



Harnessing the Power of Cloud Computing for M2M

By

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A plethora of cloud computing definitions are available and their sheer number does not help in shedding light on this burgeoning domain. Cloud computing authors often acknowledge the difficulty of coming up with a precise definition. Others are more comfortable defining what it is not, rather than what it is. However, in an effort to bring clarity to the matter, a recent well-documented article in *Computer Communication Review* by professionals of the telecommunications and software industries, examining 20 definitions related to this new paradigm, establishes a sound starting point, which we adhere to and can be used for our purpose. The paper proposes a simple and yet encompassing definition: *“Clouds are a large pool of easily usable and accessible virtualized resources (such as hardware, development platforms and/or services). These resources can be dynamically reconfigured to adjust to a variable load (scale), allowing also for an optimum resource utilization. This pool of resources is typically exploited by a pay-per-use model in which guarantees are offered by the Infrastructure Provider by*

means of customized SLAs.” (Source: “A Break in the Clouds: Towards a Cloud Definition”, *Computer Communication Review*, Volume 39, Issue 1 [January 2009]).

The U.S. National Institute of Standards and Technology (NIST) of the U.S. Department of Commerce is currently drafting a working definition of cloud computing for the U.S. government use. It is still a work in progress, but reactions from the blogosphere seem to indicate that the final definition will probably be along the same line as the one adopted here.

Ease of use, on-demand self service, location independent resource pooling, dynamic provisioning capabilities, scalability, performance, reliability, virtualization, and pay per use are critical properties of cloud computing. Of course, the “cloud” is, in general, a metaphor for the Internet, and Information and Communication Technology specialists know that the underlying principle is not a revolutionary concept. To some degree, cluster computing, distributed computing, utility computing and grid computing, which have been around for quite some time, exhibit cloud computing family traits. They all combine vast amount of computing power to form one single enhanced processing resource; *out of many, one*. Unfortunately, in a lot of instances, the terms are used, too rapidly, interchangeably. But cloud computing is progressively viewed as the next step of the utility-grid framework where expertise is not a requisite and where “on-demand service” is replacing “on-demand infrastructure”. While utility computing users still have some control over the architecture, cloud computing users relinquish that control and do not necessarily care how things are built. Free to concentrate on core activities, life is easier for them. In short, cloud computing is customer-friendly and user centric. Trust

and security assurance must naturally play a capital role all the way through (see for instance the newly released White Paper from the Cloud Security Alliance on *Security Guidance for Critical Areas of Focus in Cloud Computing*, April 2009).

Thanks to cloud computing, with increased processing power at their disposal, M2M innovators should no longer be intimidated by the challenges posed by capturing and analyzing the massive amount of data available in all kinds of smart devices. Leaning on a cloud computing-based business model, they can quickly invent and disseminate the product of their ingenuity. The monitoring and analysis of what Complex Event Processing experts call the “event cloud”, i.e. the multiple streams of occurrences, big or small, e.g., empty or full, open or closed, etc., which flow at any given point of time in any system, company, residence or other organization and constitute the focus of M2M activities, is now not restricted by the amount of required upfront investment and expertise. The barriers to entry are significantly lowered. To some extent, cloud computing is an equal opportunity provider!

In a nutshell, cloud computing improves service delivery by applying engineering discipline and economies of scale in an Internet inspired architecture. Standardized systems and software components reduce operating expenses, while virtualization helps decrease capital expenditures in hardware, software and facilities. In addition, service management capabilities are critical for dynamically provisioning, managing and securing resources within the cloud. Addressing these challenges in a cloud environment

is key to reduce infrastructure costs, while still meeting the dynamic needs of the business.

Cloud computing has come of age for M2M. It is a reducer of complexity, and, as such, an agent of change for the M2M industry as a whole. The more versatile the platform, the more interest we can expect from the customer. In the software and customer relation management industries, cloud computing appears in many multifaceted delivery offerings with the *as a service* moniker, each displaying varying degrees of openness and control. The recent controversy about the so-called “Open Cloud Manifesto” (e.g., see “A Cloud Manifesto Controversy”, *The Wall Street Journal [Digits]*, March 28, 2009), the intent of which was to create the conditions to make clouds open, i.e., flexible and interoperable, clearly demonstrates that open platforms are disruptive. And yet, wouldn't they be what customers want?

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