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Executive Summary

Providing data and functionality where it is most needed is important for organizational success. Employees and internal stakeholders need data to make good decisions. Agile, highly-productive companies distribute data and functionality to internal stakeholders wherever they happen to be. All companies claim to want more productivity but are impacted by their choices in information technology and application development.

Most organizations have a variety of enterprise, legacy, bespoke and off-the-shelf systems. Getting mobile apps to work across nonstandard technical landscapes is challenging. Also, internal users use several apps on a regular basis each with their own user experience, navigation and functionality. Further, internal users often only use a portion of an application, not the whole thing. Many times, usage is infrequent, just often enough to forget where everything is located. Saddled with the burden of inconsistency and complexity, it is no wonder employees find it hard to stay informed and follow the myriad of processes these complex applications present.

Emerging technology is on the rise to address application sprawl and improve internal user efficiency. One such approach is microapps. A microapp is a custom view or workflow made available to a user. Microapps run inside of a microapp container that offers a consistent interface and contains the necessary functionality for an effective mobile app. Each microapp is designed to support an abbreviated set of workflow steps using a user interface optimized for mobile users.

You can think of this like an application launch pad. Or even a digital hub to get at the applications and interactions needed to do the job, while avoiding the parts that aren't relevant. Microapp architecture provides a consolidated experience for business services in one single mobile app.

In this whitepaper, we will introduce the concepts of microapps and how you can use microapps architecture to accelerate app development and deliver a consistent experience your workforce will love using.

Problem: Slow App Development & Delivery

According to the US Bureau of Economic Analysis, software spending in the United States jumped from 32 percent of total IT corporate investment in 1990 to almost 60 percent in 2011 and hasn't slowed down. A lot of money and time are allocated to designing, developing, testing, delivering and maintaining applications that should be providing value to the organization. In many organizations, the application development process is inflexible and expensive.

Many executives have shared with us the difficulty in finding and retaining technical talent. Not only is it hard to appropriately staff projects, but it is hard to resource for those projects due to the mix of skills available and required. Depending on the application development strategy in use, a development team may have pockets of skills in high demand, and other pockets of less demanded skills that must be kept around to maintain existing applications but aren't reusable in other areas.

Internal applications receive less attention than customer facing applications. Internal apps are often slow, riddled with inconsistencies and are hard to use. Outdated and dysfunctional applications create organizational friction dragging down productivity in hard to measure ways.

Software spending in the United States jumped from 32 percent of total IT corporate investment in 1990 to almost 60 percent in 2011.

One reason worth examining is these applications are held back by inefficient development, infrequent updates, bad architecture design and years of technical debt. It will take more than incremental improvements to fix these deep problems; it requires a complete reboot of the application. Application rewrites are almost never an acceptable option for internal applications. Leadership would rather direct staff to work on a new application in the backlog than spend time overhauling internal apps that work.

