The Impact of FQDN Database Updates on Name-based Routing Architecture

Shingo Ata1, Haesung Hwang2, and Masayuki Murata3
1Graduate School of Information Science and Technology, Osaka University
2Graduate School of Engineering, Osaka City University
3Advanced Network Architecture Research Group, Osaka University

Abstract: This paper evaluates the feasibility of using name-based routing in the current network infrastructure. The evaluation considers the impact of updating the FQDN database on name-based routing. The study involves a feasibility evaluation on name-based routing, which demonstrates the advantage of TCAM and hierarchical longest prefix match (HLM) in handling name-based routing effectively. The results show that name-based routing, based on FQDN, can provide excellent performance in terms of fast search speed and good scalability. The study also highlights the challenges in integrating name-based routing into the current network infrastructure.

Distribution

- FQDN - variable length, usually longer than IP address
- > distribute routing information to multiple routers
- Distribution Algorithms
  - Hierarchical Longest Alphabet Match (HLAM)
  - Inspired by longest prefix match
  - Takes full advantage of TCAM
  - Hybrid Distribution (HD)
  - Grouping by TLD + hashing function
  - Balanced distribution

TCAM (Ternary Content Addressable Memory)

- Search using the content of memory, returns the memory content or the memory address
- Cell representation: o / v */
- Fast search speed, excellent performance in longest prefix match

Sketch of Proposal

In this proposal, we aim to demonstrate the feasibility of name-based routing, highlighting the advantages of using FQDN compared to IP-based routing. The focus will be on evaluating the impact of updates in the FQDN database on the current network infrastructure. We will present a hybrid distribution algorithm that leverages the advantages of TCAM and HLM to handle name-based routing effectively. The proposal will outline the methodology for the feasibility evaluation and discuss the expected outcomes, including the potential benefits and challenges of integrating name-based routing into the current network architecture.

Goal

Feasibility Evaluation of name-based routing

- Hardware
  - Is storing routing information of 'names' to currently deployed routers possible?
- Network
  - How does topology change when the database is updated?

Name-based Routing

- FQDN (Fully Qualified Domain Name)
- Hierarchical
- Generalize to resource-based routing

Sketch of Proposal

I want to send an email to Alice

To:Alice

Alice → 192.168.128.111

I want to download proc of NOMS 2010

Out

Data

In

Address

TCAM

<TCAM>

<RAM>

Data In

Address In

Data Out

Address Out

Sketch of Proposal

...
Topo policy

- Full path is used for the name.
- Each child is a child of the previous and is not stored in the same place.

Discussion

- Feasibility of using an open source solution.
- Current plan.

Conclusion

- We developed a flexible and efficient resource-based routing algorithm.
- The algorithm can be applied to dynamic updates and new resource creation.

Future Work

- Investigate the scalability of the algorithm with a larger number of nodes.
- Enhance the algorithm for dynamic resource creation and deletion.

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References

1. [Reference 1]
2. [Reference 2]
3. [Reference 3]
Thank you!

Haesung Hwang
h-hwang@ist.osaka-u.ac.jp