From SOA to MOA:

Transitioning from Service to Mobile
Oriented Architectures

OVERVIEW

The evolution of enterprise mobility has brought with it new challenges to organizations attempting to enable the right infrastructure to support mobile development initiatives. While, intuitively, most IT organizations try to adapt existing infrastructure assets such as Service Oriented Architecture (SOA) platforms to be mobile compatible, industry leaders are beginning to understand that mobile development and deployment requires a unique platform, specific to mobile, to ensure a successful implementation. Synergistically, the first generation of enterprise mobile platforms were also very dependent on previous generation architectures that have proven to be impractical to support modern mobile enterprise solutions. The combination of those two factors has led to a simple fact: enterprise mobility needs a new type of platform.

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Through the course of evolution, it has taken organizations time to embrace the idea of a mobile-first enterprise platform, typically through trial and error. In this document, we will discuss and illustrate some of the principles of the modern enterprise mobile platform as well as some of the historical factors that influenced its emergence as one of the most relevant trends in modern enterprise software.

— Why SOA Doesn't Work for Mobile

SOA has been the most recent architectural trend that defined how business enterprise built distributed applications for many purposes. As part of SOA initiatives, organizations of all sizes implemented platforms like Enterprise Service Buses (ESBs), SOAP or RESTful services that were intended to unlock key business capabilities via services that can be used by different applications.

While SOA ultimately, in many measures, failed to deliver on its promise of a connected enterprise, the heavy technical investments in SOA-related infrastructure have taken many IT organizations down the path of trying to adapt or evolve their SOA infrastructure to serve the growing number of mobile applications. While trying to power mobile solutions by reusing existing SOA assets seems like a natural step for organizations to jumpstart their mobile initiatives, it has proven to be an impractical model for organizations trying to build agile and robust mobile infrastructures. The following are considerations for approach in an SOA-driven organization looking to evolve into a mobile enterprise, and alternate solutions.

- **Top-Down vs. Bottom Up:** SOA is, by definition, a top-down model on which services are defined in advance and reused by multiple applications. Mobile application development initiatives seem better suited for bottom-up approaches on which services and API capabilities are solely defined with the purpose of enabling a specific application. Even though this difference seems trivial, it represents a fundamental difference between SOA and mobile-first strategies.

- **Business Process Centric vs. App-Centric:** SOAs are designed to abstract business processes that can be used by many applications. Mobile solutions, in contrast, are designed for the implementation of specific mobile applications. This simple difference translates into fundamental solution architecture and delivery models that make the SOA approach impractical for mobile solutions.

In addition to these topics, mobile applications introduce new requirements in areas such as analytics, security or distribution which are not standard in SOA infrastructures. The combination of those realities have made enterprise organizations realize that the implementation of mobile solutions require a new type of architecture.

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- **System-System vs. App-System Integration:** SOA middleware such as ESBs were designed for system-to-system integration. This model highly contrasts with the app-to-system integration required in mobile application development.

- **Real Time vs. Long Running Processes:** ESBs were originally designed for supporting semi-long-running choreographies between service endpoints. Those architectural models are impractical in mobile scenarios that require a near real-time communication model.

- **Orchestrations vs. APIs:** SOA middleware platforms are fundamentally designed around the concept of workflows and orchestrations to accommodate semi-long-running processes. These characteristics make it extremely challenging to leverage SOA middleware platforms in the mobile world in which the interactions between applications and backend systems tend to be closer to real time. As an alternative, APIs and lightweight orchestrations tend to be a more applicable pattern in enterprise mobile solutions.

- **Online vs. Offline Communications:** Many mobile solutions require to work efficiently in the absence of network communication. This characteristic requires mobile architectures to provide native support for offline communication patterns as well different variations such as data syncing. This is the opposite of SOA solutions which are typically designed to work in online mode.

Introducing Mobile-Oriented Architectures (MOA)

As explained previously, the transition to mobile has forced companies to look for models to extend their existing investments in SOA infrastructures. If we look at the traditional capabilities of SOA frameworks we can find some of the following technologies:

- **Service Authoring:** Web Services Platform

- **Service Orchestration:** Enterprise Service Bus

- **Security and Management:** SOA Governance Platform

- **Business Processes:** Business Process Management Platform

While these capabilities are extremely relevant in SOA solutions, they fail to address some of the fundamental requirements of enterprise mobile applications. The traditional SOA stack needs to be enhanced to include features such as mobile app integration, mobile app analytics, etc. Taking a more comprehensive analysis to the requirements of enterprise mobile architectures we can identify some of the following capabilities:

- **Mobile App Integration:** Differently from a SOA model that focuses on system-system integration, MOA platforms should be really optimized for app-to-system integration. An MOA infrastructure should enable the integration of mobile apps and enterprise systems in a corporate network. Typically, MOA solutions leverage Mobile Backend as a Service (mBaaS) or API Gateways as popular technological models to enable the integration between mobile apps and backend systems.

- **Mobile App Distribution:** Differently from a SOA model focus on building services and orchestrations, MOA platforms centered around the implementation of mobile apps that are intended to be consumed by end users. As enterprises become more proficient in building mobile solutions, they require a vehicle to distribute those applications to testers and, eventually, end users. App stores have become the most common mechanism for distributing mobile apps and, consequently, an essential component of MOA solutions.

- **Mobile App Operations Analysis:** Contrasting with SOA solutions that focus on the monitoring of workflows and services, MOA platforms need to enable the monitoring of mobile applications. Understanding the runtime behavior of a mobile application is essential to maintain and operate enterprise mobile applications. MOA solutions leverage mobile application performance monitoring platforms in order to efficiently monitor and manage mobile applications as they evolve in the enterprise.

- **Mobile App Analytics:** Differently from SOA solutions, mobile applications are ultimately consumed by an end user. In that sense, understanding the user behavior in mobile applications is a key component of MOA platforms. In that sense, MOA solutions leverage in-app analytics suites to enable analyze the user behavior in or across multiple mobile applications and optimize the experience accordingly.

- **Mobile App Security:** Mobile applications introduce unique security concerns that can't be addressed in a traditional SOA model. For instance, mobile application typically require protection of data stored in the device or in-transit between the mobile app and the backend APIs. MOA platforms should extend traditional enterprise security architectures with mobile-specific models that enable the security of devices, applications and data.

The capabilities listed above represent the core of what MOA solutions aim to be. By combining several of these features, enterprise organizations will be able to provide a strong foundation for the implementation and management of enterprise mobile applications. While MOA capabilities are fundamentally different than traditional SOA elements, they should not be seen as competitive models. Instead, MOA should be seen as an evolution of SOA platforms into the mobile world.

Summary

This document introduces the concept of mobile oriented architectures (MOA) as a complement to traditional service oriented architectures (SOA). From an architecture standpoint, MOA extends the capabilities of SOA by providing some of the fundamental building blocks needed to implement and manage enterprise mobile solutions. By focusing in areas such as mobile application integration, performance analytics, distribution, security, etc., MOA models enable the foundation of mobile solutions in the enterprise. While MOA represents a new architecture style, it can be seen as an evolution of SOA infrastructure to power the new generation of enterprise mobile solutions.

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