Using AVX512 to optimize OVS packet modifications

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OVERVIEW

• Introduction
  – OvS Actions
  – Current State

• Optimizing Actions
  – Code Refactoring
  – Testing & Validation
  – SIMD packet modification

• Upstreaming & Future Work
OvS 2.16 Datapath Overview
Datapath with Actions Optimizations

Actions Refactor And Optimization
Actions: Current State

Implementation Today

- One large switch containing all actions
- Difficult to optimize individual actions

What about splitting the single `switch()` into smaller functions...
Refactoring existing code
  • Smaller per-action functions

Refactor is better for
  • Testing individual actions
  • Optimizing individual actions
$ ovs-appctl dpif-netdev/action-impl-get

Available Actions implementations:

scalar (available: True, active: False)
autovalidator (available: True, active: False)
avx512 (available: True, active: True)

$ ovs-appctl dpif-netdev/action-impl-set scalar
$ ovs-appctl dpif-netdev/action-impl-set avx512
$ ovs-appctl dpif-netdev/action-impl-set autovalidator
• **Action Implementations**
  - Scalar
  - AVX-512
  - AutoValidator

• **Automated Testing**
  - Action Function Pointer re-use
  - Tests all other implementations
  - Validates results as Identical

Previous talk presented at OvS Conf ‘19 - [https://www.youtube.com/watch?v=x0bOpojnpmU](https://www.youtube.com/watch?v=x0bOpojnpmU)
Example SIMD Optimization for “Pop VLAN” Action

Instructions Required:
1x AVX-128 Load
1x “Align Right” (palignr)
1x AVX-128 Store
Example SIMD Optimization: POP VLAN

- **VLAN POP**
- **AVX512 “broadcast”**
  - **VLAN_SIZE**
- **DP Packet Offsets**
  - **VLAN_POP Applied Offsets**
Example SIMD Optimization: POP VLAN
• V1 on mailing list
• Reviews & comments Welcome!
Questions

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