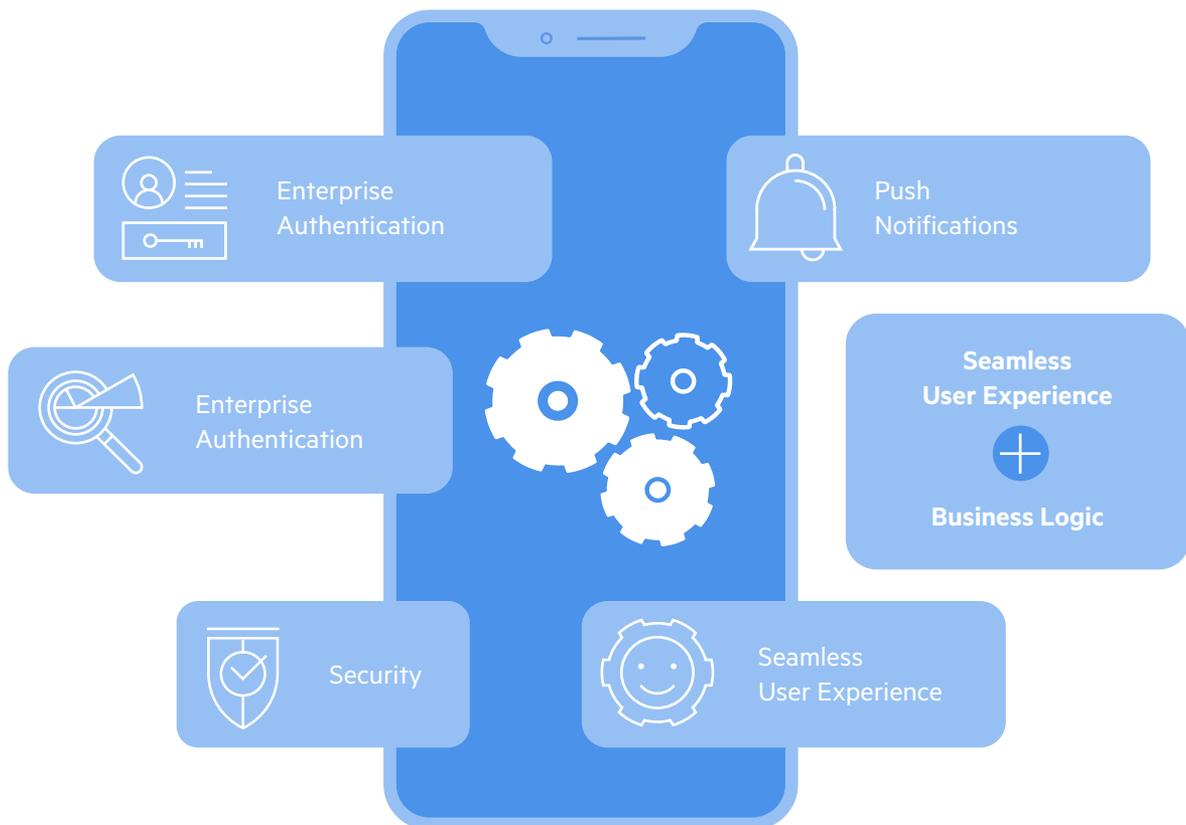
Employees expect to access applications on the go. Employees may be at different sites, traveling, visiting customers, sitting in a meeting room, or doing work away from their desk. One key to enabling employee productivity is distributing functionality and data. Mobility is important, but modern users bring high

expectations for application quality and experience through years of interacting with high grade consumer apps.

Building engaging mobile experiences is hard. A well-built mobile app is expected to properly incorporate all these features:

- Enterprise authentication
- Offline support
- Push notifications
- Crash analytics and monitoring
- Great UX
- Security
- Cross-platform support
- UI and business logic

While there can be standardization across apps, this goal is complicated due to different apps being built at different times, thus having different versions of the “standard.”



Also, once built, app store approval and propagation cost a lot of time. Each time an app needs an update, the entire build, push, approval process workflow must be completed for each store. For companies not using a cross-platform mobile strategy,

not only is the approvals work required for both platforms, but the development work must also be done twice.

App development teams could deliver more value per sprint if they only had to focus on the value creation activities, not ceremonial, utility activities. Fortunately, newer options are emerging to help alleviate these issues.

What is a Microapp?

To visualize microapps, think of a microapp as a single purpose, cross-platform selection of functionality designed to support user workflow. A user interacts with one or more microapps during business. In contrast to full-blown mobile apps, microapps are lightweight apps within a container app that perform one single task—and do so seamlessly, with little friction.

Each microapp resides inside a larger app called a “microapp container.” The microapp container handles platform specific functionality and provides utility



