Calculating Packets Interarrival Times using Hashes and Registers

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The Cyberinfrastructure Lab at UofSC
Energy Sciences Network (ESnet)
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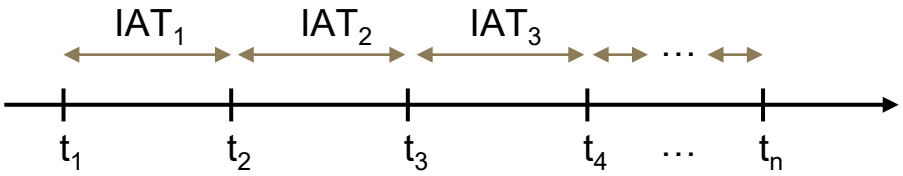
Hands on Session 2: Calculating Packets Interarrival Times using Hashes and Registers

Interarrival Times

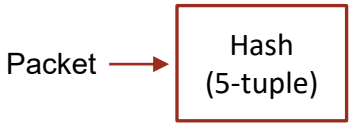
- The Interarrival time (IAT) is the time between two consecutive packets belonging to the same flow
- Calculating IAT is not possible on a general-purpose CPU, especially when the traffic rate is high
- Programmable switches offer a granular timestamp that can be leveraged to compute the IAT of packets



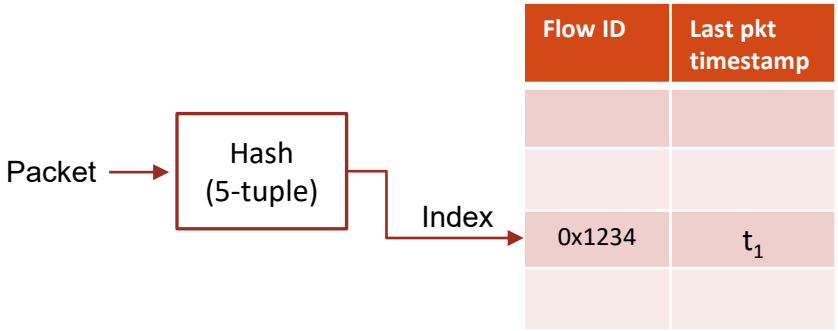
Hashing in P4

- 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

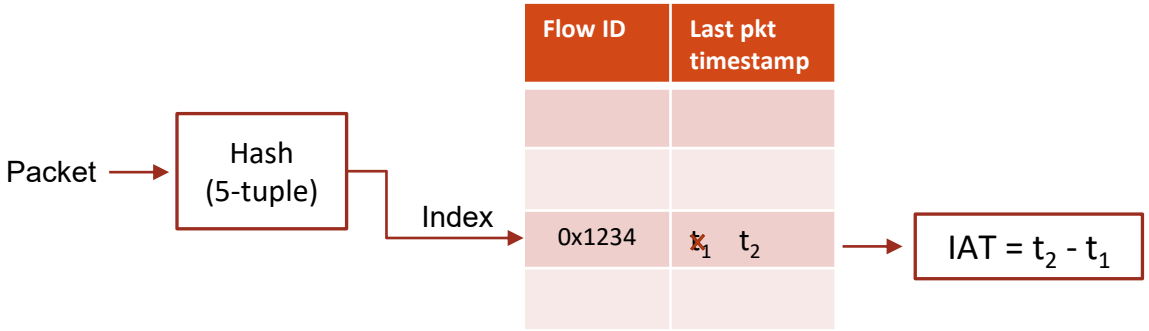
IAT Calculation in P4



IAT Calculation in P4



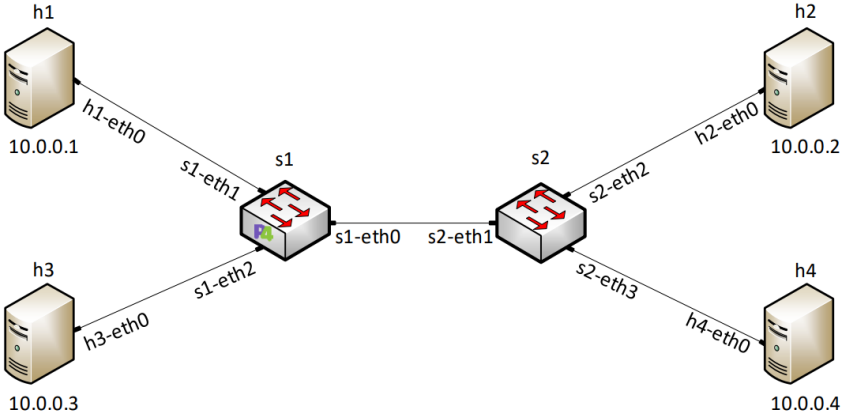
IAT Calculation in P4



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:



