DATAART

Ready or not, iPhone 5S Pushes Apps into the 64-bit Future

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By Stephen Shankland

Image processing is one chore that could run faster on Apple's A7 chip inside the iPhone 5S -- but not necessarily because it's a 64-bit chip.

(Credit: Sarah Tew/CNET)

iOS developers, start your 64-bit engines.

The iPhone 5S and its Apple A7 chip mark the beginning of the mobile industry's transition to a new processor architecture. Even though the vast catalog of older 32-bit apps will still work, the 64-bit move means that sooner or later programmers will have to take the plunge.

So how do they feel about that? CNET heard from many iOS app developers, and some themes emerged:

• Some are excited by the 64-bit nature of the A7, but more are eager to sink their teeth into other improvements that come along with ARM Holdings' overhauled chip architecture.

• None seemed daunted by the architectural shift, and several expect it to be a simpler affair than when the PC industry moved from 32-bit to 64-bit chips starting about a decade ago.

• Programmers differ widely on when they plan to add 64-bit versions of their apps. Some already have begun, but others don't see a point yet.

Developers' opinions matter: Their enthusiasm for iOS has led to an Apple App Store brimming with utility and entertainment, and better hardware means apps that do more, work faster, and use less battery power. So a consumer hoping for app improvements could be forgiven for fretting that many coders aren't racing to build 64-bit software. The good news, though, is that even if Apple marketing chief Phil Schiller overemphasized the A7's 64-bit benefit, there's still plenty of new power in the iPhone hardware.

What's a 64-bit chip?

A 64-bit chip can handle vastly larger amounts of memory than a 32-bit chip, which is generally limited to 4GB. That's still more than enough for today's phones and [tablets](#) -- the [Samsung Galaxy Note 3](#) Android phone has an unusually large [3GB of RAM](#), but for now even 2GB is at the high end, and the iPhone 5S only has 1GB.

A 64-bit chip also can do a better job handling larger numbers. But many of the A7's expected performance improvements come not because the chip is 64-bit, but because it gets a number of other features that are built into the ARMv8 chip technology that Apple licenses from ARM Holdings.

Among those features are a new set of instructions that are designed to consume less battery power; improvements to the [Neon technology](#) for speeding video, audio, and graphics calculations; built-in encryption hardware; and a doubling of the number of high-speed storage slots called registers -- both for general-purpose processing and for floating-point math.

"I think the transition from 32-bit to 64-bit software will be smoother on iOS than on Windows because there is only one brand of hardware to deal with, and the Apple community is much tighter, faster-moving, and aligned," said Moor Insights analyst Patrick Moorhead.

Separately from ARMv8, Apple's design gooses graphics and speeds access to high-speed cache memory and slower main memory, Moorhead said. But all software should be able to benefit from those improvements, not just those apps running in 64-bit mode.

Apple's Xcode programming tools, which already are updated to let programmers build 64-bit versions of their software, will smooth the way to 64-bit.

"Development for new architectures is pretty easy on Apple platforms," because the company has had lots of practice, said Andrian Budantsov, chief technology officer of Readdle, which makes apps such as [Calendars](#) and [Scanner Pro](#). "Apple went through more architecture transitions than any other consumer company (68000 to PowerPC to PPC64 to Intel to ARM). Xcode tries to make this process as effortless as possible and there are a lot of useful tips in documentation."
One drawback of 64-bit software is that software file sizes typically get larger, and that's exactly what James Thomson saw when he created his new version of the [PCalc](#) calculator app this week. The 64-bit PCalc is about 50 percent larger than the 32-bit incarnation. But building it wasn't hard.

"It took about an hour to fix a few problems," Thomson said.

Theoretical improvements

Several developers see long-term advantages to the 64-bit shift, but not much in the near term.
"This opens up the path to 4, 6, 8GB and more of memory on the phone in the future," said Dan Guy, CTO of [shopping app maker Clutch](#). But that's far in the future. "As far as immediate impact for the iPhone 5S, we expect to see little in our app, outside of an increase in speed of the A7 chip itself, which is independent of the move to 64-bit."