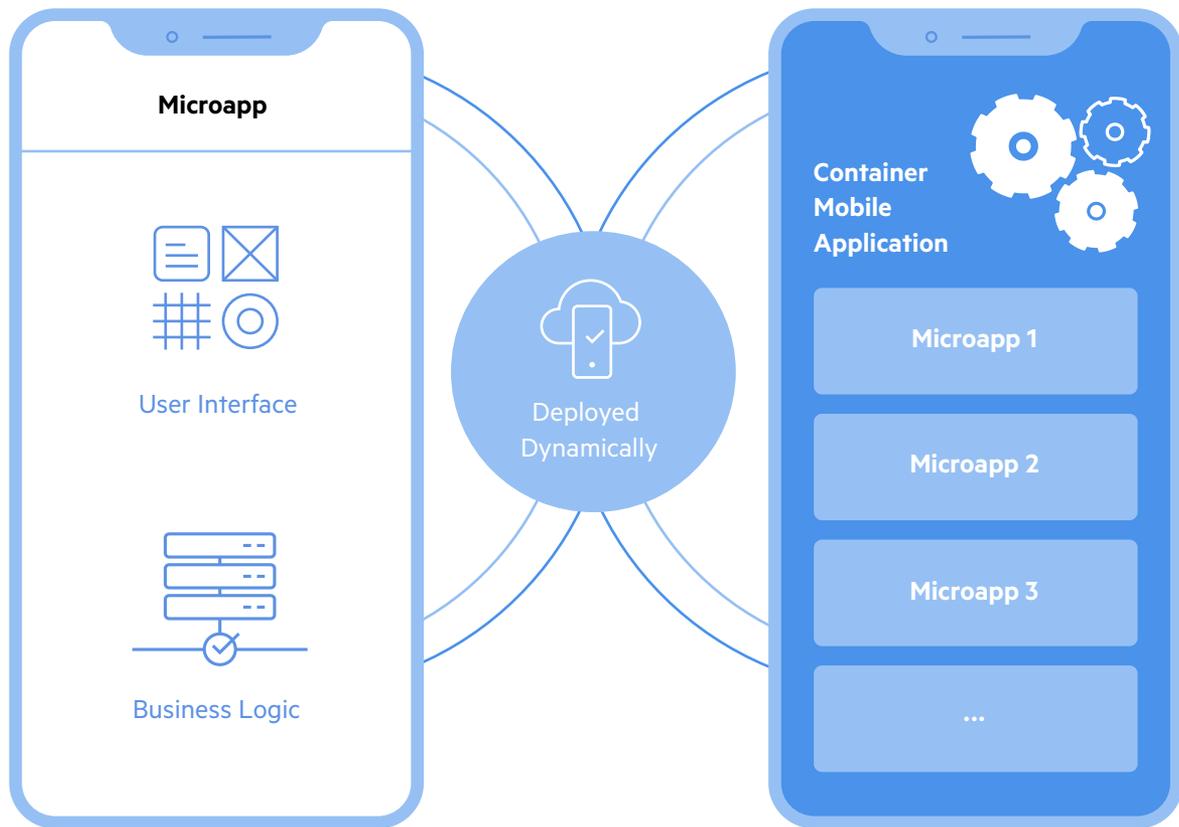
A microapp is a discrete, reusable and portable app function, process or workflow that operates within the context of a larger app or application that also serves as the microapp runtime container.

— Gartner

available to all microapps like authentication, security, offline support, push notification functions, crash analytics and monitoring.

A microapp container can host any number of microapps. The amount and order of microapps delivered to a user can be tailored by role or user specific preferences. Thus, a user can get just the functionality they need and are authorized to have, while avoiding all the rest.

Further, application permissions and access are maintained in a central location, not spread across many apps. Centralization simplifies adding and removing roles for microapps, or even termination of access.



Microapps are self-sufficient and encapsulated. This means microapps do not interact nor interfere with other microapps. A microapp is developed independent of other microapps. The microapp can communicate with specific backend services, enterprise, legacy, or systems of record as needed.

Delivering a Consolidated Experience with Microapps

Microapp architecture decomposes complex workflows into an ecosystem of easy to use, focused mini-apps. Microapps are perfect for notifications or focused workflows of 2-4 steps.

For example, an employee interacts with different systems like Salesforce, Workday, Exchange and ServiceNow. Before changing over to microapp architecture, the employee would interact with multiple mobile and web apps to perform daily work. After microapp implementation, the employee would use a single installed mobile app and interact with focused, purpose-built functionality

for the Lead Search function from Salesforce, the Time Off Request function from Workday, the Calendar Reminder function from Exchange and the Ticket Submission function from ServiceNow.



It's clear to see the improvement this has on employee productivity. Constant context switching causes inefficiency and focus loss. We all need less friction in our work lives and having to navigate different user interface layouts, branding, user patterns and form factors complicates work.

Also, modern applications require modern functionality. Building a complete application is expensive and requires many problems to be solved. The amount of minimum functionality for a small application increases the costs and could prove cost prohibitive to even undertake the initial app construction. There are many internal business problems that could be solved with technology if it just didn't require so much investment.