Accessing the Platform

- Please use the following link to access the platform:
  - https://netlab.cec.sc.edu/
- Login using your credentials

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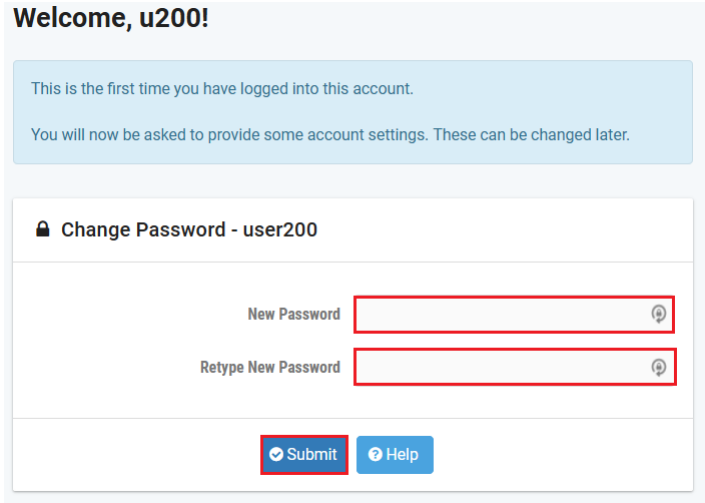

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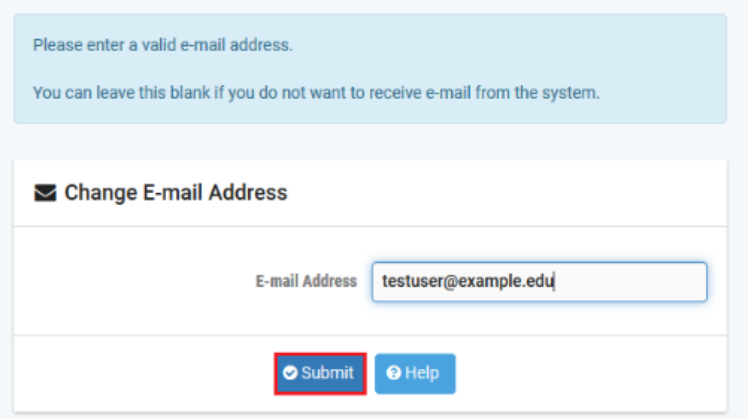
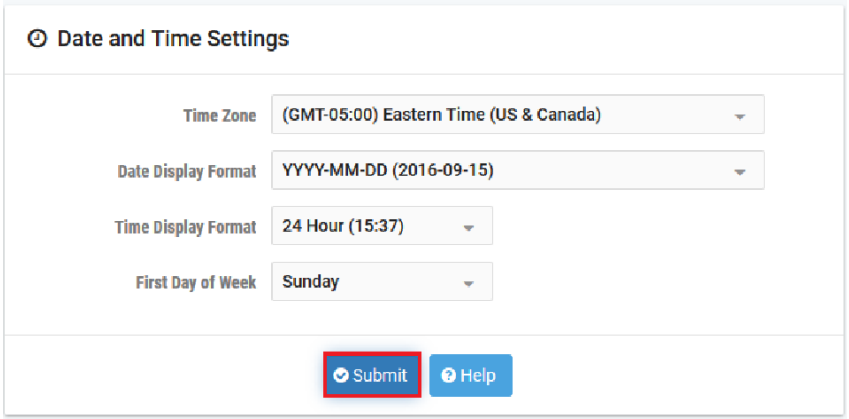
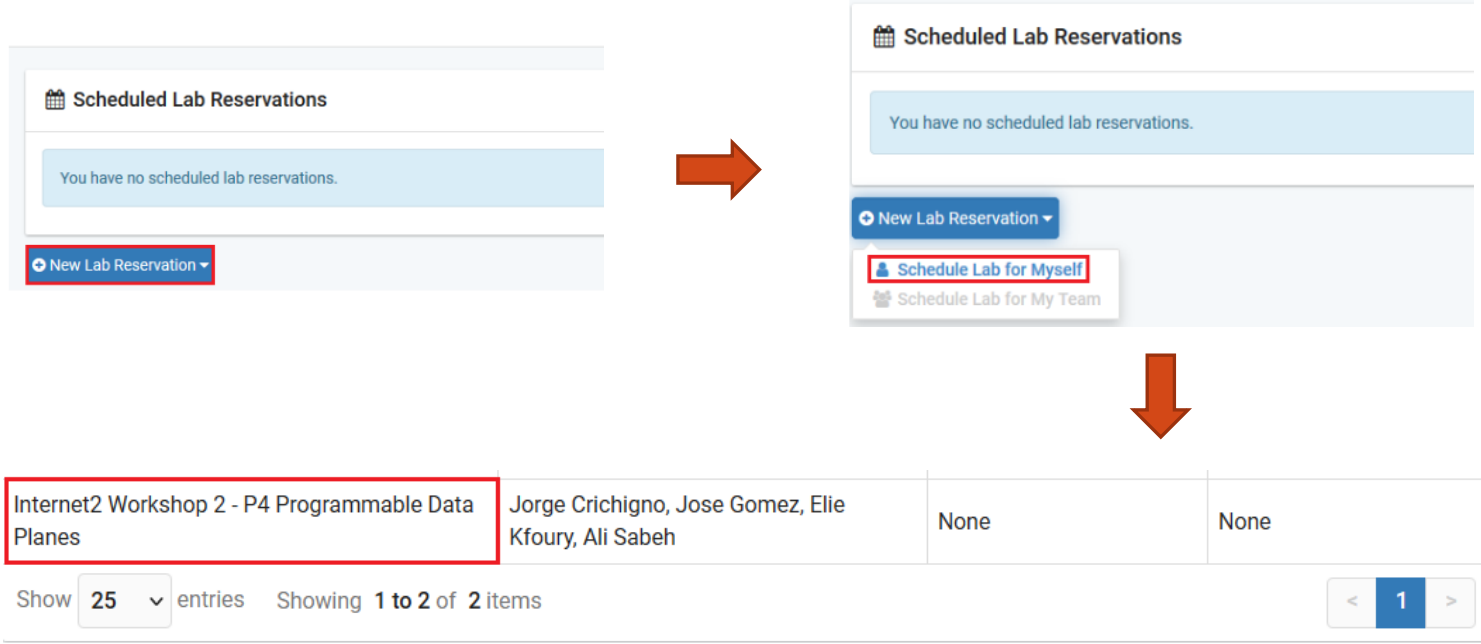




