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Issues and Reflections in the Construction of the Internet of Supercomputing (Remote Presentation)

With the development of supercomputing technology, the demand for computing power and their usage scales are also continuously expanding. The construction of the Internet of Supercomputing (IoSC) has become the main development direction of the supercomputing industry in China. Being as a large-scale supercomputing infrastructure, the IoSC will integrate major domestic supercomputing nodes to found the basement of manufacture, service, application, research and education in supercomputing fields, and effectively promoting scientific innovations and industrial development.

The main aim of the IoSC is to enable resource providers to make the integration of supercomputing resource more direct and low-barrier, as well as provide consumers with more convenient and user-friendly accesses to resources. In response to this construction demand, it asks the current supercomputing industry to provide better designs, optimizations and upgrades for a series of mechanisms and services.

First, as the large-scale supercomputing resource sharing platform, the computing power, data, and application resources within the IoSC are more complex, hence brings higher requirements for cross domain resource integrating and locating. Establishing a more optimized architecture through top-level design, and providing partitioning and association for multi-domain resources, is a necessary task to enable convenient and fast integration of resources while achieving unified positioning and indexing of the IoSC resources.

Second, the issues of complex processes, long computational cycles, and cumbersome dependencies in large-scale scientific computing tasks are becoming more prominent in the context of cross-domain heterogeneous computing infrastructure. To meet the expanding user demand of computational power, there are a number of problems to be solved such as computing task collaboration, cross-domain scheduling of computing power and data resources. Therefore it is necessary to realize functional optimization includes cross-domain workflow parsing based on resource description, task delivery with regard to the need of multi-domain load balancing, authorized resource access, and intelligent task orchestration.

Third, the large-scale supercomputing resource infrastructure and large-scale computing applications are mutual benefiting and promoting relationships. It is essential for the IoSC to providing large-scale supercomputing capabilities for various science and industry domains, interdisciplinary collaboration, and industrial applications through new mechanisms, methods, and technologies. This is also the important manifestation of the strategic significance and value of the IoSC. Encapsulating and invoking supercomputing resources through the paradigm of 'Function as a Service' (FaaS) can be an effective solution.

As a national level supercomputing infrastructure, the IoSC is of great significance in promoting scientific research and innovation. Optimizing and upgrading services and mechanisms, providing more convenient resource integration and usage, is the core step in unleashing the potential of the IoSC.

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