Workgroup: COINRG
Internet-Draft:
draft-irtf-coinrg-coin-terminology-01
Published: 10 July 2023
Intended Status: Informational
Expires: 11 January 2024
Authors: J. Hong (ETRI)
I. Kunze (RWTH Aachen)
K. Wehrle (RWTH Aachen)
D. Trossen (Huawei)
M. J. Montpetit (Concordia)
X. de Foy (InterDigital Communications, LLC)
D. Griffin (UCL)
M. Rio (UCL)

Terminology for Computing in the Network

Abstract

The term Computing in the Network (COIN) is used for a diverse set of scenarios. Often associated with leveraging richer computing capabilities within network elements, its clear scope is yet unknown. This document tries to bring clarity to the current understanding of COIN by providing an overview of the terminology and definitions to streamline corresponding discussions.

Table of Contents

1. Introduction

The ongoing development of ever richer computing capabilities within network elements is often captured as Computing in the Network (COIN). However, there are different interpretations of the term, often revolving around the 'place' of execution, captured by the 'in-network' aspect of COIN [TRANSPORT]. The different views range from 'only computations on networking hardware' on the one hand to 'COIN is a subset of edge/cloud computing' on the other hand. These differences in interpretation often lead to difficulties in discussions.

The goal of this document is to contribute to the clarity in any discussion on COIN through outlining what is a first understanding of a terminology that ought to be used in such discussion. The first definitions in this context were proposed by [I-D.draft-kutscher-coinrg-dir-02] and later adapted by [I-D.draft-irtf-coinrg-use-cases-04] before being moved to this separate document for broader discussion.

With this in mind, this document captures the current state of agreement on a common terminology. It is likely that the document will (need to) see a future revision if this understanding is improved through increased insights and changes in the views of the community.

2. Terminology

Programmable Network Devices (PNDs): network devices, such as network interface cards and switches, which are programmable, e.g., using P4 or other languages. These devices are designed to provide flexibility and customization options beyond the traditional static configuration models.

(COIN) Execution Environment: a specific class of target environments where functions or code can be executed, for example, a JVM-based execution environment that can run functions represented in JVM byte code

COIN System: the PNDs (and end systems) and their execution environments, together with the communication resources interconnecting them, operated by a single provider or through

interactions between multiple providers that jointly offer COIN capabilities

COIN Capability: a feature enabled through the joint processing of computation and communication resources in the network

(COIN) Program: a monolithic functionality that is provided according to the specification for said program and which may be requested by a user. A composite service can be built by orchestrating a combination of monolithic COIN programs.

(COIN) Program Instance: a specific running instance of a COIN program, created to fulfill user requests or as part of a composite service. It encapsulates the code, data, and resources necessary for executing the program and delivering the intended functionality.

COIN Experience: the holistic outcome of adopting and implementing COIN, encompassing the advantages and benefits that arise from distributed computing capabilities within the network infrastructure.

COIN Function: a specific computation or task that can be invoked as part of a program. It contributes to the overall functionality of the program by providing a modular and reusable unit of computation.

3. Security Considerations

TBD

4. IANA Considerations

N/A

5. Conclusion

This document defines a core terminology for COIN at this point in the work of COIN RG and is thus positioned as a living document which may see revision in due course.

6. Informative References

[I-D.draft-irtf-coinrg-use-cases-04] Kunze, I., Wehrle, K., Trossen, D., Montpetit, M., de Foy, X., Griffin, D., and M. Rio, "Use Cases for In-Network Computing", Work in Progress, Internet-Draft, draft-irtf-coinrg-use-cases-04, 30 June 2023, <https://datatracker.ietf.org/doc/html/draft-irtf-coinrg-use-cases-04>.

[I-D.draft-kutscher-coinrg-dir-02] Kutscher, D., Karkkainen, T., and J. Ott, "Directions for Computing in the Network", Work in Progress, Internet-Draft, draft-kutscher-coinrg-dir-02, 31 July 2020, <https://datatracker.ietf.org/doc/html/draft-kutscher-coinrg-dir-02>.

[TRANSPORT]
Kunze, I., Trossen, D., and K. Wehrle, "Evolving the End-to-End Transport Layer in Times of Emerging Computing In The Network (COIN)", 2022 IEEE 30th International Conference on Network Protocols (ICNP), DOI 10.1109/icnp55882.2022.9940379, October 2022, <https://doi.org/10.1109/icnp55882.2022.9940379>.

Authors' Addresses

Jungha Hong
ETRI
218 Gajeong-ro, Yuseung-Gu
Daejeon
34129
Republic of Korea

Email: jhong@etri.re.kr

Ike Kunze
RWTH Aachen University
Ahornstr. 55
D-52074 Aachen
Germany

Email: kunze@comsys.rwth-aachen.de

Klaus Wehrle
RWTH Aachen University
Ahornstr. 55
D-52074 Aachen
Germany

Email: wehrle@comsys.rwth-aachen.de

Dirk Trossen
Huawei Technologies Duesseldorf GmbH
Riesstr. 25C
D-80992 Munich
Germany

Email: Dirk.Trossen@Huawei.com

Marie-Jose Montpetit
Concordia University
Montreal
Canada

Email: marie@mjmontpetit.com

Xavier de Foy
InterDigital Communications, LLC
1000 Sherbrooke West

Montreal H3A 3G4
Canada

Email: xavier.defoy@interdigital.com

David Griffin
University College London
Gower St
London
WC1E 6BT
United Kingdom

Email: d.griffin@ucl.ac.uk

Miguel Rio
University College London
Gower St
London
WC1E 6BT
United Kingdom

Email: miguel.rio@ucl.ac.uk