

# Implementation of Live Migration with UDT Protocol

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NICT is providing a wide-area distributed storage system for big science data as a cloud service called by Science Cloud but is becoming important to simple system operation and efficient manage machine resources. We plan to update to the storage system including virtualization technology which can create multiple virtual machines (VM) reproduced by software on one host and can add/reduce hardware resource of VM anytime.

Current virtualization proposes Live Migration for a long distance which can migrate a running VM without downtime between hosts over the Internet. It is the key technology as disaster avoidance and becomes important to synchronize memory status of VM between hosts more quickly. However, Live Migration adopts only TCP protocol which is known to produce low throughput by a congestion control function depending on RTT (Round Trip Time) in a long distance network communication.

I propose Live Migration for a long distance with UDT protocol (UDP-based Data Transfer) due to shorten the time of VM synchronization. UDT is a UDP data transfer protocol including a congestion control without depending on RTT and is able to provide higher throughput than TCP in a high latency network. I implemented UDT protocol in Live Migration of KVM (Kernel-based Virtual Machine) to coexist with both TCP and UDT as communication protocol of Live Migration. In this paper, I report the design of the proposed method and its evaluation result.

**Keywords:** virtualization, high-speed data transfer, disaster avoidance, cloud storage system