

NEW DIRECTIONS IN COMPUTING ON DEMAND (CoD)

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ABSTRACT

First to foresee the emergence of Computing on Demand (CoD) was John McCarthy, at MIT Centennial in 1961. He declared that *“If computers of the kind I have advocated become the computers of the future, then computing may someday be organized as a public utility just as the telephone system is a public utility... The computer utility could become the basis of a new and important industry”*. Since then many scientific terms emerged in order to describe new trends and directions in utility computing or on demand computing or computing on demand. But CoD to flourish needs resources and applications. In this direction, they have been developed concurrent, multiprocessor, multicore and multicomputer systems and scientific concepts like parallel computing, cluster computing, distributed computing, autonomic computing, pervasive computing, ubiquitous computing and sentient computing.

The decisive boost of CoD in the last decade came from Grid computing, Internet, Web and Semantic Web technologies. Grid computing put together and promoted the major advantages of related existing technologies by providing a theoretical and practical framework in which (a) computing resources are not administered centrally, (b) open standards are used and (c) non-trivial quality of service is achieved. Internet and Web technologies provided a common communication platform accelerating the physical and virtual connection between machines, digital content and people. In this direction, Semantic Web according to Tim Berners Lee *“the vision of the SW is as an extension of Web principles from documents to data.”* and *“to exploit the possibilities of logical*

assertion over linked relational data to allow the automation of much information processing”.

A major step in the commercialization of Computing of Demand (CoD) based on Grid technologies have been provided by GGF’s “Grid economy use cases” setting an operational framework on computational providing, reselling and brokerage. Nowadays, all major IT companies are spending vast amount of resources in Grid and CoD research and development. Indicatively, Sun Microsystems is reselling computing power, Oracle introduced grid database infrastructure, HP proposed the computon metric, IBM charges pay-as-you-go major corporate accounts and Microsoft published a cluster edition of the Windows operating system. On this direction, g-work has been introduced, a holistic analytical framework advancing CoD benefits. G-work was initially introduced as a personal grid e-workspace for every citizen and defined to have four interconnected parts:

- Digital Storage.
- Network Traffic.
- Processing Power.
- One-stop Web Services.

Fully operational implementation of g-work in a local economy constitutes a change in paradigm in personal, economic and social level.

The third critical component (apart from resources and applications) for making computer power as easy to access as an electric power grid is considered to be the adoption of a universal metric of computing power. Originally, the concept of flop was used in order to account for computer resources usage. The Sun Power Units, Grid Processing Units (GPUs), cobblestones and computons have been introduced in the same direction but with no wide and universal acceptance.

In the present paper, we suggest a simple definition for computons and the idea of assigning computing consumption on each Web Service in analogous way of Watt consumption of electrical devices. Usage scenarios of the proposed computing consumption metric in the g-work framework are presented. Finally, we evaluate ICTs’ developments into the future trends and directions of CoD.