Ways of resource virtualization for HPC Cloud Systems

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Cloud computing means the convergence of two major trends in today's IT: efficiency - where the power of modern computers is more efficiently used through a high scaling of hardware, software and business agility resources - where information technology can be used as a competitive tool on the market due to fast delivery, parallel processing, use of business intelligence tools that require intensive processing and interactive applications that respond in real time to the user requirements. The concept of Cloud computing has several definitions among the access of computing power and storage used as services by a large community of user is the most common one. Cloud system is a revolutionary method of development and implementation of infrastructure as a service (IaaS) based on the evolution of information technologies integrated in modern business [1].

Resource virtualization is the core of any cloud computing architecture, allowing the use of an abstract logical interface for accessing physical resources (servers, networks, storage media). Simulating methods of the interface to physical objects are: (a) Multiplexing - creating multiple virtual objects from a single instance of a physical object, for example a processor is multiplexed to process multiple chained processes (threads) (b) Emulation - building a virtual object from a physical object of another type, for example a physical hard disk can emulate RAM (through a swap file or swap partitions) (c) Aggregation - creating a single a virtual object from multiple physical objects, for example a number of hard drives can form a RAID aggregate disk (d) Multiplexing combined emulation - for example, the TCP protocol emulates a secure communications channel and multiplexes data transfer between the physical channel of communications and processor. In conclusion, virtualization allows intelligent management of the resources as: hardware independence, resources isolation for the compatibility and simplifying administration, copying, backups and deployment activity.

In the last few years, an increased interest has been detected in the need to introduce virtual systems instead of physical ones. Due to these cost-cutting benefits by using the optimal and efficient use of the physical resources of the server. Cloud technologies has taken the virtualization success by giving the ability to expand virtual machines to their customers, theoretically unlimited, with maintenance operations planned at long intervals. Designers for infrastructure application or cloud virtual machines are trained to configure service availability by allocating resource to different geographic locations.

The concept of virtualization and centralized storage is not exclusive cloud concepts. The difference between a large-scale processing center of a large company and a private form of cloud appears only when the self-service term is properly implemented with information tools based on a catalog of services provided to users [2]. From the point of the agility view, we find a technical difference: the virtualization concept is a horizontal model of extensibility by accumulating computing power and allocating processing resources, compared to the cloud which represent a vertical development model by adding services.

Considering the variety of requirement's for HPC clouds, it is known that the range of the virtualization media options may vary a lot. Solutions varies from remotely shared clusters to fully-fledged cloud-based systems. Each method brings its own set of features that must be tailored to the needs

of the users.

Bibliography

[1] L. M. Vaquero, L. Rodero-Merino, J. Caceres, M. Lindner, *Abreak in the clouds: towards a cloud definition*, ACM SIGCOMM Computer Communication Review, vol. 39, nr. 1, pp. 50-55, 2008.

[2] M. Armbrust, A. Fox, R. Griffith, I. Stoica, M. Zaharia, *Above the Clouds: A Berkeley View of Cloud*, Electrical Engineering and Computer Sciences, California, 2009