

# Implementácia distribuovaného firewallu založeného na OpenFlow

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# Obsah prezentácie

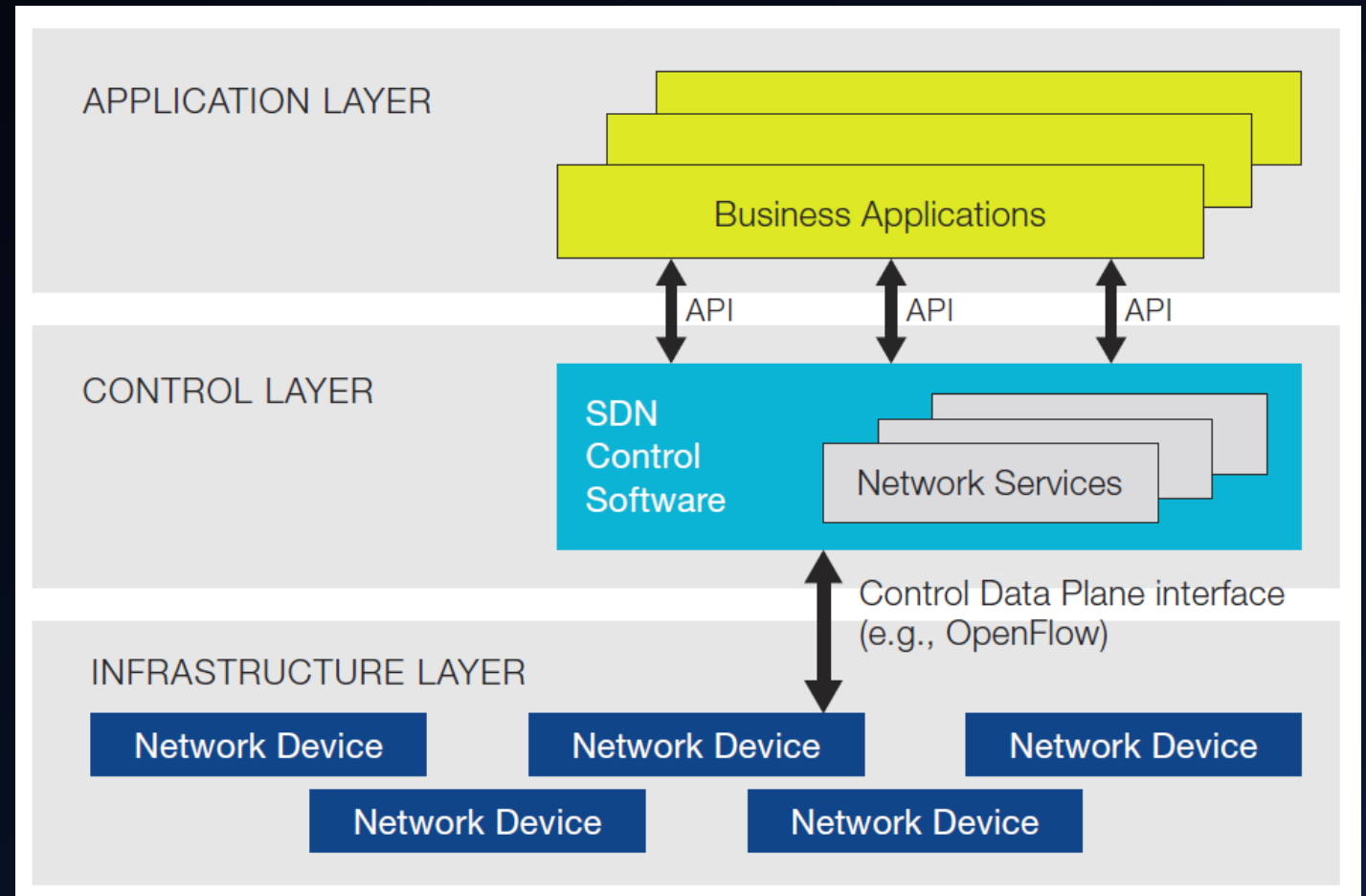
- Objasnenie témy
- Experiment
- Naša nadstavba na článok

