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A prototype Infrastructure for Cloud-based distributed services in High Availability over WAN

The advancements in technologies on provisioning end-to-end network services over geographical networks, together with the consolidation of Cloud Technologies, allow the creation of innovative scenarios for data centers.

In this work, we present the architecture and performance studies concerning a prototype of distributed Tier2 infrastructure for HEP, instantiated between the two Italian sites of INFN-Roma1 and INFN-Napoli.

The Network Infrastructure is based on a Layer-2 geographical link, provided by the Italian NREN (GARR), directly connecting the two remote LANs of the named sites. By exploiting the possibilities offered by the new distributed file systems, a shared storage area with synchronous copy has been set up. The Computing Infrastructure, based on a OpenStack facility, is using a set of distributed Hypervisors installed in both sites. The Cloud is then using the common distributed storage facility to allow High Availability (HA) and Crash Recovery.

The result is a strongly coupled system, enabling the creation, management and migration of Virtual Machines in both sites.

The main parameter to be taken into account when managing two remote sites with a single framework is the effect of the latency, due to the distance and the end-to-end service overhead. In order to understand the capabilities and limits of our setup, the impact of latency has been investigated by means of a set of stress tests, including data I/O throughput, metadata access performance evaluation and network occupancy, during the life cycle of a Virtual Machine. A set of resilience tests has been also performed, in order to verify the stability of the system on event of hardware or software fault.

The results of this work show that the reliability and robustness of the chosen architecture are effective enough to build a real system and to provide common services. This prototype can also be extended to multiple sites, by changing the network topology, thus creating a National Network of Cloud-based distributed services in HA over WAN.

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