

**Memory-Efficient and Ultra-Fast Network Lookup and Forwarding Using Othello Hashing**

**Abstract:**

Network algorithms always prefer low memory cost and fast packet processing speed. Forwarding information base (FIB), as a typical network processing component, requires a scalable and memory-efficient algorithm to support fast lookups. In this paper, we present a new network algorithm, Othello hashing, and its application of a FIB design called concise, which uses very little memory to support ultra-fast lookups of network names. Othello hashing and concise make use of minimal perfect hashing and relies on the programmable network framework to support dynamic updates. Our conceptual contribution of concise is to optimize the memory efficiency and query speed in the data plane and move the relatively complex construction and update components to the resource-rich control plane. We implemented concise on three platforms. Experimental results show that concise uses significantly smaller memory to achieve much faster query speed compared to existing solutions of network name lookups.

**Existing System:**

Existing high-end switch fabrics use fast memory, such as TCAM or SRAM, to support intensive FIB query requests. However, as discussed in many studies fast memory is expensive, power-hungry, and hence very limited on forwarding devices. Therefore, achieving *fast queries* with *memory-efficient* FIBs is crucial for the new network architectures that rely on *location”; independent names*.

Modifying a forwarding action of a existing name (or removing a name) never results in POG reconstruction. The shows the average update speed (including the time overhead for reconstruction). POG reconstruction only imposes minor impact on the update speed.

**Proposed System:**

To simplify network management, pure layer-two Ethernet is suggested to interconnect large-scale enterprise and data center networks where MAC addresses are identifiers.

Software Defined Networking (SDN) uses matching of multiple fields in packet header space to perform finegrained per-flow control. Flow IDs can also be considered names, though they are not fully flat.

Flat network identifiers have been suggested by various works to support host mobility and multi-homing, including HIP, Layered Naming Architecture, and MobilityFirst.

AIP applies flexible addressing to ensure trustworthy communication.

The core network of Long-Term Evolution (LTE) needs to forward downstream traffic according to the Tunnel End Point Identifier (TEID) of the flow. The most critical problem caused by location-independent names is *Forwarding Information Base (FIB) explosion*. A FIB is a data structure, typically a table, that is used to determine the proper forwarding actions for packets, at the data plane of a forwarding device (e.g, switch or router).

Forwarding actions include sending a packet to a particular outgoing interface and dropping the packet. Determining proper forwarding actions of the names in a FIB is called name switching. Unlike IP addresses, location-independent names are difficult to aggregate due to the lack of hierarchy and semantics. The increasing population of network hosts results in huge FIBs and their continuing fast growth.