Even something as simple as Internet connectivity can cause issues. If the employee works at a remote site with limited connectivity, web applications misbehave as connectivity misbehaves. Mobile apps, if not properly built, will cause subpar experiences and even crashes if the connection is lost.

Further, feature bloat encourages mistakes as users try to find the features they need to use the application effectively. How can we deliver the functionality needed by our business partners, without taking on an ever-increasing load for development, support, maintenance and so on?

“ 80% of the time only 20% of an app’s features are used frequently.”

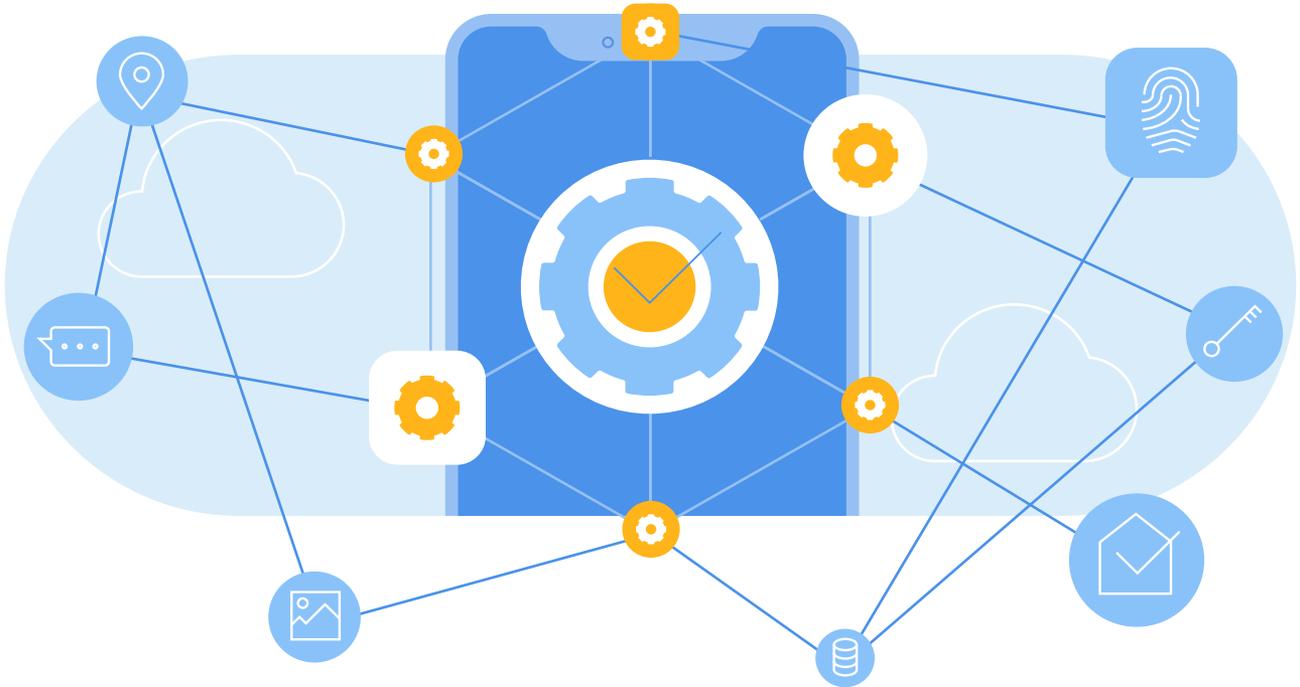
To improve these two issues, we decompose existing application features into microapps. A microapp could be built in a matter of hours, due to the streamlined nature of development. The duty of the microapp developer is to solve the specific use case for the microapp. This could be building a notification panel, or even a form that posts to an API. The rest of the normal functionality one would expect to be in an app would be the responsibility of the microapp container.

The microapp container provides a lot of shared functionality each microapp can use. Some common examples would be:

- The ability to gracefully handle loss of Internet connection and handle data synchronization for occasionally connected clients.
- Common ways to do push, email, SMS and other notification methods.
- Common security and authentication mechanisms (LDAP, Active Directory, OAuth2, etc.).

The cost savings are immediately apparent. Of equal importance is the simplification of compliance and auditing. Having common functionality means there are fewer custom implementations in the environment thus a smaller surface area for security risks.

