Mobile application development in the cloud and its strategies are reaching new heights, but so are the software tools needed to build, test and deploy.
Exploring Mobile App Development Tools, Middleware, IoT Tactics

There’s ample evidence that enterprises are using mobile applications. The global mobile enterprise app market is expected to reach $61 billion by 2018, according to a CDW survey. This spurt of activity gives mobile app developers lots to do, as about a quarter of enterprises surveyed have created custom apps. DevOps teams must also integrate off-the-shelf apps into their enterprise app portfolio since 77% of businesses surveyed allow employees to use them for work-related tasks.

This guide serves up advice and information on new mobile developments and strategies for using mobile tactics in the internet of things (IoT) and choosing mobile-first middleware.

In the first feature, SearchCloudApplications reporter Joel Shore surveys trends in mobile app adoption and new challenges facing developers who are creating mobile apps. He also shares experts’ advice on development tools that can compile code simultaneously for devices that run iOS or Android.

There’s more than iOS and Android know-how involved in building mobile apps. Finding middleware that aligns with a mobile-first strategy is a critical step, IT consultant Tom Nolle says in the second feature. Readers can learn the difference between mobile adaptation and mobile application design and how to select a middleware-based mobile architecture and middleware tools to support it.

In the third feature, IT analyst Kurt Marko takes developers into the new frontier of IoT. He describes why and how to use mobile app practices and technologies to handle data challenges in IoT. Rather than reinvent management approaches for back-end processing and data aggregation, DevOps teams should leverage existing mobile app tactics.

Jan Stafford
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Better Design Means More Mobile App Challenges

A decade ago, downloadable mobile apps did not exist. Today, we can’t function without them. How in the world did we get here—and become thoroughly dependent—so quickly? And what does the continual introduction of operating system updates, new devices and multiple screen sizes mean for developers? Mobile app challenges are many.

“Developers of mobile apps face challenges that simply did not exist a decade ago,” Burke Holland, director of developer relations at Progress Software, a Bedford, Mass., provider of database and application development tools, said. “Fortunately, the number of tools for building apps and user interfaces, testing, and deployment is growing in number and power.”

It’s easy to forget, but when Steve Jobs announced the first Apple iPhone in January 2007, the concept of third-party apps did not yet exist. The debut of the Apple app store was still 18 months away. Today, less than a decade later, worldwide mobile app downloads for all mobile operating systems are forecast to reach 224.8 billion in 2016 and climb to 268.7 billion in 2017, according to Statista—a rise of nearly 20% in just one year.

As of June 2016, mobile app downloads from the Apple app store topped 130 billion. As for the number of apps available, the Google Play store is the current champ with 2.2 million, with Apple’s 2 million close behind. With discoverability—finding the one app that’s right for you—approaching impossibility, it’s no wonder app stores are widely rumored to be in the midst of a total makeover. And if you’re keeping track, the Windows store lags far behind with a relatively paltry 669,000 available apps. As it turns out, making one’s app discoverable among a blizzard of similar offerings is just one of the mobile app challenges that developers must overcome.

“It’s an extremely competitive world where
you have literally millions of applications out there,” Nick Landry, a senior technical evangelist at Microsoft specializing in mobile, said. “It’s very hard to get discovered; it’s not like ‘if you build it, they will come.’” Of course, for captive apps, those designed by enterprise IT for use only within the corporation, discoverability is not an issue. If a publicly available app is not among the top 50 in its category, chances are it will never be downloaded, Landry said.

SCREEN AND OS PERMUTATIONS ADD UP
Regardless of any one app’s discoverability likelihood, the success of the mobile app industry has given rise to numerous form factors—wristwatches, fitness wearables, phones, tablets, automotive dashboards, all the way up to laptops and desktops. Where building an app that runs on multiple operating systems—usually Windows and Mac—was once a developer’s primary technical challenge, it’s now the proliferation of screen sizes, even within the same OS, that has become chief among mobile app development challenges.