Added Thomson, "For an app like PCalc, you're not going to see much in the way of a performance improvement -- it's mainly UI [user interface] code. But shipping a 64-bit version is still important, because when all the apps running on the phone are 64-bit, the OS doesn't need to have any 32-bit frameworks around any more, so there will be an overall improvement. Nobody wants to be the one app dragging everything down!"

One company with some insight into what developers are actually doing is uTest, which helps developers test their software on thousands of users' devices. Right now it's seeing programmers putting the priority on adapting their apps for iOS 7 -- both to iron out bugs and to bring their user interface up to date, said Matt Johnston, uTest's chief marketing and strategy officer. After that will come the 64-bit retooling, he said.

"Advanced games, graphic, or video editing apps are the most obvious candidates to gain a marked advantage by writing 64-bit apps, but for the developers of your average to-do list app or angry avian game, the urgency to convert their code will be less," Johnston said.

One company expecting to make use of the 64-bit design is Tapose, even though there aren't any 64-bit iPads yet.

"We were naturally very excited to learn of the new 64-bit A7 processor because it opens up new areas of native mobile development that previously had severe performance and device battery life penalties," Junnarkar said. "Performance and battery life limitations would previously force some complex tasks to be carried out in the cloud, which introduces delays and negatively impacts the app experience."

Readdle, too, expects to benefit from 64-bit processing soon.

"We are going to release 64-bit version of Scanner Pro (our most CPU-bound application) this year," Budantsov said, and the company will evaluate whether its PDF and image-processing engines will speed up.

Some remain unmoved

Their optimism, though cautious, contrasts with others' skepticism:

• Michael Swindell, senior vice president of products and strategy at Embarcadero Technologies, which sells developer tools. "Most mobile apps in today's app stores won't significantly benefit from moving to 64-bit," he said. "The majority of developers and apps are likely to wait to transition until most hardware in use it 64-bit."

• Sean Middlemore, developer of horse management app XLEquine. He sees no benefit to a 64-bit conversion at the moment.

• "There is no benefit of using 64-bit in the mobile arena simply because onboard device memory is still low and biggest advantage of 64-bit is having access to more memory addressing space," said Jordan Edelson, CEO of Appetizer Mobile, which has written apps for the National Basketball Association, CityJet, and others. "At the moment, we don't see any benefit for our applications to move to 64-bit."

• Don't expect a 64-bit version anytime soon of Skimbox, an e-mail app due to ship this fall. "Ideally we'd wait until the old 32-bit only phones weren't supported or had a very small user base, so we wouldn't have to develop both 32-bit and 64-bit versions," said Brian Barnes, Skimbox's director of marketing.

