Live Migration of 5G Services between Heterogeneous Infrastructure Domains

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Abstract

5G-enabled network infrastructures can include multiple heterogeneous domains such SDN/NFV networks, edge/core datacenters, and more. This complicates the case of services that run close-to-the edge (e.g., a personal firewall) when user mobility is concerned, as the service may need to migrate from a first technological domain to another when the user terminal changes its network attaching point. In fact, current live migration technologies are available only when the source and the destination domain are homogeneous, e.g., two data centers.

This prototype presents the case in which a first service instance, such as an OpenFlow application running on an SDN infrastructure, is migrated to a second service instance, such as a Virtual Machine running in an edge datacenter. As traditional live migration techniques cannot be exploited in this case, we demonstrate the possibility to migrate a service by abstracting its state in a data model, which becomes the elementary building block for service migration. The prototype demonstrates that the live migration of an abstract state is (i) feasible, and (ii) faster than traditional full-memory migration because of the smaller information footprint that has to be transferred, and (iii) it does not depend on the actual implementation of the service. Finally, as side effect, this technique could also be exploited to strengthen the robustness of the infrastructure, e.g., by keeping in "hot standby" multiple copies of the same service, but running in different domains.

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References

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- The Universal Node – An NFV node orchestrator with support to resource-constrained hardware: http://github.com/netgroup-polito/un-orchestrator