A high-bandwidth virtual remote storage (HbVRS) system on long fat network (LFN) and its application

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Science cloud is a cloud system specialized for data intensive/centric science, which is based on a concept of the fourth paradigm proposed by Jim Gray in 2009. However, only a few science cloud systems have ever yielded tremendous scientific results so far. High-bandwidth storage I/O is one of the important issues to be overcome for big data sciences. In the study, we propose a high-bandwidth virtual remote storage (HbVRS) tool using a distributed file system (Gfarm) and a UDP-based data transfer protocol (HpFP). The tool is based on our examination of parallel HpFP data transfer in 10 Gbps using a long-distance 10G network (long fat network: LFN) between Japan and USA crossing the Pacific. We installed an application to draw a set of time sequential graphic files using the tool on the NICT Science Cloud. We successfully read data files in order of time sequence from a virtual storage as fast as more than 20 Gbps. The present results suggest that client hosts connected with a long fat network will be able to access to big data stored in cloud storage wherever over the world it is located. An application is demonstrated using the HbVRS.