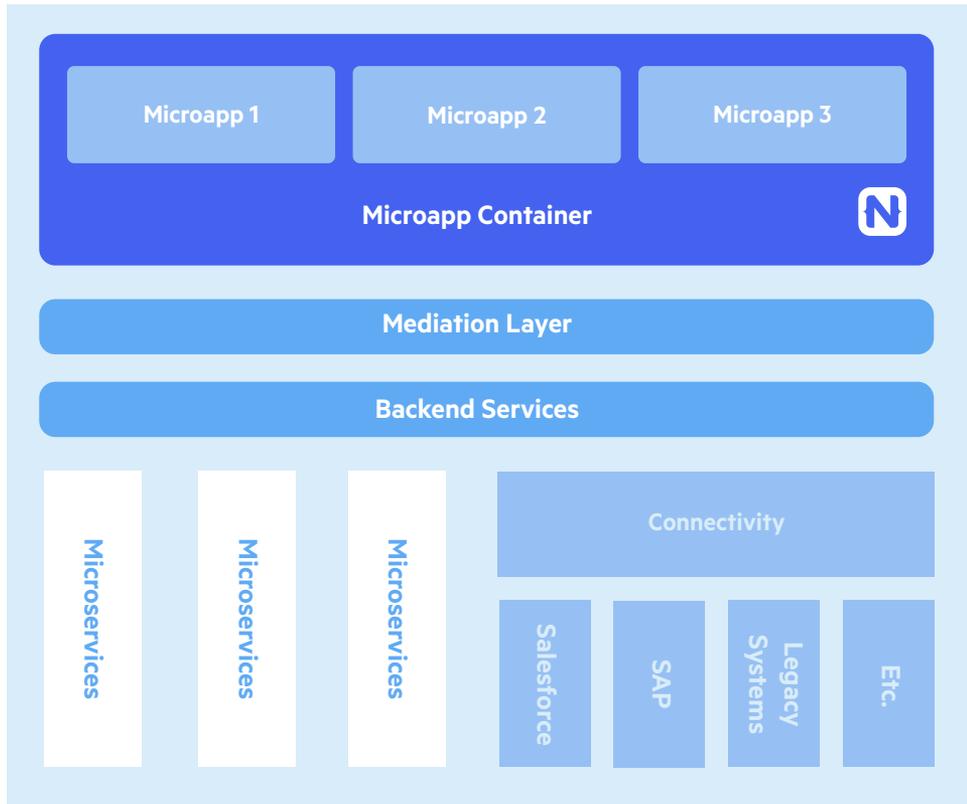
Accelerating Microapp Development with Progress



Progress offers a modern platform—Kinvey—for building and delivering microapps. The Kinvey platform provides the tools necessary for building and deploying cross-channel microapps at record speed. It offers a cloud-based service with many no-code and low-code connectors for getting at enterprise, legacy and bespoke apps and allows for easy integration with other systems. The Kinvey platform is scalable and secure, offering the ability to secure data at rest and in transit. Progress makes a compliance-enabled edition offering HIPAA and SOC2 compliance. Hosting and DevOps are included so adoption resourcing costs are low.

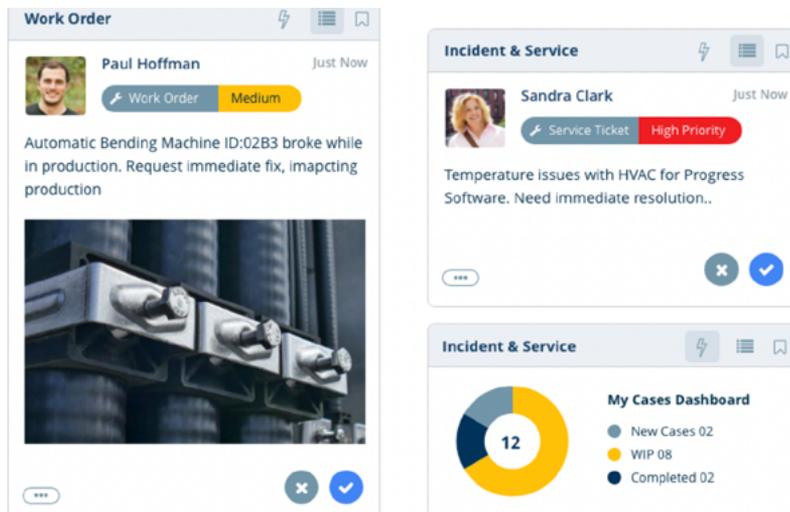
Microapps are built using a cross-platform native mobile technology, NativeScript. The microapp will have 100% access to all native device APIs directly from the JavaScript layer. The user interface uses all native components meaning you never deal with poor performance or unnatural user experience commonly associated with hybrid mobile development.

