Distributed & Collaborative Monitoring in SDN

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Motivation

• Per-flow monitoring: different actions for different flows.
  – monitoring rules

• Challenge: Rule storage consumes non-trivial memory space.
Task: Distribute Monitoring Actions

- Each flow may have its own action requirements.
  - Millions of flows

Task:
- Distribute actions among switches.
- Represent rules efficiently
Approach: Bloom Filters

Use Bloom Filters to identify flows that should be monitored.

Bloom Filter \{f1,f3,f5\} → Heavy Hitter
Bloom Filter \{f1\} → Sampling
DCM Data Plane: Two-stage Bloom Filters

Admission Bloom Filter

No Monitoring Action
DCM Data Plane: Two-stage Bloom Filters

Admission Bloom Filter

No Monitoring Action

Action Bloom Filters

BF1: \{f_1, f_2, \ldots\}
BF2: \{f_2, f_3, \ldots\}
BF3: \{f_4, f_5, \ldots\}

\ldots

Actions

ActA
ActB
ActC
\ldots

Match

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Distributed and Collaborative Traffic Monitoring in Software Defined Networks
DCM Controller Operations

- Monitoring load distribution
  - Less # of switches involved for a single action
  - No overloaded switches
- Bloom filter construction and updates
  - Real-time addition
  - Periodical re-construction
- False positive detection
  - SDN allows detecting & eliminating false positives
The overestimate ratio reduces significantly.
Thank you!