ABSTRACT

This article examines current mobile Service Oriented Architecture (SOA) research concerns and presents approaches to the challenges of enterprise support for mobility.

Keywords: Mobile Devices, Mobile Middleware, Pervasive Architecture, Service Oriented Architecture, Web Services

INTRODUCTION

The workforce is becoming increasingly dynamic as information demand is everywhere and all the time. Pervasive information is the only way to keep up and the only way to persistently consume this information is high availability through mobility.

Contemporary IT architectural approach is for an orchestrated, agnostic, federated enterprise through the adoption of loosely coupled open service interfaces. The service oriented architecture (SOA) paradigm connects pervasive, heterogeneous technologies. It resurrects legacy technology silos with a service “face-lift” while maintaining their autonomy.

SOA attempts to deliver a potentially Pan-glossian promise of an IT infrastructure agile enough to cater for rapidly changing business demands. It offers a panoptic vantage point for enterprise business state and empowers the Business to define and map IT infrastructure to process.

There is currently little consideration made for mobile service support as part of SOA design although it figures significantly in business and technology concerns. There has been limited exploration of mobile service discovery, consumption, composition and orchestration, the fundamental nomenclature of SOA.

If SOA is truly to be the colonial window to the Enterprise, increasingly integral to the function of the Enterprise, then fundamental mobile service consumption and delivery has to be embraced.

This article is structured as follows; Part one describes the characteristics of mobile devices. Part two outlines the main drivers for enterprise adoption of mobile communications and the challenges it faces. Part three addresses some quality of service (QoS) aspects and how they relate to the characteristics of mobile devices. The sections following address service consumption, service discovery, consumer profiling, context awareness and mobile middleware in general. The final section presents conclusive hypotheses.

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CHARACTERISTICS OF MOBILE DEVICES

Mobile devices are negatively characterised by:

- Small screen sizes (limited real estate).
- Restrictive input mechanisms.
- Limited CPU.
- Limited storage (persistent and Random Access Memory (RAM)).
- Limited power capacity.
- Fluctuating network connectivity - unreliable radio, packet loss and service termination.
- Narrow bandwidth.
- Expensive (unpredictable) data traffic.
- Expensive and unpredictable data traffic cost.
- Vastly differing Operating Systems (OS) between devices.

Many of these characteristics improve as devices become more powerful and capable, while the cost of use is mainly a business concern.

Despite continuing advances in infrastructure, “…mobile communication will remain costly, unreliable, and different from communication over fixed networks” (Kovacs, Robrie, & Reich, 2006).

The primary differentiating capability of mobile devices is pervasiveness. It facilitates roaming communication (data and voice) and location sensitivity. Retaining this pervasive capability, necessitates the “negative” characteristics; for example, making a device’s screen larger makes it easier to read but increases the space required to transport it and reduces mobility.

Intel Corporation is the largest semiconductor producer in the world and the inventor of the x86 series of microprocessors used in many personal computers. Taking CPU speed as indicative of the progression of computing devices, Intel CPU’s achieve clock speeds of near 4GHz with “Extreme”, “Xeon” poly-core varieties for wired devices. Intel introduced their 386 SL processor specifically to support portable devices in 1990. Currently they produce “Atom” processors for Mobile Internet Devices (MID) that reach speeds approaching 2GHz, the same speed common in desktop machines in 2001. Another major mobile device hardware developer, Qualcomm is producing similarly high performance CPU’s for their “Snapdragon Platform”.

Conceding the application for top-end CPU’s is largely for server machines and that current poly-core CPU’s support parallel processing instead of just increased clock speed, mobile device CPU’s are becoming increasingly comparable to desktop computers. Speculatively, assuming a similar convergence in other facets of mobile and desktop capabilities (network (forthcoming 4G), storage, RAM), the outstanding mobile device limiting characteristics may only be screen size, input mechanisms, fluctuating network connectivity (but not bandwidth) and power consumption in the near future.

DRIVERS AND CHALLENGES

The main drivers behind enterprise adoption of mobile communications are:

- Increasing mobile workforce.
- Productivity demands.
- Competitive pressure.

To meet increasing business demand, the workforce cannot be restricted to function in a single location (Carbon, 2008). The ability to communicate and receive complex information while mobile increases productivity and reduces response times. The information needs to be up-to-date wherever and whenever (Park & Shin, 2008).

The main challenge for enterprise adoption of mobility is threefold:

- The wide variety of wireless and wireless
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