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Towards more stable operation of the Tokyo Tier2 center

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The Tokyo Tier2 center, which is located at International Center for Elementary Particle Physics (ICEPP) in the University of Tokyo, was established as a regional analysis center in Japan for the ATLAS experiment. The official operation with WLCG was started in 2007 after the several years development since 2002. In December 2012, we have replaced almost all hard wares as the third system upgrade to deal with analysis for further growing data of the ATLAS experiment. The number of CPU cores are increased by factor of two (9984 cores in total), and the performance of individual CPU core is improved by 14% according to the HEPSPC06 benchmark test at 32bit compile mode. It is estimated as 17.06 per core by using Intel Xeon E5-2680 2.70GHz. Since all worker nodes are made by 16 CPU cores configuration, we deployed 624 blade servers in total. They are connected to 6.7PB of disk storage system with non-blocking 10Gbps internal network backbone by using two center network switches (NetIron MLXe-32). The disk storage is made by 102 of RAID6 disk arrays (Infotrend DS S24F-G2840-4C16DO0) and served by equivalent number of 1U file servers with 8G-FC connection to maximize the file transfer throughput per storage capacity. As of February 2013, 2560 CPU cores and 2.00PB of disk storage have already been deployed for the WLCG. Currently, the remaining non-grid resources for both CPUs and disk storages are used as dedicated resources for the data analysis by the ATLAS Japan collaborators. Since all HWs in the non-grid resources are made by same architecture with Tier2 resource, they will be able to be migrated as the Tier2 extra resource on demand of the ATLAS experiment in the future. In addition to the upgrade of computing resources, we expect the improvement of connectivity on the wide area network. Thanks to the Japanese NREN (NII), another 10Gbps trans-Pacific line from Japan to Washington will be available additionally with existing two 10Gbps lines (Tokyo to NY and Tokyo to LA). The new line will be connected to the LHCONE for the more improvement of the connectivity. In this circumstance, we are working for the further stable operation. For instance, we have newly introduced GPFS (IBM) for the non-grid disk storage, while Disk pool manager (DPM) are continued to be used as Tier2 disk storage from the previous system. Since the number of files stored in a DPM pool will be increased with increasing the total amount of data, the development of stable database configuration is one of the crucial issues as well as scalability. We have started some studies on the performance of asynchronous database replication so that we can take daily full backup. In this presentation, we would like to introduce several improvements in terms of the performances and stabilities of our new system, and also present the status of the wide area network connectivity from Japan to US and/or EU with LHCONE.

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