Tools that can compile code simultaneously for devices that run iOS or Android are now relatively commonplace. For Progress Software, its entry is the Telerik development platform. However, develop for Windows Mobile and the choices are fewer, RAD Studio from Embarcadero Technologies among them. As for Samsung’s nascent Tizen operating system, the company does offer developer resources that include a software developer’s kit. Microsoft also offers an SDK for its Windows Mobile platform.

The more profound mobile app challenge for developers is dealing with multiple device types—smartphones, tablets, wearables—and the corresponding cornucopia of screen sizes. For example, the current crop of Apple iPhones requires apps to support three screen resolutions, 1334 x 750 for the iPhone 6 and 6s, 1920 x 1080 for the 6 Plus and 6S plus, and 1136 x 640 for the SE model. Resolutions for previous models included 960 x 640 for the models 4 and 4s. The original iPhone, with its resolution of 480 x 320 pixels, seems positively archaic today. The current iPad Mini and iPad Air, both at 1536 x 2048, and the iPad Pro, at 2048 x 2732 complicate matters further. Add the Apple
Watch’s two current sizes—312 x 390 and 272 x 340—into the mix, along with its vastly different user interface, and app development can get very convoluted very fast.

On the Windows side, Microsoft’s Universal Windows Platform is a framework for building apps that run on everything from phones and tablets up to laptops and desktops with monitors that may reach 30 inches at a resolution of 2560 x 1600 pixels, a favorite of photographers and medical professionals. The key to overcoming this mobile app development challenge is so-called adaptive user interface technology that adjusts apps to specific device types based on screen resolution.

For user experience designer Jason Scott at Y Media Labs, a favorite design option is the cloud-hosted InVision collaborative prototyping tool. “We can drop in photos, sketches or whiteboard drawings and share to get feedback,” he said. “I’m a proponent of the more ideas, the better.” For digital design, Scott prefers Sketch, a vector-based design tool.

Perhaps recognizing that its traditional products are being upstaged by newcomers, Adobe launched the Mac version of its all-new Experience Design earlier in 2016 with a Windows version on the way. The company positioned the platform as a new experience for designing and prototyping websites and mobile apps.

**APPS UP, BUT SPENDING IS DOWN**

With mobile app downloads continuing to soar, it might come as something of a surprise that spending on mobile app development is actually expected to decline in 2016.

According to research from Gartner published in June 2016, the average portion of overall application development budgets earmarked for mobile is a meager 10%, a decline of 2% from 2015. In the report, Adrian Leow, principal research analyst at Gartner, said, “The urgency to scale up mobile app development doesn’t yet appear to be a priority for most organizations.”

With the myriad mobile app challenges that must be overcome, scaling back might not be the way to go. —Joel Shore
Choosing Middleware for Your Mobile-First Strategy

Mobile middleware was once almost a luxury, but enterprises now realize that mobile empowerment is the basis for the next wave of productivity enhancement. Instead of making current applications mobile-compatible, they want applications designed specifically for mobility, and that means finding middleware that aligns with a mobile-first strategy. To get this critical step right, it’s important to understand the difference between mobile adaptation and mobile application design, look for a middleware-based mobile architecture and select specific mobile middleware tools to support that architecture.

There are few businesses out there that have not already faced the need to provide workers with mobile platforms to support some activities. In most cases, that’s done by adding a mobile front end to an existing application, a model that minimizes changes to current applications while still accommodating mobile workers with consistency and timeliness.

Going beyond simple mobile-screen adaptation generally requires adopting a mobile middleware tool—or perhaps several of them. Mobile middleware is divided into three broad categories: the front-end tools that facilitate unified development across a spectrum of devices, the back-end tools that provide integration and mapping elements that link the two. Some tools specialize in one area; others cover them all.