The iPhone 5S hasn't even begun shipping, of course, so all these opinions should be taken with a grain of salt. And plenty of companies are still in the evaluation stage. "We have not begun initial build," said Chia-Lin Simmons, vice president of marketing for Harman International's Aha Radio app.
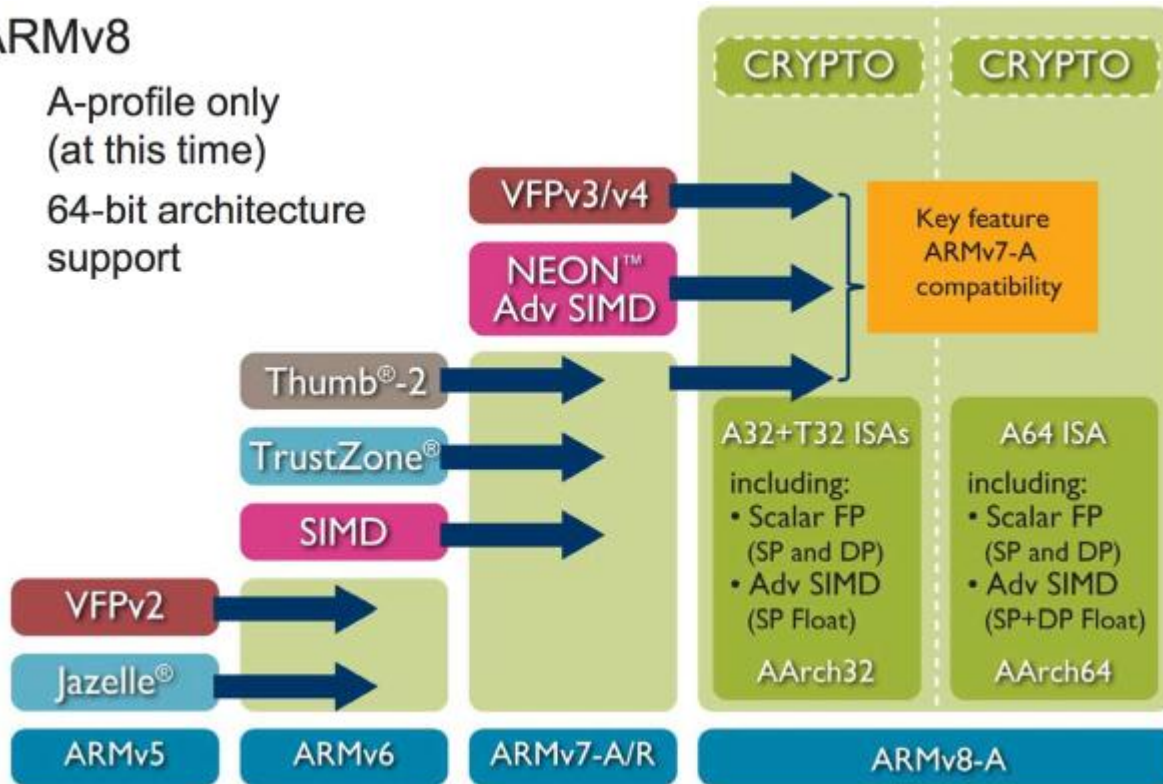
The ARMv8 architecture used in the Apple A7 chip brings several improvements in addition to a 64-bit design, including more registers to store data, better double-precision math, and built-in cryptography features.

(Credit: ARM Holdings)

Fringe benefits

Budantsov is at least as interested in other capabilities of the chip besides its 64-bit design.

"According to the specs, the increased amount of Neon registers is the most useful feature for us. Cryptography code will also benefit greatly from 64-bit chip, which is quite important as a lot of network traffic is encrypted now and is going to be encrypted even stronger soon," Budantsov said.

Wes Ng, chief executive of Casetagram, an app that converts social-media photos into custom phone cases, is eager for a chip that can handle data better -- though that's largely a product of the chip's greater register-based storage rather than being 64-bit.

"A 64-bit ARM processor includes twice as many integer and floating-point registers as earlier processors do. Because of that, 64-bit apps can work with more data at once for better performance," Ng said.

Inadev's Junnarkar also is eager for faster encryption and decryption processing, which makes higher security more practical since stronger protection isn't so computationally demanding, and the greater abundance of data-storage registers.

Programming hassles

Even if developer tools make the 64-bit transition easy, programmers must deal with more versions of their software. They have to build new versions, test them all, and debug them all. It's what programmers are paid to put up with, but that doesn't make it fun.

"There is a potential for fragmentation," said Anton Garkusha, senior software developer for DataArt, which writes apps for financial institutions including Plastyc. "We already have two types of screens (Retina/non-Retina), screens' aspect ratio, and now we can have more types of processors."

And trying to keep a common code base for 32-bit and 64-bit incarnations of an app could cause problems, Junnarkar said, so programmers might have to undo some changes made for optimum 64-bit performance.

Apple and others that offer developer tools could ease the pains.
"Let's see what Apple will offer to developers to decrease the overhead required to make two versions of the application," said Anton Garkusha, senior software developer for DataArt, which writes apps for financial institutions including Plastyc. "I am pretty sure that iOS SDK will give developers a smooth and simple way to support both versions of the applications, maybe even without a line of code."

In the long run, as the 64-bit history of servers and PCs repeats itself in the mobile market, the 64-bit fans will carry the day. Legacy apps may be forever 32-bit, but sooner or later, 64-bit programs will be the norm.

"In three years, the majority of iOS devices will use 64-bit chips," Readdle's Budantsov said, "so we will definitely release 64-bit versions of all our applications in that time."