

Cloud-based Distributed Computing System for LHAASO Experiment

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The LHAASO(Large High Altitude Air Shower Observatory) experiment of IHEP which is located in Daocheng, Sichuan province (at the altitude of 4410 m), which will generate a huge large amount of data and requires massive storage and computing power. With the rapid growth of the High Energy Physics(HEP) experiments data, a single data center in Institute of High Energy Physics (IHEP) has been unable to meet the resource and cooperation requirements from experiments. And the computing resource of LHAASO distributes in several sites like Beijing, Daocheng, Chengdu and so on. It's very necessary to integrate resources across regions to provide the distributed computing service. This paper we mainly discuss the LHAASO distributed computing system based on virtualization and cloud computing technologies. Particularly, we introduce the cloud-based computing architecture to construct the data center located in the observation base Daocheng. Openstack and Docker container orchestration are used to greatly reduce the operation and maintenance cost as well as to make sure the system availability and stability. Also we discuss the key points of federating distributed resources. Firstly, the integration solution of cross-domain resources is proposed, which adopt the HTCondor-C to make the distributed resource work like a whole resource pool. Then a flexible resource scheduling strategy and a job scheduling policy are presented to realize the resource expansion on demand and the efficient job scheduling across regions transparently, so as to improve the overall resource utilization. Finally, the distributed monitoring and secure certification of the distributed computing system are illustrated.

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