For most users, even the mobile-adaptation approach will eventually involve mobile middleware in the form of a mobile-friendly,
RESOLUTION

EDITOR’S NOTE

BETTER DESIGN MEANS MORE MOBILE APP CHALLENGES

CHOOSING MIDDLEWARE FOR YOUR MOBILE-FIRST STRATEGY

USING MOBILE APPS TO EXPLOIT IoT CLOUD SERVICES

front-end system like Bootstrap. This type of middleware can harmonize the presentation of information and help developers avoid having to make device-specific changes. When applications are designed with a front-end middleware tool in mind, they can be adapted to virtually any mobile device and continue to support workers on laptops and desktop computers.

CONTEXTUAL DIFFERENCES

The problem with a front-end-driven approach is that information needs and work sequences of mobile workers are different than those of fixed-location workers. This difference is sometimes described as being contextual because a mobile worker expects information in the context of their current location, intention and conditions. That requires a more dynamic relationship between the worker and databases or transactional processes, which form the back end of mobile applications.

Mobile backend as a service (MBaaS) is a popular marketing term, so you have to look carefully at the products to ensure that they’re doing what you need them to do. Some, such as Modo Labs’ Kurogo platform, will provide everything from database and application service connections to policy-based business mapping to presentation in a way line organizations can use. Others, like Red Hat’s mobile computing architecture, are primarily true back-end elements designed to facilitate developers’ connecting mobile devices to application workflows. Microsoft and IBM both provide sets of mobile-development tools that are modular, easily linked with each other and cover all the elements of a mobile application. All of them are suitable for mobile-first development, so long as you match the features to your mobile application model.

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And yes, you need a mobile application model for mobile-first development. A mobile-first strategy commits you to design for mobile
worker behavior. And while virtually any MBaaS tool will support that goal, not all will support it optimally.

LOGICAL PROGRESSIONS
A mobile application model starts with the tasks an empowered worker is expected to perform and breaks these tasks down into logical steps. Each step is associated with a work event that will be generated by the worker and for which the worker will expect a response. Usually that response will contribute to completing one of the steps and advancing the task to the next step. If you develop your application model without reflecting any biases related to current application structure, the model can then be compared to the current structure by comparing work events to transactions. That lets you optimize your mobile middleware tools to your needs.

Optimization means addressing some basic questions:

- Do you have a repertoire of applications your mobile workers will expect to use, or are you primarily developing from scratch? If it’s the latter, look for comprehensive MBaaS products from a software supplier who has full-spectrum development and application lifecycle management tools available. This will make the job easier.

- If you have applications already, are the transactions they support easily mapped to work events? If they are, then back-end integration to workflows will be relatively straightforward, and you can focus your MBaaS selection on tools with more front-end and application access policy mapping capabilities.

The more agile your mobile-first applications, the more you’ll need to address the issue of policy-based application and data access. Many MBaaS middleware platforms include that, but the sophistication varies significantly. At the minimum, a platform should control access to application components and data based on worker identification, but it may be helpful to add other policy controls based on job activity. Remember, whatever you can’t do
with policies you may have to write into applications on a custom basis.

Mobile accommodation has turned into mobile-centricity as more aggressive worker productivity objectives increasingly drive application design. However, it’s also true that the real shift at the application level isn’t mobility at the device level, but contextual application delivery. That’s likely to shift mobile middleware strategies to broader-based application platforms that support flexibility in mobile devices—BYOD—and agility in supporting worker-generated events through those devices.

Companies need to examine their motives for mobile-first design and where those motives are likely to take them. For those whose goals focus on productivity gains rather than simply on supporting worker interactions on their most convenient devices, it would be smart to start thinking about a mobile-first strategy in the broadest development sense and prepare for a service-based and event-driven evolution in applications. —Tom Nolle
Using Mobile Apps to Exploit IoT Cloud Services

The past year has seen internet of things evolve from an IT buzzword to a strategic business imperative, as a steady drumbeat of big business projects and vendor product announcements have legitimized the concept of connected devices. IoT was one technology trend that analysts predicted correctly in 2015. About 10 billion connected devices are currently in use, and various forecasts predict that number will double or quintuple by 2020. That translates into at least a billion dollars in annual revenue for companies active in the IoT industry, with a total economic impact rivaling that of the German economy by 2025. Even if these estimates prove wildly optimistic, companies and IT developers can’t ignore business applications that promise new sources of revenue, higher customer satisfaction and greater efficiency by incorporating intelligent, connected devices into products, services and business processes.

