The Grid: A .COM or Service Oriented Software Cabling Technology for Building the Internet-scale CPU

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Abstract

The growing popularity of the Internet along with the availability of powerful computers and high-speed networks as low-cost commodity components is changing the way we do (high performance) computing. This led to the emergence of two advanced computing themes: "cluster computing" and "global (network) computing" (grid computing). This technology opportunity enables the cabling or coupling of a wide variety of geographically distributed resources such as desktop computers, clusters, storage systems, data sources, and scientific instruments, and allows them to be used as a single unified resource and thus forms what is popularly known as "computational (power) grids". Computational Grids offer infrastructure that allows us to access computing power similar to the way we access electric power in the home. Like conventional cable, the software cabling technologies (that the Grid provides) enable connecting to (computational) resources as easy as connecting a plug to a wall socket and accessing electric power. We will be able to access computing power (not just access to documents) and software applications from the Internet and pay for what we use. You can even sell excess computing power that you have on your desktop machines. Due to rapid technology growth in the near future, we will be able to access Internet, Web, TV, phone, Applications (Software), and computing power, and so on – all through the electric cable (i.e., from your wall-socket)! When this happens, we need not buy computers, service oriented companies will install them freely and we just need to pay access/service fee.

The presentation focuses on challenges in building commodity computational grids and computing portals that allow anyone to access any amount of computing power (from desktop computers, clusters, or Grids) from anywhere at anytime, of course from any platform including hand-held devices (e.g., PDAs and mobile phones). We discuss various approaches to building such grand challenge systems by surveying the major international adventures in developing this upcoming technology. There are several social and administrative issues needing to be

addressed in order to build successful industrial computational power grids. In this talk, we share our experience in developing economy driven resource management and scheduling systems for the Grid that should answer whether such a scalable computing is a hype or reality?