South Carolina

Lab 10: Calculating Packets Interarrival Times using Hashes and Registers

Jorge Crichigno

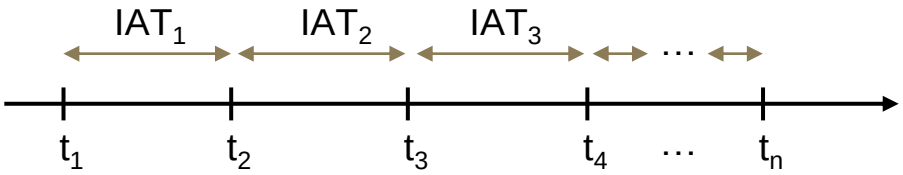
College of Engineering and Computing, University of South Carolina

A Hands-on Tutorial on P4 Programmable Data Planes

Wednesday March 8, 2023

Interarrival Times

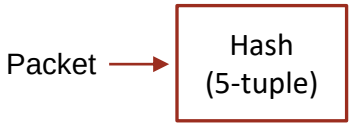
- The Interarrival time (IAT) is the time between two consecutive packets belonging to the same flow
- Calculating IAT is not possible on a general-purpose CPU, especially when the traffic rate is high
- Programmable switches offer a granular timestamp that can be leveraged to compute the IAT of packets



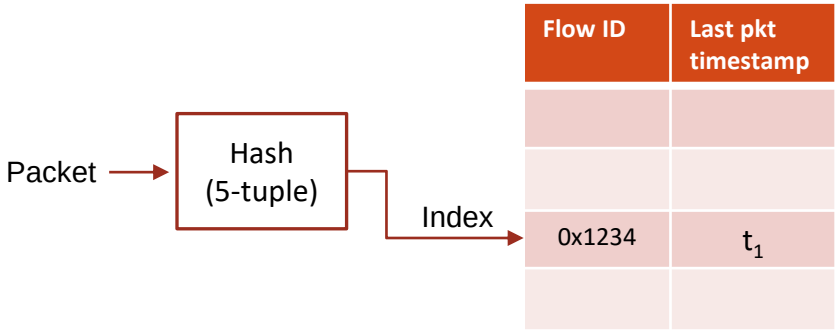
Hashing in P4

- The Interarrival time (IAT) is the time between two consecutive packets belonging to the **same flow**
- A flow can be identified by its 5-tuple fields:
  - Source IP address
  - Destination IP address
  - Source port
  - Destination port
  - Protocol
- It is possible to hash multiple fields in P4 and get a single digest value
- Cyclic Redundancy Check (CRC) is an example of a hash algorithm provided by the v1model

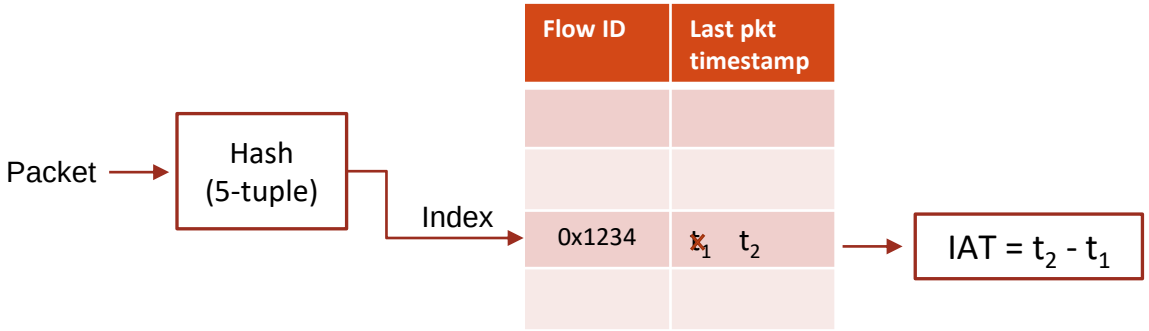
IAT Calculation in P4



IAT Calculation in P4



IAT Calculation in P4



Lab 10: Calculating Packets Interarrival Times using Hashes and Registers

Lab Topology and Objectives

- The topology consists of four hosts: h1, h2, h3 and h4; one P4 switch: s1; one legacy switch
- The hosts h1 and h3 send packets with a custom header (`interarrival`)
- A flow is identified by the source IP and the destination IP of the packet
- The P4 switch s1 computes the IAT and inserts its value into the custom header
- Hosts h2 and h4 receive packets from hosts h1 and h3, respectively
- The IATs are shown on hosts h2 and h4
- Headers:

interarrival
IPv4
Ethernet