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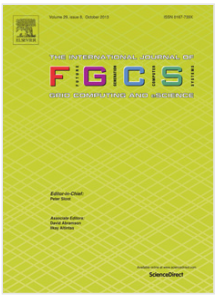

Replicating the geographical cloud: Provisioning omnipresence, omniscience and omnipotence

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Replicating the Geographical Cloud: Provisioning Omnipresence, Omniscience and Omnipotence

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***Abstract*— This paper discusses the current state-of-art and proposes a novel evolution of cloud computing and communications. New attributes, introduced continuously, have additively improved and evolved cloud computing to what it is today. Grid computing, data-centers and High Performance Computing (*HPC)* are critically reviewed and fall-outs are analyzed to corroborate new solutions. We propound a futuristic paradigm, founded on symbiosis and utility-oriented ideas, and propose a new architecture/framework for systems of the future. The authors have also made an attempt to address the question of what is to transcend cloud computing and current networking paradigms. Several applications are discussed qualitatively and rudimentary approaches are discussed. Principal theoretic feasibility of one of the proposed hypothesis of cloud communications is established. In this proposed scenario we obtain a linear increase in communication capacity, with minimal energy requirement.**

***Index Terms*—Cloud Computing, Virtualization, Abstraction, Grid Computing, Symbiosis.**

I. Where we Stand & What the Future Beholds

A cloud is often defined as a visible collection of particles of ice and water suspended in the air, usually at an elevation above the surface. It is generally a dim and obscure area in something otherwise clear and transparent. The cloud computing paradigm accepted within the scientific community, however, is far from this geographical definition. This paper purposes an approach to do justice to the classical definition and form a rational basis for advancement towards the same.

Evolution has been fast. With research in High Performance Computing (*HPC*), processors were able to use parallel processing algorithms and software to divide programs into little pieces and execute them simultaneously [1]. Grid computing, a development on this, brought you the ability to make more cost-effective use of a given amount of computer resources and essentially a way to solve problems that couldn't be approached without an enormous amount of computing power [2]. It suggested that the resources of many computers could be cooperatively harnessed and managed toward a common objective. In the envisioned paradigm computers will truly collaborate rather than being directed by one managing computer.

Virtualization, a heavily researched area, expedited the process of scaling standards and concepts through networks in a hierarchical and cyclic manner [3]. A further development and an explosive research topic today, cloud computing and communication, developed by borrowing a little from grid computing, distributed computing and remote client facilitation. Working over a network of distributed servers, it provides "***X***" (IT, computing resource etc.) as a service to users in a cost-effective, on-demand manner [4]. It enables the user to associate certain smart devices to this cloud server; examples *VMWare, Microsoft Azure, Amazon EC2* [5]. At the enterprise level, cloud service providers let clients link limited devices at the enterprise through a server to the cloud [6]. This, however, is no-different from outsourcing your resource and service requirements to a third party, especially a very concentrated (not distributed) third party. Further, the services offered are limited in nature through data-centers and are minimal over the ubiquitous local networks, a very potential and ubiquitous resource by itself [7]. Cloud computing today is a disjoint collection of independent cloud services each handled and facilitated by a certain service provider running a data-center.

Cloud computing, grid computing, *HPC* and data center computing, largely fall within the realm of parallel computing [5]. While *HPC* focuses on scientific computing, with high processing performance and low delay as its corner stones, grid computing, simply based on *HPC* centers, utilizes multiple connected *HPC* centers to form a large grid which owns a powerful underlying concept – service oriented architectures. Some other impressive concepts such as utility computing and autonomic computing are more economy oriented and are addressed vaguely [4]. Cloud computing, which today is based on data centers, is spreading far more quickly than traditional grid computing [8].

Technological progress in *HPC* largely revolves around two well defined corner stones. Transitory in nature, both trace changes over time, the two decades since the introduction of the technology. One, representing gross performance (hypothetical) measured in floating-point operations per second (flops), progressing toward the brink of teraflops performance [3]. The other, evaluating gross purchase price/unit of performance shows a constant downward trend [9]. Considered together they question the present state in

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