



Accelerating Business Value by Mobilizing Backend Enterprise Applications

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By 2016, mobile phone adoption will grow at astonishing rates where 70 percent of the mobile workforce will have a Smartphone. 90 percent of enterprises will have two or more platforms to support.

<http://www.gartner.com/newsroom/id/2213115>

Mobilization of the enterprise started with business to consumer (B2C) applications to enhance engagement with digitally savvy consumers. However, enterprises are lagging behind when it comes to mobilizing traditional backend applications. This will need to change with the growing consumerization of IT, the burgeoning virtual workforce, and bring your own device trends (BYOD). Whether it is providing a more flexible work environment, improving productivity or increasing operational efficiency, organizations will need to shift focus from desktop applications to more targeted mobile applications. Staying competitive necessitates accelerating mobilization of business processes and backend applications for richer and more personally relevant experiences. This paper reviews the most commonly used methodologies for developing mobile applications and the best-fit approach for delivering superior user experiences while ensuring faster and cost effective development.

Choosing the Right Strategy for Developing Enterprise Mobile Applications

Developers today deal with a plethora of challenges when it comes to developing and deploying backend mobile applications. Employees are demanding anytime, anywhere access to enterprise data on devices of their choice. In addition to devices becoming faster and smarter, user experience has never been more important. Diverse and constantly changing devices and platforms place immense pressure on time and resources. Integration with multiple backend systems for fast and easy access to information, uninterrupted network coverage, and the ability to support offline operations are other roadblocks to development. In order to keep up with changing devices,



computing styles, user contexts and interaction paradigms many organizations are leveraging short term approaches instead of focusing on those that generate long term business value. In this section we take a look at the three most commonly used approaches, their advantages and disadvantages as well the best-fit approach for meeting development challenges.

Mobile Browser Applications

This approach mobilizes applications on a web browser. Users can launch the browser on their mobile device, without having to learn how to use a new application. Mobile browser applications allow for a single codebase which developers can deploy on multiple platforms quickly. They can write it once and have that same version run on several operating systems. Browser based applications are gaining popularity, since most enterprises have an existing web application and this approach allows them to leverage the existing code to build a mobile browser version much faster. Updates can also be made directly on the website. This approach therefore delivers significant time and cost savings.

Some organizations may opt for hybrid mobile applications where the Hybrid Web Container allows developers to create applications in open, standards-based HTML5, JavaScript and CSS. The native portion of the application uses the operating system APIs to create an embedded HTML rendering engine that serves as a bridge between the browser and the device APIs.

However these approaches have their disadvantages. For instance, browser based applications fail to make the most of the unique and rich features of each device type, leading to less than rewarding user experiences. Since

users are dependent on network connections, performance and response time may also be slow. Most importantly, this approach misses out on the opportunity to create truly immersive and interactive user experiences.

Magic Box Solutions

The write-once-run-anywhere (WORA) approach is another method used to enhance cross-platform adaptability. In the WORA approach, the application is written only once in a single codebase and then dropped into a 'magic box' which ensures that the application aligns with the operating system and form factor of each device.

While magic box solutions allow code generation across multiple devices, they tend to become bulky as the business logic and integration challenges increase. In case of upgrades to mobile operating systems (iOS, Android), there is also increased dependency on the respective vendors. Moreover, the user interface and performance of the application are not comparable with native applications. This impacts the user experience and adoption and may fail to achieve the business objectives behind the application.



Native Application Development

It is evident that no one platform will dominate the market or replace the others in the near future. Therefore, building applications that are optimized for each of these platforms seems to be a logical choice. This is where native application development fits in. Native applications are specific to a given mobile platform (iOS or Android). It uses the development tools and language that the respective platform supports (e.g., Xcode and Objective-C with iOS, Eclipse and Java with Android). There are several advantages to this approach, the most important being, the ability to take full advantage of the underlying platforms and thereby deliver exceptional user experiences. However, native application development has its limitations. For instance, full-fledged development of native applications, is time consuming and expensive and could slow down the pace of innovation within the enterprise.