# Objasnenie témy

ARCHITEKTÚRA SDN  
TOPOLÓGIA SIETE

# Architektúra SDN

- Aplikačná vrstva – firewall
- Kontrolná vrstva – POX kontrolér
- Sieťová vrstva – jednotlivé prepínače





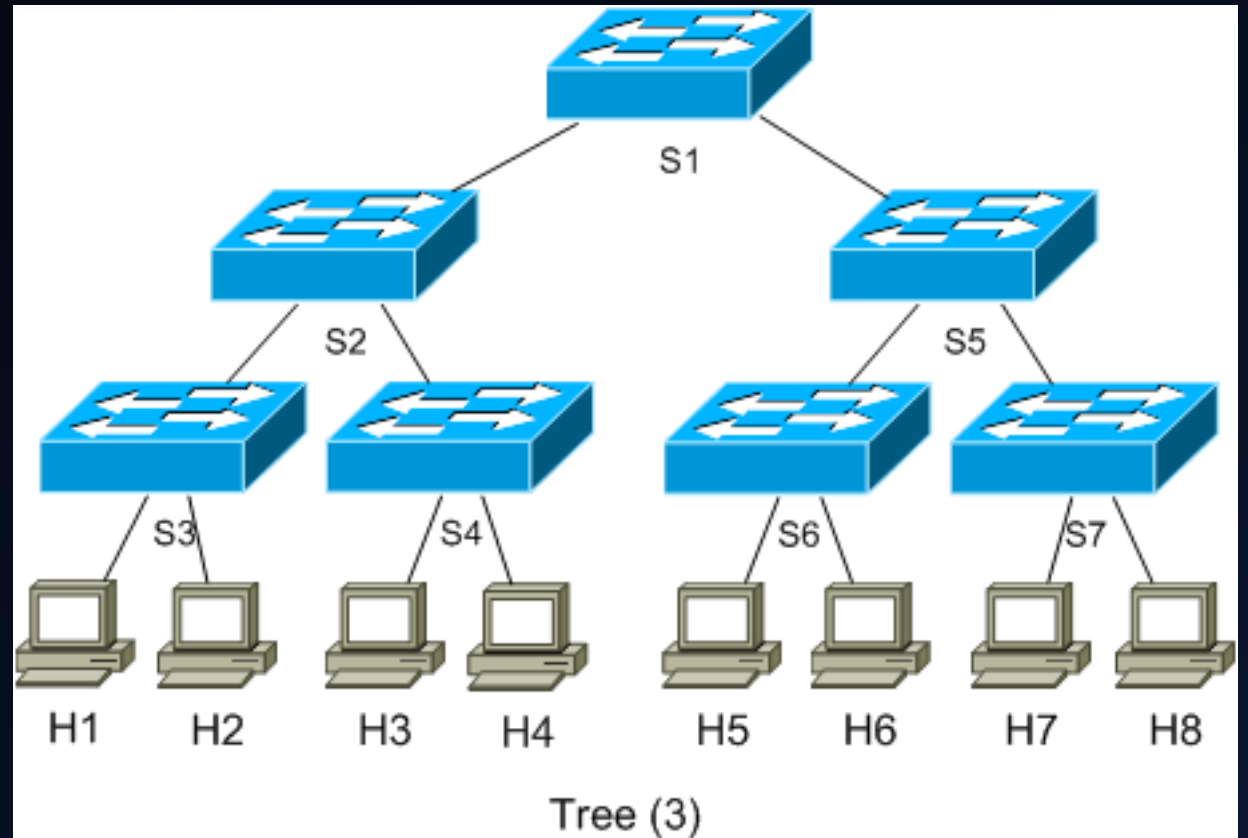
# Experiment

TESTOVANIE FUNKČNOSTI FIREWALLU



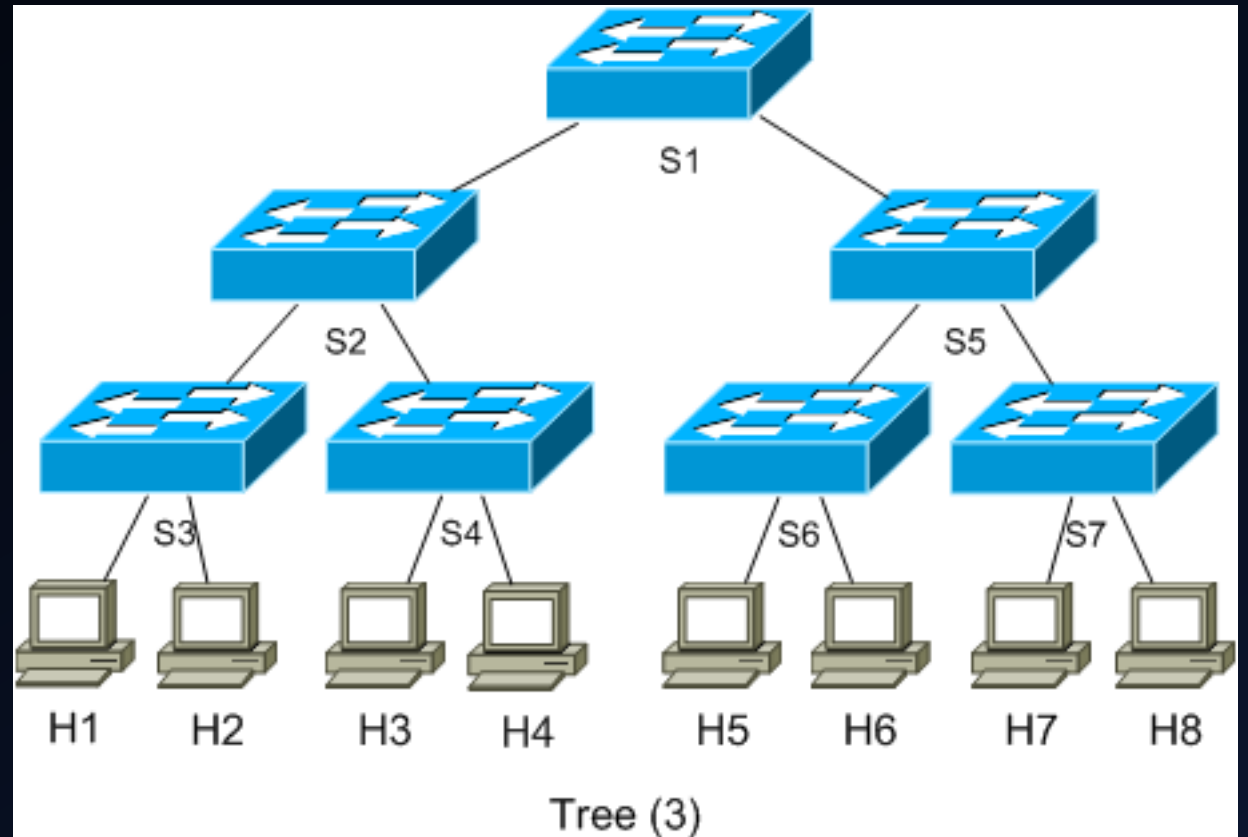
# Topológia siete

- Stromová topológia
- 7 prepínačov
- 8 hostov
  - IP: 10.0.0.1-8



# Testované scenáre

1. H1 nepingne H2
2. H1 nepigne H7
3. H1 nepristúpi na web server na H4
4. H7 nepristúpi na UDP port 53 na H8



# Tabuľka pravidiel blokovania komunikácie

Prepínač	Zdrojová IP	Cieľová IP	Protokol	Port
S3	10.0.0.1	10.0.0.2	1(ICMP)	-
S1	10.0.0.1	10.0.0.7	1(ICMP)	-
S2	10.0.0.1	10.0.0.4	6(TCP)	80
S7	10.0.0.7	10.0.0.8	17(UDP)	53



