

Transparent Multicore Scaling of Single-threaded Network Functions



DSL Lab



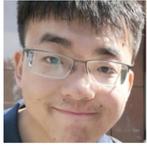
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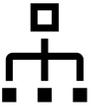
NFs are essential building blocks of today's Internet



NAT



Firewall



Load balancer

Developing scalable NFs is hard and error-prone

Writing concurrent code is error-prone

Finding the root causes of scalability bottlenecks is hard

Fixing bottlenecks requires rewriting concurrent code

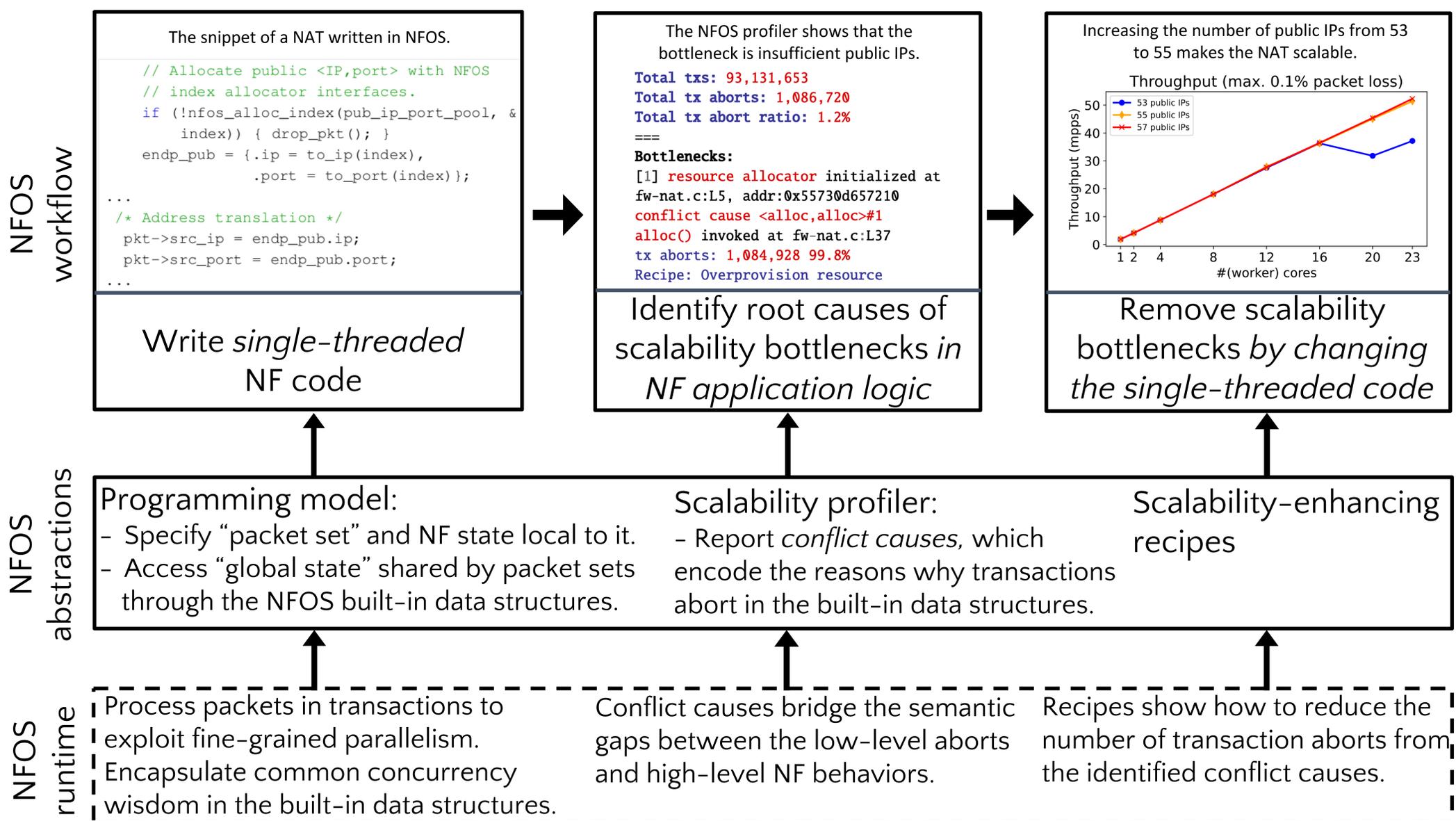
We found that 28 concurrency bugs existed in Cisco VPP NFs.

Semantic gaps exist between low-level profiling events and NF application-level behaviors.

This may introduce new concurrency bugs or scalability issues.

Insight: Writing single-threaded code is much less error-prone. A smart runtime can scale single-threaded code as needed.

NFOS: Transparent scaling of single-threaded NF to multicore



NFOS-based NFs (NAT, Bridge, Load balancer) achieve 0.75-2.5x throughput of the hand-parallelized Cisco VPP NFs.

Guided by NFOS profiler/recipes, developers can productively improve NF throughput by 2 - 91x.

