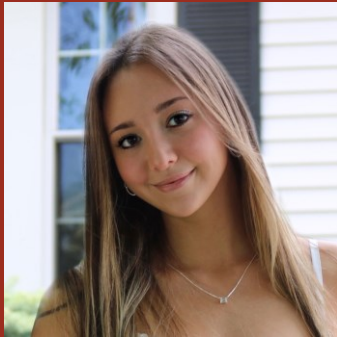


Implementing a Packet Filter using a P4 Programmable Switch

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Agenda

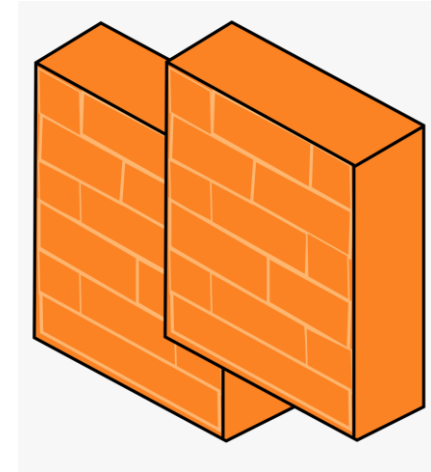
- Purpose
- Introduction
- Project Description
- Background
- Implementation
- Conclusion

Purpose

- Understand Software Defined Networking
- Understand the P4 language
- Understand the BMv2 architecture
- Implement a packet filter

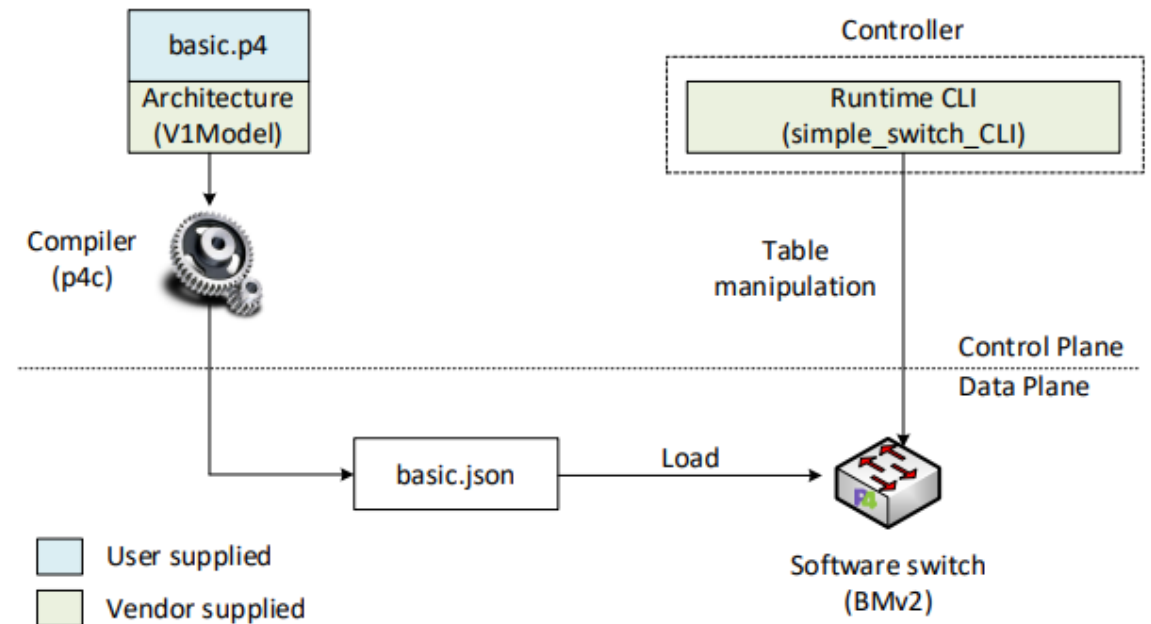
Introduction

- P4
- Mininet
- Topology Creation
- Filtering Decisions
- Executing commands at runtime



Background

- Traditional Switches
 - I. Hard coded chips that have a predetermined instruction set
 - II. Manufacturer decides what the device will do
- Software Switches (BMV2)
 - I. Software code and architecture
 - II. Full control over the entire device



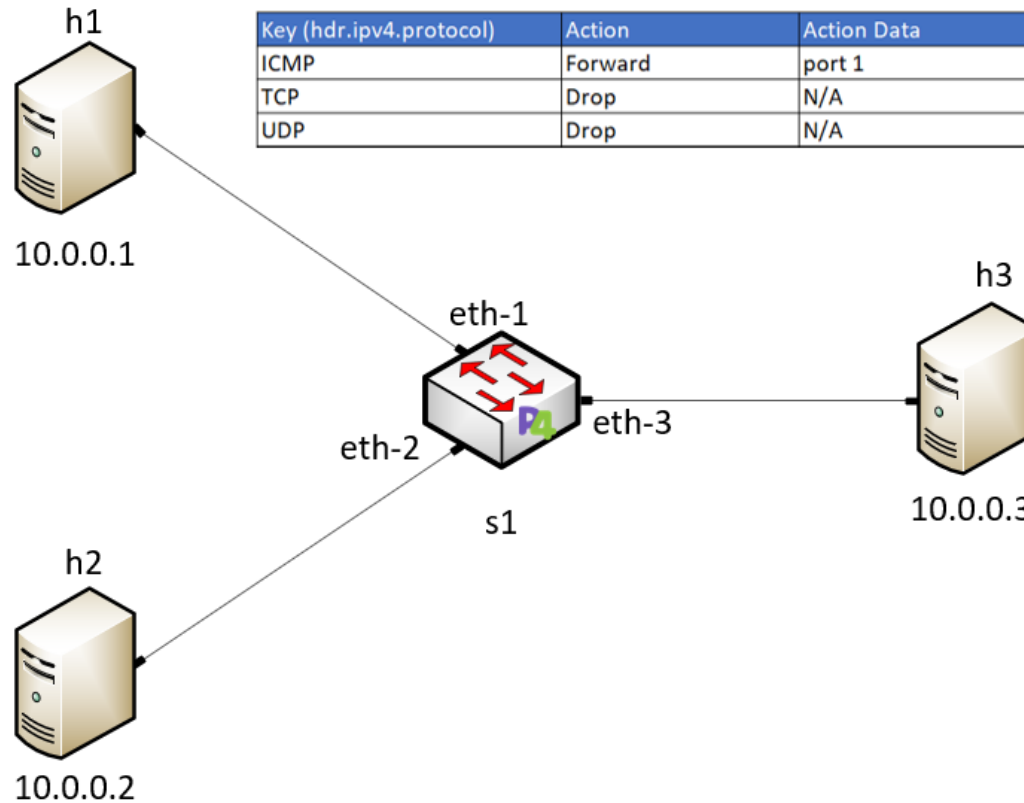
Project Description

- Program, compile, and run a P4 program on a programmable switch
- Block or forward packets based on certain criteria
- Creating a passive (stateless) firewall, ACL

Implementation

- Topology
- Headers
- Parsing
- Tables
- Runtime

Bit	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
0	Version				IHL			DSCP				ECN		Total Length																		
32	Identifier											Flags			Fragment Offset																	
64	Time To Live					Protocol					Header Checksum																					
96	Source IP Address																															
128	Destination IP Address																															
160	Options (if IHL > 5)																															



Key (hdr.ipv4.protocol)	Action	Action Data
ICMP	Forward	port 1
TCP	Drop	N/A
UDP	Drop	N/A

Results

- Filter successfully drops or forwards based on the rules populated from the control plane
- Solution is fully customizable
- Why does this matter?
- Future research and projects