

Data center resource management for in-network processing

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Table of contents

1. Introduction
2. Analysis
3. FIXME Requirements? It is necessary?
4. Design
5. Conclusions

Introduction

(2.4)

Problem statement

...RMs do not consider server and switch resources **conjunctly**...

(abstract)

1. Model and evaluate an API through which applications can ask for INP resources
2. Discuss the importance of a scheduler which can reject INP requests and propose their server-only equivalent when needed (e.g., high switch utilization)

Analysis

Currently existing In-Network Processing (INP) solutions

- In-network data aggregation
 - Properties (5.3.1)...
 - Dalet, SHArP
- In-network storage
 - Properties (5.3.1)...
 - NetChain, IncBricks

In-network aggregation: Dait

Aggregation protocol: SHArP

In-network caching [fabric]: IncBricks

Resource models (3.4)

- VC
 - Image
- VOC
 - Image
- TAG
 - Image

1. Fine-grained resource requests
2. High-level goals

(3.3)

FIXME: the only “network-aware” RM + its problems

(3.3.2)

**FIXME Requirements? It is
necessary?**

Design

(Thesis repository `dock/thesis/figures/design/model/presentation.pdf`)

The extended-Tenant Application Graph (eTag)

- (5.2.1 why existing resource models do not satisfy all requirements)
- (5.2.2 eTag)

The template database

- (5.3 generic groups)
- (5.1.2 template database role)(5.1.2 template database role)



FIXME I should introduce composites earlier



Some references to showcase `[allowframebreaks]` [2, 3, 4, 1]

Conclusions

Questions?

Thank you

-  R. L. Graham, D. Bureddy, P. Lui, H. Rosenstock, G. Shainer, G. Bloch, D. Goldenberg, M. Dubman, S. Kotchubievsky, V. Koushnir, et al.
Scalable hierarchical aggregation protocol (sharp): a hardware architecture for efficient data reduction.
In Proceedings of the First Workshop on Optimization of Communication in HPC, pages 1–10. IEEE Press, 2016.
-  X. Jin, X. Li, H. Zhang, N. Foster, J. Lee, R. Soulé, C. Kim, and I. Stoica.
Netchain: Scale-free sub-rtt coordination.
In 15th USENIX Symposium on Networked Systems Design and Implementation (NSDI 18), pages 35–49, Renton, WA, 2018. USENIX Association.

-  M. Liu, L. Luo, J. Nelson, L. Ceze, A. Krishnamurthy, and K. Atreya.
Incbricks: Toward in-network computation with an in-network cache.
In *Proceedings of the Twenty-Second International Conference on Architectural Support for Programming Languages and Operating Systems, ASPLOS '17*, pages 795–809, New York, NY, USA, 2017. ACM.
-  A. Sapio, I. Abdelaziz, A. Aldilaijan, M. Canini, and P. Kalnis.
In-network computation is a dumb idea whose time has come.
In *Proceedings of the 16th ACM Workshop on Hot Topics in Networks, HotNets-XVI*, pages 150–156, New York, NY, USA, 2017. ACM.