Ideas for a Next Generation of the Reliable Server Pooling Framework
draft-dreibholz-rserpool-nextgen-ideas-12

Abstract

This document collects some idea for a next generation of the Reliable Server Pooling framework.

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1. Introduction

1.1. Abbreviations

- ASAP: Aggregate Server Access Protocol
- ENRP: Endpoint Handlespace Redundancy Protocol
- ID: Identifier
- MPTCP: Multi-Path Transmission Control Protocol
- PE: Pool Element
- PR: Pool Registrar
- PU: Pool User
- RSerPool: Reliable Server Pooling
- SCTP: Stream Control Transmission Protocol
- TCP: Transmission Control Protocol
- VNFPOOL: Virtual Network Function Resource Pooling

1.2. Reliable Server Pooling

Reliable Server Pooling (RSerPool) has been defined as RFCs in [1], [2], [3], [4], [5], [6], [7], [8]. There is also a detailed introduction provided by [16] as well as lots of further information.
material on [22]. RSerPool is therefore not introduced in more
detail here.

1.3. Scope

The scope of this document is to collect some ideas of what to
update/change for a next generation of the RSerPool framework. It is
a result of lessons learned with more than one decade of RSerPool
deployment (see also [17], [18], [19]) as well as ongoing discussions
on applying RSerPool for Virtual Network Function Resource
Pooling (VNFPOOL; as introduced in more detail in [15]).

2. What to Change in the Next Generation of RSerPool?

- ENRP servers denote the management systems in the context of
  RSerPool. The term "server" is misleading, since ENRP servers are
  actually ENRP peers. Literature on RSerPool -- for example [16]
  -- therefore uses the more accurate term "Pool Registrar" (PR). A
  future revision of RSerPool should also use this term. (The
  RSerPool documents did not use "registrar" to avoid confusion with
  SIP registrars.)

- Pool Element Identifiers (PE ID) and Pool Registrar
  Identifiers (PR ID) are 32-bit random numbers used for the
  identification of PEs and PRs. Since 64-bit CPUs are standard
  since quite a long time, these IDs should be extended to 64 bits.

- ENRP uses the Internet-16 checksum defined in [9] to detect
  handlespace inconsistencies. It is trivially possible to extend
  the underlying algorithm to 32 bits, and the computation is more
  efficient on today’s CPUs. The checksum algorithm should
  therefore be changed. (The Internet-16 checksum was finally
  chosen in 2005 after long decisions to avoid any possible patent
  issues. The trivial extension of Internet-16 to Internet-32 is
  probably not an issue any more?)

- PR failures lead to possible concentration of all PUs and PEs at a
  single PR. To achieve a better load balancing, the solution ENRP
  Takeover Suggestion -- as defined in [14] -- should be included in
  ENRP.

- For a Handle Resolution, a PR has to decide on how many PEs to
  select. Selecting too many ones causes additional overhead (which
  might be unnecessary), selecting too few ones may cause problems
  for the applications. The extension Handle Resolution Option --
  defined in [12] -- provides a possibility for the PU to specify
  the amount of PEs to be selected. This possibility should be
  integrated into ASAP.
RSerPool defines SCTP (defined in [10]) as transport protocol for RSerPool. TCP and particularly Multi-Path TCP (MPTCP; see [11]) should be possible further transport protocols for all RSerPool traffic. SCTP should still be the recommended choice, but allowing TCP/MPTCP could make the deployment much easier. (SCTP is superior, but it lacks of support in operating systems and support by underlying network infrastructure, like firewalls and middleboxes.)

2.1. Security Considerations

Security considerations for RSerPool can be found in [6].

2.2. IANA Considerations

This document introduces no additional considerations for IANA.

3. Reference Implementation

The RSerPool reference implementation RSPLIB, including example applications, can be found at [22]. It supports the functionalities defined by [2], [3], [4], [5] and [6] as well as the options [12], [14] and [13]. An introduction to this implementation is provided in [16].

4. Testbed Platform

NorNet is a large-scale and realistic Internet testbed platform with support for Reliable Server Pooling as well as the underlying transport protocols SCTP and MPTCP. A description of and introduction to NorNet is provided in [19], [20], [21]. Further information can be found on the project website [23].

5. Acknowledgments

The author would like to thank Randall R. Stewart, Michael Tuexen, Ning Zong for their discussions and support.

6. References

6.1. Normative References


6.2. Informative References


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