The developer environment offers a way to quickly test microapps on a device. Each source code change is synchronized to the test device instantly for a seamless development experience. The development environment comes with pre-built templates for common microapp use cases. The templates can be updated or altered to provide custom workflows.



The microapp platform comes with a microapp container holding the common application functionality shared with the microapps.

During development, a software developer will use the development environment to connect a microapp to the needed services using the platform as a mediation layer or “glue layer” between the mobile apps and backend systems. Developers can use their own test data in the mediation layer for development, so they won’t be blocked waiting for official data or systems access. It is important to encapsulate the microapp from knowing too many details about the infrastructure so that the microapp stays lightweight and resistant to upstream changes.



What Happens to Existing Apps?

A common question is, “What happens to existing apps?” Are microapps delivered in addition to the existing app catalog or do they replace existing apps? The answer is, it depends.

Is the app fully decomposable?

If an application is fully decomposed into microapps, there is no need to continue to maintain the existing user interface layer. All functionality would be implemented in microapps allowing the IT organization to regain time normally spent on maintenance.

This has many advantages. User interfaces tend to not age gracefully. The frameworks and concepts popular for user interfaces change quickly. Testing user interfaces is time consuming and error prone. An organization can save a lot of costly work by porting app functionality to microapps.

In this case, either the application is simple, or the application is used by many people and no one group uses the majority of the app’s functionality.

The app is not fully decomposable

If the app is not fully decomposable, microapps still offer substantial value. Each application should be approached individually. One characteristic is the proportion of functionality required by certain user groups. Another characteristic is workflow design. Many times, there is a “best choice” form factor for a given workflow. What makes sense in a mobile context may not hold up in a web context, and what may be a good choice for a full keyboard and mouse, may be unrealistic on a mobile device and soft keyboard. By making a matrix and scoring functionality needs and workflow requirements, it will be easy to see which parts of an application make the best microapps and which should be left as-is.

Occasional users of an application are good candidates for microapps. Also, breaking out lightweight functionality easily available to users, while still maintaining a suitable experience for complex workflows can bring the best informational and context value without forcing users into less optimal experiences.

When possible, aim for total decomposition. Microapps are quick to develop and update. Due to their small, encapsulated nature, microapps will be simpler to replace in 10 years once we have new user experiences to meet.

Conclusion

Microapps are playing a key role to unlocking organizational agility. Productivity improvements come from delivering focused experiences streamlining how a user interacts with organizational applications. IT costs are controlled by reducing work required to ship new functionality. Further, existing apps can at times be replaced by microapps, helping to clean up organizational digital clutter—all while enhancing the user experience.

The best way to get started with microapps is to have a consultation with our subject matter experts. We'll help you understand what the possibilities are with microapps, as well as discuss tradeoffs. We can initiate a limited duration Fastrack innovation cycle where we do the initial implementation then train your team to continue building microapps from a known point of success. Or, if preferred, we can handle the full cycle of development.

Ready to explore Microapps? Start a discussion with one of our Kinvey experts to work through your use case.



About Progress

Progress (NASDAQ: PRGS) offers the leading platform for developing and deploying strategic business applications. We enable customers and partners to deliver modern, high-impact digital experiences with a fraction of the effort, time and cost. Progress offers powerful tools for easily building adaptive user experiences across any type of device or touchpoint, award-winning machine learning that enables cognitive capabilities to be a part of any application, the flexibility of a serverless cloud to deploy modern apps, business rules, web content management, plus leading data connectivity technology. Over 1,700 independent software vendors, 100,000 enterprise customers, and two million developers rely on Progress to power their applications. Learn about Progress at www.progress.com or +1-800-477-6473.

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