

Implementing a Packet Filter using a P4 Programmable Switch

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Agenda

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Project Description

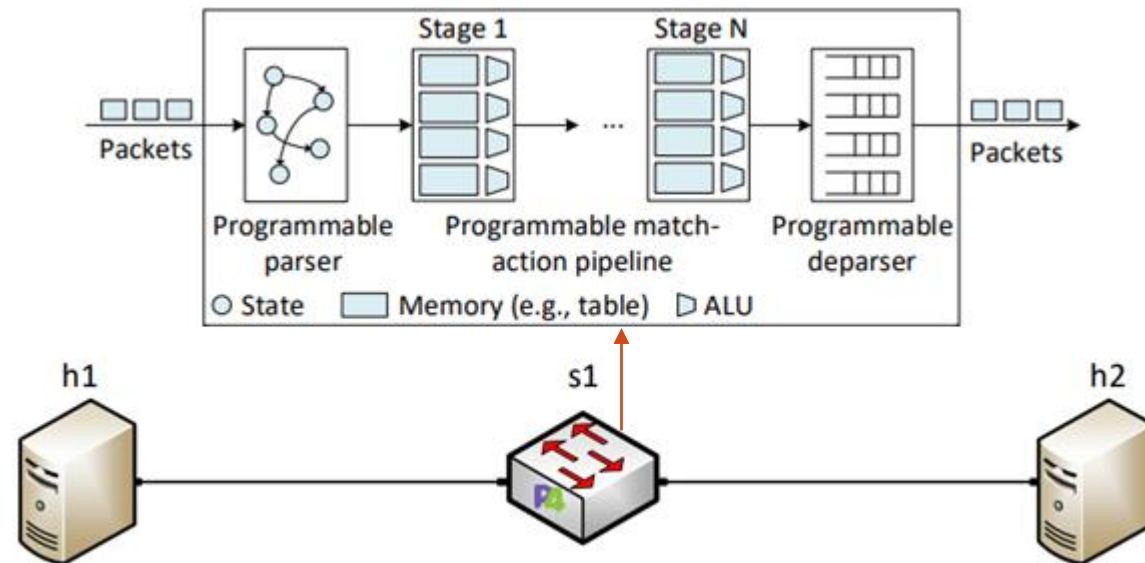
- Implementing a packet filter on a programmable switch, using P4
- Block and filter traffic based on certain security policies
- Examples of the security policies are:
 - Blocking packets based on the destination IPv4 address
 - Dropping segments going to an UDP and/or TCP port
 - Restricting ICMP requests to a security zone
 - Applying a combination of security policies to different security zones

Objectives

- Construct a packet filter using a P4-programmable switch
- Implement security policies using the P4 language
- Apply the concept of security zones
- Validate the implementation using open-source tools