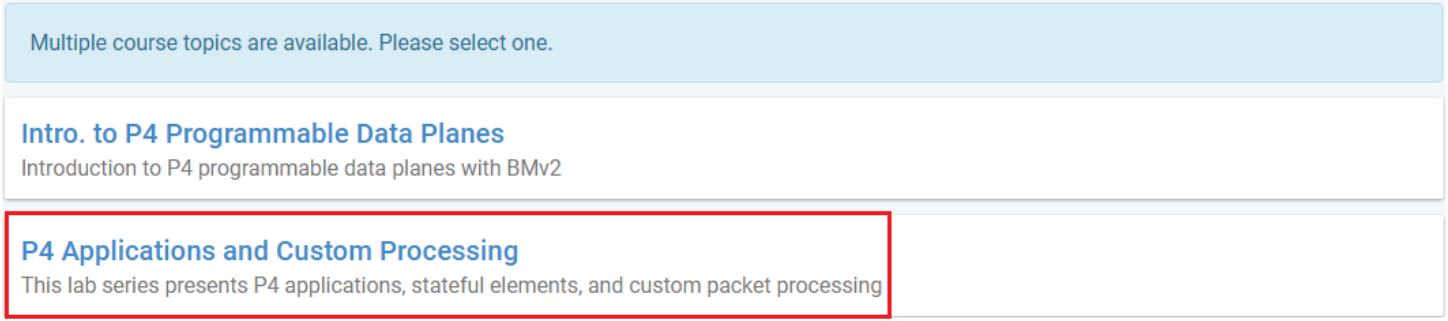
Scheduling a Reservation

- Click on New Lab Reservation
- Click on Schedule Lab for Myself



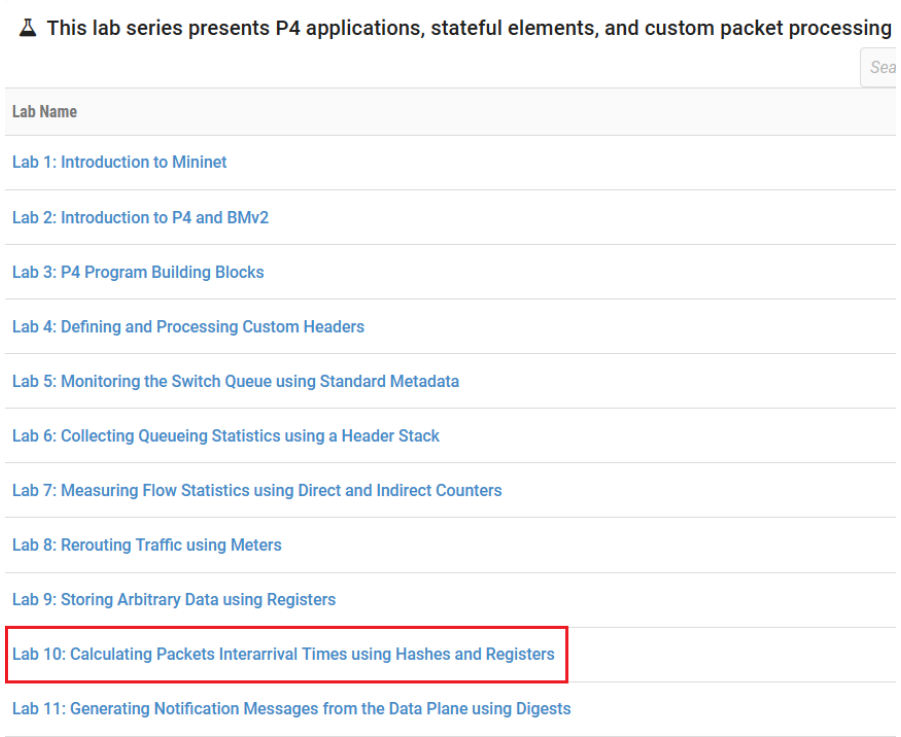
Scheduling a Reservation

- Select the course
- For this session, we will use “P4 Applications and Custom Processing”



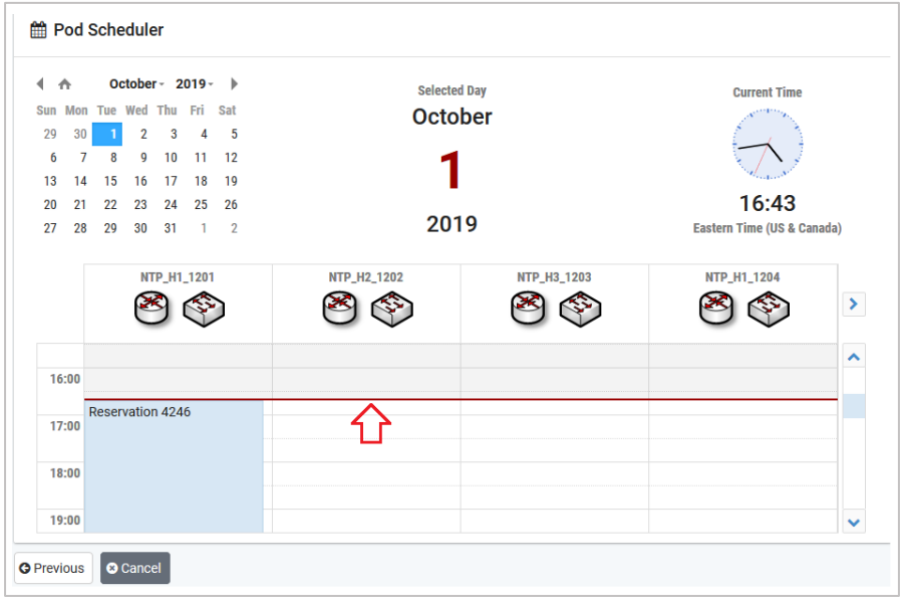
Scheduling a Reservation

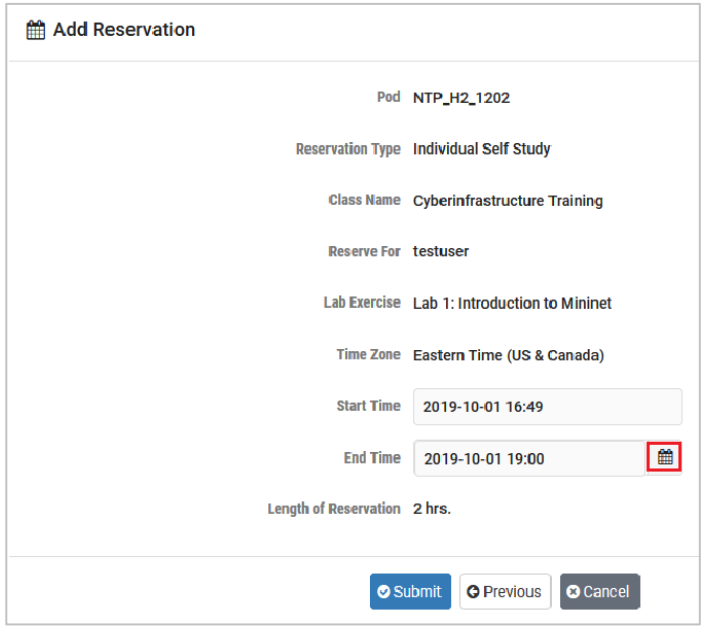
- Select the Lab
- For this session, we will run:
  - Lab 10: Calculating Packets Interarrival Times using Hashes and Registers



Scheduling a Reservation

- Select the next available POD and allocate time





Website URL and Accessing the Platform

- Tutorial website with slides and URL to resources:

http://ce.sc.edu/cyberinfra/workshop_2022_ie2_p4.html

- Access to virtual platform for this tutorial:

https://netlab.cec.sc.edu/