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Opinion

Stefano Secci – LIP6 - consortium nuage: Cloud and Mobility: a Castling Move?

April 2012 by Stefano Secci – LIP6 - consortium nuage

The Internet as we know it is not going to change disruptively, don't worry. We are just going to see an incremental evolution that will discard some patches that had been introduced, to open the path towards new protocols offering new intelligence to the Internet edges, where services are managed and users are placed. Two main forces are indeed stressing the Internet edges: the mobile Internet users, increasingly addressed and routed using IP, and the virtual machines, beyond IP too, that are increasingly moving across data centers. There is an ineluctable similarity: IP mobile users and virtual machines shall be managed with the same "tools".



Within the nuage project, the interest is principally addressed toward novel machine mobility functions in a context where most of the users use an IP-based Cloud interconnection. It is not just about user mobility, manageable changing user's network locators, but also (especially) the mobility of servers, virtual machines, services. The volatility of users' and machines' attachment points calls for an unification of IP mobility management protocols. Operational simplifications could favor advanced ubiquitous services; for example, a green-oriented management of the data centers across the globe (« follow the sun »): only the routing location changes, the address of a moving IP server can be the same at many data centers in different places worldwide. Clone servers can therefore coexist in the same time, turning them on (and localizing them) when is night (electricity being less expensive), or balancing the load in presence of congestion, or geo-localizing content access managements. Moreover, servers could follow their mobile users, whether their number and data volume become significant.

In this context, which are the patches likely going to disappear? Mobile IP, in v4 or v6, with its triangular routing and encapsulation or its compatibility issues, will not make much sense any longer because users as well as machines may simply not have a "home" of preferential attachment. Protocols such as LISP (Locator Identifier Separation Protocol) offer a distributed control-plane to dynamically manage the localization via IP-en-IP encapsulation, either end-to-end or hierarchically within a provider network. Some Ethernet extensions adopted to meet data center as well as mobile backhauling network requirements, such as IEEE 802.1ad/ah/aq, far too complex and expensive (in terms of throughput and CAPEX) could be discarded at the advantage of more scalable protocols such as TRILL (« Transparent Interconnection of a Lot of Links »). LISP and TRILL control-planes, both under standardization at the IETF, suit well with situations where layer-2 and layer-3 locations often change. LISP and TRILL could become increasingly essential to favor the emergence of advanced Cloud services at a less regional scope than today, allowing for unified 4G mobility and server migration management with a seamlessness difficult to reach with legacy technologies, and a strong improvement of the Quality of Experience for the Cloud users. It is worth noticing that LISP et TRILL currently capture more the interest of small Cloud access providers present in many sites, than that of incumbent providers that follow, instead, a monolithic Cloud approach, with a few data-center sites.

The path forward is the definition of the right coupling between these two protocols in the frame of a high-diversity distributed hypervisor solution, sufficiently more efficient than low-diversity solutions. Efficiency here means service seamlessness, reliability and IP availability. In order to increase Cloud reliability and availability, we target solutions able to manage very high geographical diversity and high virtual machine mobility, while guaranteeing service seamlessness in a TCP-UDP/IP world. In the framework of the nuage consortium, we aim at reaching availability and reliability levels customizable around customer's needs, with a carrier grade (99,999%) and beyond. This performance can be guaranteed via a largely distributed hypervisor over many sites, supported by a next generation control-plane.

nuage is a French research and development consortium composed of the following members:

- Non Stop Systems, software engineering company specialized in secure infrastructure solutions
- CELESTE, internet access provider, designer of an ecological data-center
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