Consumer products like wearables, connected appliances and smart-home controllers have generated most of the IoT buzz, but the more important profit- and revenue-enhancing applications come from adding sensors, intelligence and connectivity to equipment. The combination of smart sensors, cheap battery-powered processors, and storage—as well as ubiquitous wireless networks—yields a bonanza of new information that can be transformed into business insight.

There’s more to the story

Indeed, “things” are only half the IoT story because device “intelligence” is a relative term: They only collect and distribute data about local conditions with the ability to process the data. Thus, IoT is equally a big data problem because the whole point of connecting intelligent devices is to gather and share
data—information that once aggregated and analyzed can spot trends, detect problems, flag anomalies and modify actions. Yet IoT isn’t your typical big data system because it involves thousands, if not millions, of data sources scattered across myriad remote networks that combined can generate enormous amounts of data.

Cisco Systems estimates that connected devices will create 507.5 zettabytes (1 billion terabytes) of data per year by 2019. Although most of this raw data, like machine telemetry or device logs, will never make it to a data center, it still implies gigabytes, if not terabytes, per year per device flowing into some sort of IoT analysis system. The question is where? What can handle IoT data volumes, from millions of connections, where the data flow can be highly variable and episodic, and process the data into useful information? Hyperscale IoT cloud services are a natural fit.

I agree with IDC’s forecast that within five years “more than 90% of all IoT data will be hosted on service provider platforms because cloud computing reduces the complexity of supporting IoT ‘data lending.’” IDC also projects that “the growing importance of analytics in IoT services will ensure that hyperscale data centers are a major component of most IoT service offerings.” That is, IoT will fuel cloud growth.

We already have an example from the smartphone world. Mobile app developers needing back-end processing, data aggregation and state management for millions, if not billions (in the case of Facebook), of connected clients, recognize the value of cloud back ends and have fueled the rise of mobile backend as a service (MBaaS) products. IoT is following a similar path, although this time, cloud providers are ahead of the app developers.

READY OR NOT...

Intelligent devices generating reams of data are coming whether enterprises want them or not. Industrial and IT products will increasingly provide much richer telemetry about their state of operation, usage and anomalies. But without an IoT data collection and analysis strategy, organizations will end up wasting it. Here are some suggestions:
Investigate the IoT features of existing data center, manufacturing and facilities equipment and select a few areas in which better understanding of operating conditions might eliminate service calls, prevent or mitigate equipment problems, or provide a deeper understanding of user behavior.

Organizations developing hardware products should make IoT data collection and communication a part of the design. Look at reference architectures from component manufacturers such as Intel, Marvell and MediaTek.

Exploit IoT cloud services for the data aggregation and processing back end. Although Amazon Web Services and Azure lead the way and have beta services available today, others are sure to follow.

Build the IoT software architecture on three pillars: data streaming, collection and management, and big data analysis and security, looking at the full spectrum of authentication, credential and monitoring features.

IoT is still a new and dynamic field, meaning that projects must start small, adapt and iterate quickly, and include user and business unit feedback early and often because the goal is improved operations, greater efficiency and new sources of revenue. Look for problems that could be fixed easily with better information, but don’t require a major new hardware design (unless, of course, you’re in the hardware business and starting a new design cycle). Using IoT cloud services removes a major project roadblock, namely back-end infrastructure deployment and management, and will reduce the time between idea and results. —Kurt Marko
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