001 for Mojave also updates BridgeOS to version 17.16.11081.0.0. Given that BridgeOS runs on the T1 or T2 chip that's responsible for boot security (see "What Does the T2 Chip Mean for Mac Usage?," 5 April 2019), it's not a stretch to theorize that interrupting a BridgeOS update would cause havoc with subsequent boot attempts.

Solutions to the problem range from using previous passwords to reinstalling macOS via Internet recovery, sometimes after reinitializing the boot drive and then restoring data and settings from a backup. So far, it seems that admins and consultants have been able to bring every affected Mac back to life, though sometimes with data loss, depending on the state of backups.

In the end, my advice is simply to go ahead with installing Security Update 2019-001 (Mojave), with two important caveats. First, make sure you have good backups before starting, in case the worst happens. That's always a good plan anyway. Second, **do not interrupt the installation process!** It may take longer than you expect, but let it run as long as it needs. As a corollary to this second piece of advice, only start the installation on a MacBook Pro or MacBook Air when it's plugged in; the last thing you want is for it to lose power in the middle of the installation.

By Adam Engst

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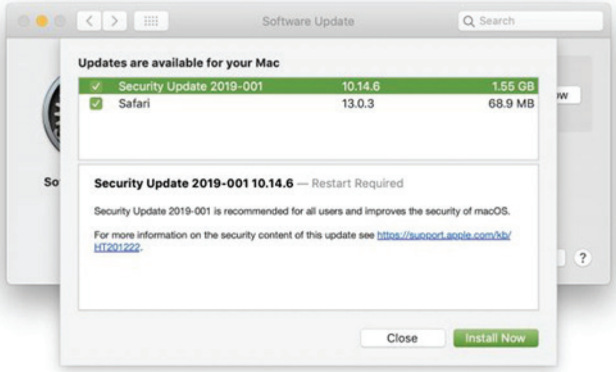

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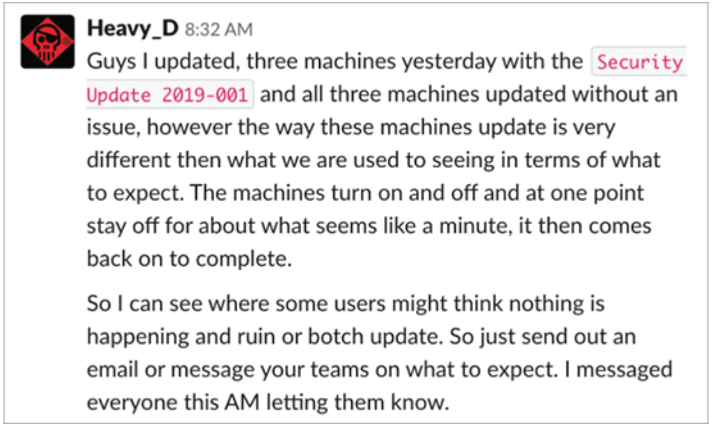
For more information on the security content of this update see https://support.apple.com/kb/HT201222.

The details vary, but all revolve around problems at boot, with complete lockups, accounts not available, current passwords not working, the login window reappearing after the user enters the password, or a crash screen after login. So far, it seems that only Macs with the T1 or T2 security chip are affected — that includes the MacBook Pro with Touch Bar (2016 and later), iMac Pro, MacBook Air (2018), and Mac mini (2018).

As far as I can tell, no one has actually seen the problem happen in person; users are always reporting it after the fact. (And in the admin world, user reports are taken with a very large grain of salt.) But in at least some cases, the users are admitting that they interrupted the update because it seemed to be taking too long. That’s key, because as user James Dean suggested on the MacAdmins Slack, for at least some users, this update appears to install itself in an unusual way, seemingly turning the Mac off and back on, and at one point keeping it off for what he says feels like a minute. (On Tonya’s T1-equipped MacBook Pro (2016), the installation took about 10 minutes, and I didn’t notice any particularly unusual behavior, though I wasn’t watching all that closely.)



Heavy_D 8:32 AM

Guys I updated, three machines yesterday with the `Security Update 2019-001` and all three machines updated without an issue, however the way these machines update is very different then what we are used to seeing in terms of what to expect. The machines turn on and off and at one point stay off for about what seems like a minute, it then comes back on to complete.

So I can see where some users might think nothing is happening and ruin or botch update. So just send out an email or message your teams on what to expect. I messaged everyone this AM letting them know.

While the Mac appears to be off, I suspect that the security update is upgrading BridgeOS, which is a modified version of watchOS embedded on the T1 or T2 chip that runs things like the Touch Bar and the FaceTime HD camera. Mr. Macintosh reports that Security Update 2019-001 for Mojave also updates BridgeOS to version 17.16.11081.0.0. Given that BridgeOS runs on the T1 or T2 chip that’s responsible for boot security (see “What Does the T2 Chip Mean for Mac Usage?,” 5 April 2019), it’s not a stretch to theorize that interrupting a BridgeOS update would cause havoc with subsequent boot attempts.

Solutions to the problem range from using previous passwords to reinstalling macOS via Internet recovery, sometimes after reinitializing the boot drive and then restoring data and settings from a backup. So far, it seems that admins and consultants have been able to bring every affected Mac back to life, though sometimes with data loss, depending on the state of backups.

In the end, my advice is simply to go ahead with installing Security Update 2019-001 (Mojave), with two important caveats. First, make sure you have good backups before starting, in case the worst happens. That’s always a good plan anyway. Second, **do not interrupt the installation process!** It may take longer than you expect, but let it run as long as it needs. As a corollary to this second piece of advice, only start the installation on a MacBook Pro or MacBook Air when it’s plugged in; the last thing you want is for it to lose power in the middle of the installation.