# Nastavenie pravidiel

- ID prepínača
- A, D, S – pridanie, vymazanie, vyhľadanie pravidiel
- Zdrojová a cieľová IP
- Protokol
  - Port

```
Enter the DPID of switch in which you want to insert, delete or show rules: 3
Enter 'A' for adding, 'D' for deleting, 'S' for showing the rules: 'A'
Enter any of the following matching fields
Source IP, Destination IP, Network Protocol, Destination port(UDP or TCP)
Source IP Address(Press Enter for None): 10.0.0.1
Destination IP address(Press Enter for None): 10.0.0.2
Enter Network Protocol(1 for ICMP, 6 for TCP, 17 for UDP): 1
('adding Rule:', (2048, IPAddr('10.0.0.1'), IPAddr('10.0.0.2'), 1))
Enter the DPID of switch in which you want to insert, delete or show rules: 1
Enter 'A' for adding, 'D' for deleting, 'S' for showing the rules: 'A'
Enter any of the following matching fields
Source IP, Destination IP, Network Protocol, Destination port(UDP or TCP)
Source IP Address(Press Enter for None): 10.0.0.1
Destination IP address(Press Enter for None): 10.0.0.7
Enter Network Protocol(1 for ICMP, 6 for TCP, 17 for UDP): 1
('adding Rule:', (2048, IPAddr('10.0.0.1'), IPAddr('10.0.0.7'), 1))

Enter the DPID of switch in which you want to insert, delete or show rules: 2
Enter 'A' for adding, 'D' for deleting, 'S' for showing the rules: 'A'
Enter any of the following matching fields
Source IP, Destination IP, Network Protocol, Destination port(UDP or TCP)
Source IP Address(Press Enter for None): 10.0.0.1
Destination IP address(Press Enter for None): 10.0.0.4
Enter Network Protocol(1 for ICMP, 6 for TCP, 17 for UDP): 6
Enter TCP or UDP destination port: 80
('adding Rule:', (2048, IPAddr('10.0.0.1'), IPAddr('10.0.0.4'), 6, 80))

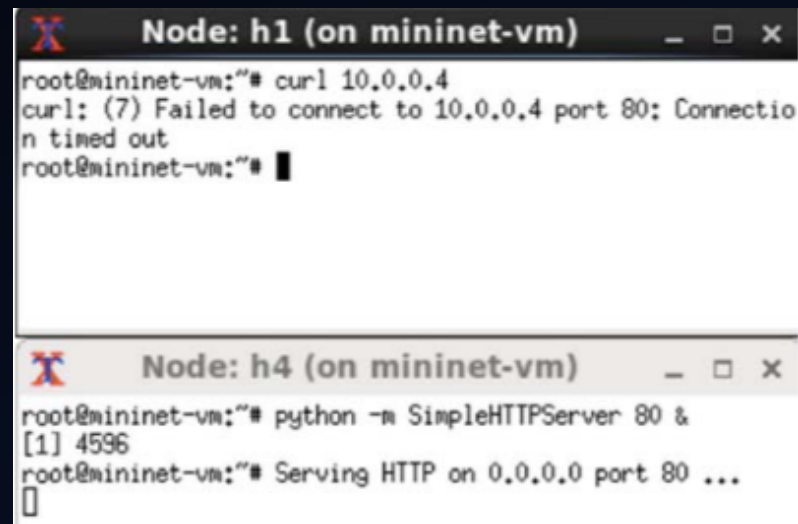
Enter the DPID of switch in which you want to insert, delete or show rules: 7
Enter 'A' for adding, 'D' for deleting, 'S' for showing the rules: 'A'
Enter any of the following matching fields
Source IP, Destination IP, Network Protocol, Destination port(UDP or TCP)
Source IP Address(Press Enter for None): 10.0.0.7
Destination IP address(Press Enter for None): 10.0.0.8
Enter Network Protocol(1 for ICMP, 6 for TCP, 17 for UDP): 17
Enter TCP or UDP destination port: 53
('adding Rule:', (2048, IPAddr('10.0.0.7'), IPAddr('10.0.0.8'), 17, 53))
```

