Scalable, High Performance Ethernet Forwarding on x86 Platforms
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GOAL
- Single-node software switch, with
  - One billion entries in the forwarding table
  - 10Gbps line speed
  - 4-8 ports support
- Motivation
  - Content-centric networks
  - Ever-larger layer-2 networks
  - Push the limits of hardware

CURRENT TECHNIQUES
- High-speed memories (e.g. TCAM)
  - Small size severely limits scalability
- Memory efficient but approximate solutions
  - Induce path stretch
- Prior hashing schemes
  - Either memory inefficient and/or have unacceptable lookup performance to handle collision

SOLUTION: INTEL DPDK + OPTIMIZED CUCKOO HASHING
- Intel Data Plan Development Kit (DPDK):
  - high-throughput packet I/O to user-space
    - NUMA-aware memory management
    - Polling mode user-space driver
    - Battching for efficiency
- Optimized Cuckoo Hash Table
  - Fast lookup: ~350 Mops for small key/value pairs
  - Compact: 95% occupancy
  - Concurrent reads with in-place writes

EVALUATION

END-TO-END PERFORMANCE

FACTOR ANALYSIS