Balancing User Experience with Reusability for Cost Effective Development

Native application development scores the highest with respect to delivering superior user experiences for enterprise backend applications. However, it is also clear that a heterogeneous and highly dynamic mobile landscape calls for a single code base for each application. Reusing codes reduces the time and costs associated with developing rich applications for multiple platforms. Enterprises will also benefit from reusing existing backend services and knowledge potential to the maximum. A balanced approach that leverages native cross platform development tools while taking into consideration industry

standard design patterns such as Model-View-View Model (MVVM) and SOA can help meet the demand for richer user experience and the much needed reusability. Building a Private Mobile Backend Services Layer (PMBSL) could therefore be a good starting point for enterprises seeking to mobilize their backend applications.



MBSL facilitates integration on ERP applications for effective operations. For e.g., accounts receivables (payment integration) for enabling true enterprise class mobile applications. It is also possible to provide PMBSL services on top of existing applications such as Sales force CRM, Oracle EBS Payable, Oracle EBS HRMS, and SQL Server Analysis Service. It also adds additional layers of security, which could be through integration with two factor authentication servers. This approach complements mobile enterprise application platforms through WORA capabilities. Intellectual property rights are also fully protected, since the business logic is not exposed to mobile clients that are vulnerable to hacking.

At GAVs we follow enterprise grade design patterns and object oriented development as opposed to scripting language and procedure coding. Such an approach, utilizes the high level language C# and robust .NET framework versus HTML5 and JavaScript. Leveraging

PMBSL helps enterprises develop light weight mobile applications and offers the best native experience while ensuring maximum reuse across platforms.

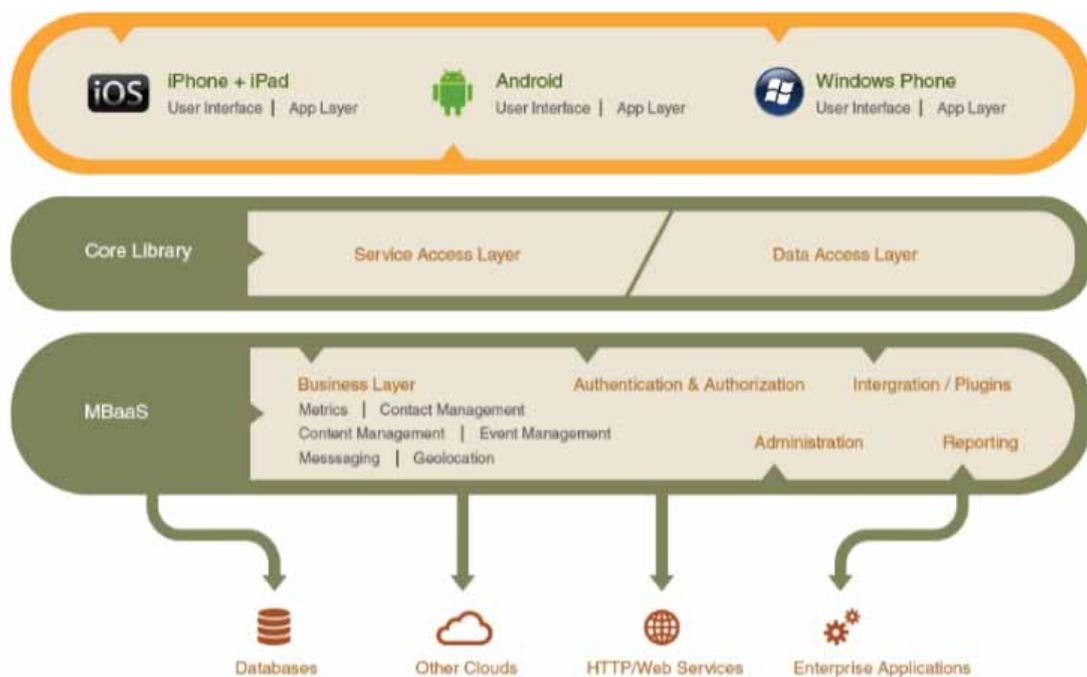


Figure 1 illustrates the reference architecture used by GAVS for enterprise mobility.

Mobile Backend as a Service (MBaaS) - Easy Integration with Enterprise Systems

As enterprise mobility grows, there is a strong need for supporting mobile clients with value added services which connect to the back end legacy systems. MBaaS is one of the fastest growing cloud services delivery model and is proving to be an ideal architecture pattern for cross platform mobile applications. It allows developers to link their applications to backend cloud storage and APIs exposed by back end applications. With standardization unlikely to happen in the near future, the actual backend integration will differ according to the specific needs of various enterprises. The MBaaS market currently includes startups such as Kinvey, FeedHenry, Any Presence and Parse (acquired by Facebook), but the coming years will witness

more MBaaS acquisitions by established players in the application and web services market. These new MBaaS solutions are likely to meet the ever growing demand for time and cost efficient mobile application development.