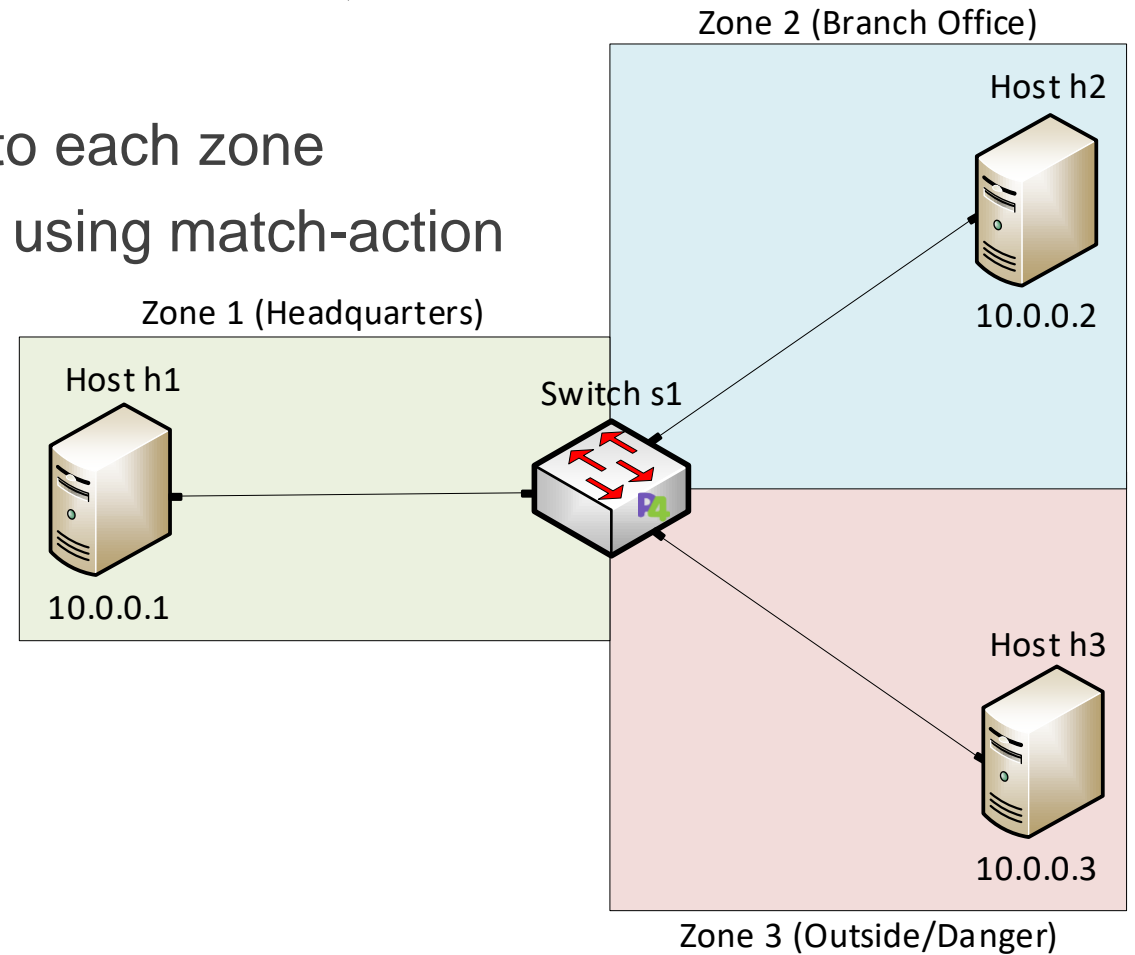
Background on P4

- Programming Protocol-independent Packet Processors (P4)
- The P4 language specifies how packets are processed through a pipeline
- The pipeline consists of different stages comprising a programmable parser, match-action stages, and a programmable deparser



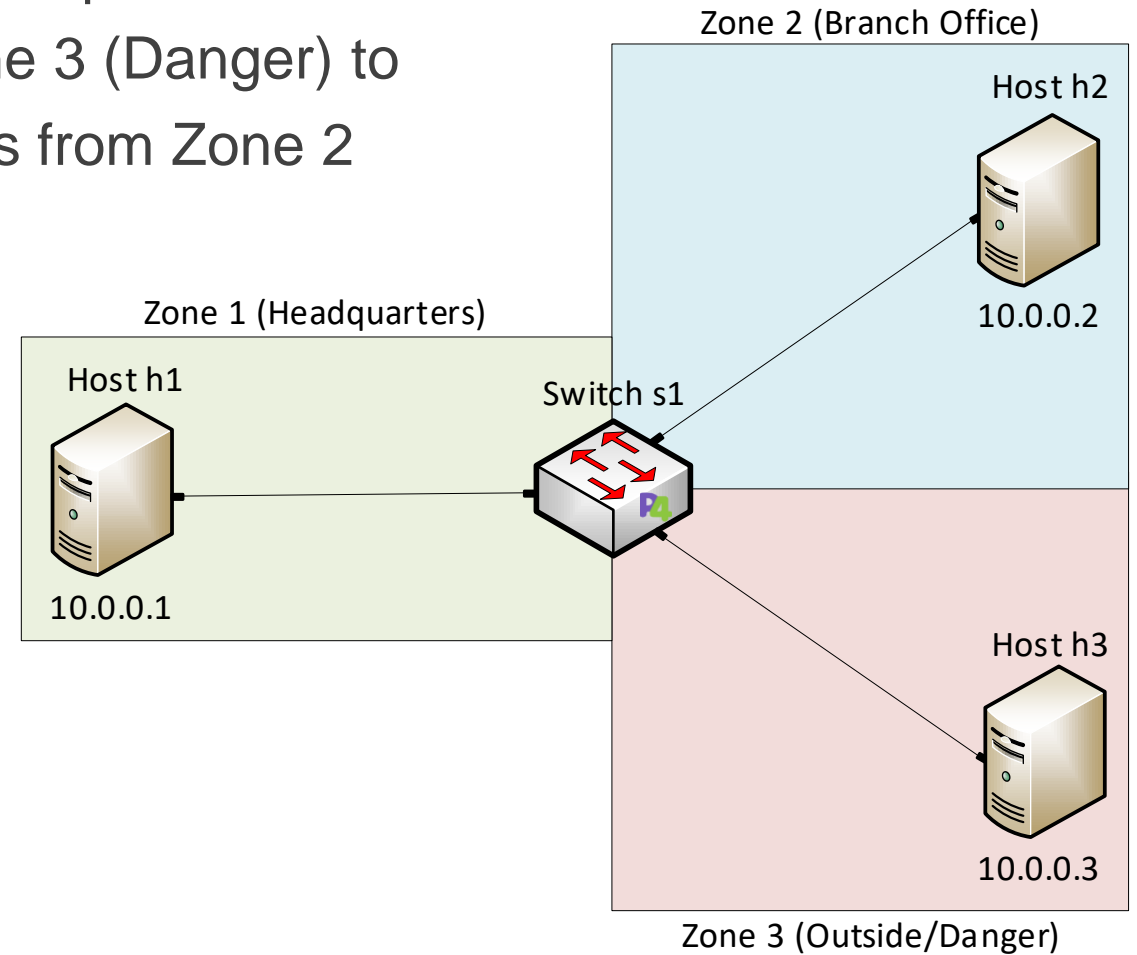
Experimentation scenario

- The scenario consists of three security zones where hosts h1, h2, and h3 represent the headquarters, the branch office, and the outside zone
- Switch s1 applies different security policies to each zone
- The security policies are implemented in P4 using match-action tables



Hands-on Demo in Netlab

- Demo 1: Filtering packets based on the destination IP address
- Demo 2: Dropping segments going to the TCP port 80
- Demo 3: Restricting ICMP request from Zone 3 (Danger) to Zone 1 (Headquarters) but allowing requests from Zone 2 (Branch Office)



Lessons Learned

- Learned how to implement a packet filter using P4
- Leveraged match-action tables to implement security policies
- Applied the concept of security zones using a P4 switch
- Validated the implementation of the security policies in the Netlab environment
- Understood the flexibility of P4 programmable switches on implementing security features

THANK YOU!