Xamarin – Design Pattern Based Cross Platform Development

Xamarin is redefining cross-platform development and enabling the best of both worlds. It provides the advantages of native user experience and performance through access to unique device features coupled with the time-to-market advantages of code sharing and reuse. Companies that build mobile applications with Xamarin can achieve the cost efficiency of cross-platform development and the flexibility to handle any application use-case and user experience requirement.

Xamarin apps are built with standard, native user interface controls. Applications not only look the way the end user expects, they behave that way too. They leverage platform-specific hardware acceleration, and are compiled for native performance. By using the same language, APIs and data structures Xamarin shares an average 75 percent of application code across all mobile development platforms. Unlike most other vendors who adjust their mobile platform strategy in line with customer needs, GAVS believes in design pattern based application development and selects Xamarin platform in line with their MVVM + MBaaS mobile application design pattern.

Cloud mobile back-end services accelerate the delivery of mobile applications, resulting in quicker time to benefit. They require minimal upfront investment and can substantially decrease the time and cost required to configure, develop and deploy mobile application back-end components - Gartner – 2014

<http://www.gartner.com/newsroom/id/2603623>

	Server	Multi-Tiered (MBaaS)	Native	Hybrid	Platform (Magic Box)
Attributes	<ul style="list-style-type: none"> UI & Business Logic at Server Side Mobile Web Sites 	<ul style="list-style-type: none"> Client Specific View Reusable Controller and Model 	<ul style="list-style-type: none"> UI & Business Logic at Client Side Typical Native Applications 	<ul style="list-style-type: none"> UI & Business Logic at Client Side HTML5 Cross Platform Apps 	<ul style="list-style-type: none"> UI & Business Logic at Client Side Generated Native Applications
Implementation	Platforms like Mobify, Sencha facilitate existing web sites to mobile devices	Native Applications using specialized middleware like Xamarin	Native Applications using Objective C for iOS and Java for Android..	Hybrid applications using Platforms like Sencha Touch, Adobe PhoneGap.	Native applications using Platforms like Kony, WorkLight, Appcelerator
Pro's	<ul style="list-style-type: none"> Cross Platform Ease of Delivery 	<ul style="list-style-type: none"> Best Of Both Worlds Greater Reusability 	<ul style="list-style-type: none"> Best User Experience Device Specific Features 	<ul style="list-style-type: none"> Cross Platform Some Device Specific Features 	<ul style="list-style-type: none"> Cross Platform Device Specific Features
Con's	<ul style="list-style-type: none"> Poor User Experience No Differentiation 	<ul style="list-style-type: none"> Not 100% Native Middleware Lock In 	<ul style="list-style-type: none"> No Reuse Cost & Time To Market 	<ul style="list-style-type: none"> Vendor Lock In Lack of User Experience 	<ul style="list-style-type: none"> Vendor Lock In for Enterprises
UX	Low	High	High	Medium	Medium
Reuse	High	Medium	Low	Medium	Medium

Figure 2 offers a comparative analysis of the various approaches already discussed.

Generate Long Term Business Value with Sustainable Mobile Development Strategies

The expectations of the workforce from mobile devices is steadily on the rise. They want rich and consistent experiences just like B2C applications. There is also an increasing demand contextually relevant information that is easy to access and update. Backend enterprise applications must be optimized for mobile devices and make the most of the underlying platforms. Mobile development strategies therefore need to anticipate and respond to the longer term business needs of a rapidly evolving digital enterprise. It requires organizations to be ready to develop applications quickly and cost effectively in a fragmented mobile landscape and without clear visibility into the future of individual platforms. As challenging as this may seem, a balanced approach that offers native performance and user experience while saving time and money is the best bet for long term success.

Why GAVS?

- Right-sized organization – responsive, flexible & nimble to client needs
- Partnership approach – leadership focus, co-investments & co-innovation
- End-to-end mobile solutions – through mobile labs, tools, frameworks & resources
- Technology neutral – cross-platform, native mobile apps & browser-based apps
- Proven expertise – business apps, enterprise apps & end user/ consumer apps