# Testovanie a výsledky

## TESTOVACÍ SCENÁR 1,2

```
mininet> pingall
*** Ping: testing ping reachability
h1 -> X h3 h4 h5 h6 X h8
h2 -> X h3 h4 h5 h6 h7 h8
h3 -> h1 h2 h4 h5 h6 h7 h8
h4 -> h1 h2 h3 h5 h6 h7 h8
h5 -> h1 h2 h3 h4 h6 h7 h8
h6 -> h1 h2 h3 h4 h5 h7 h8
h7 -> X h2 h3 h4 h5 h6 h8
h8 -> h1 h2 h3 h4 h5 h6 h7
*** Results: 7% dropped (52/56 received)
```

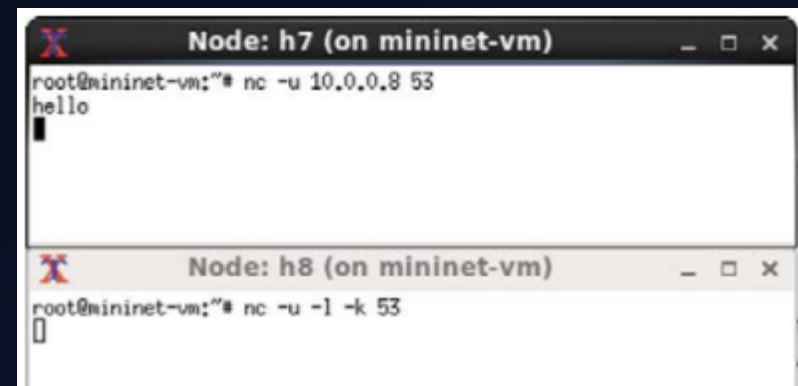
## TESTOVACÍ SCENÁR 3



```
Node: h1 (on mininet-vm)
root@mininet-vm:~# curl 10.0.0.4
curl: (7) Failed to connect to 10.0.0.4 port 80: Connection timed out
root@mininet-vm:~#

Node: h4 (on mininet-vm)
root@mininet-vm:~# python -m SimpleHTTPServer 80 &
[1] 4596
root@mininet-vm:~# Serving HTTP on 0.0.0.0 port 80 ...
```

## TESTOVACÍ SCENÁR 4



```
Node: h7 (on mininet-vm)
root@mininet-vm:~# nc -u 10.0.0.8 53
hello

Node: h8 (on mininet-vm)
root@mininet-vm:~# nc -u -l -k 53
```



# Naša práca

GRAFICKÉ ROZHRAŇIE

# Použitý firewall

- RYU rest firewall
- Black list vs. White list
- Npm
- jQuery – ajax

```
graph TD; A[GUI aplikácia] --> B[REST funkcie]; B --> C[Firewall pravidlá];
```

GUI aplikácia

REST funkcie

Firewall  
pravidlá

# Aktuálny stav prototypu

The screenshot displays a web application prototype in a browser window. The browser's address bar shows '0.0.0.0'. The application has a header with the 'Admin' logo and a hamburger menu icon. A sidebar on the left contains a menu with four items: 'Dashboard' (home icon), 'Rules' (list icon), 'Logs' (document icon), and 'Network' (globe icon). The main content area is titled 'IP address' and contains a form with the label 'IP address (e.g.: 192.168.56.101:8080):'. Below the label is a text input field with the placeholder 'IP address'. A blue 'Put' button is positioned below the input field. The footer of the application contains the text: 'Copyright © 2017 Designed by Colorlib. All rights reserved.'

Admin

- Dashboard
- Rules
- Logs
- Network

IP address

IP address (e.g.: 192.168.56.101:8080):

Put

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# Aktuálny stav prototypu

Admin

Dashboard

Rules

Logs

Network

0.0.0.0

IP address: 192.168.56.101:8080

Firewall status:

ID	Enabled	
0000000000000001	disabled	enable
0000000000000002	disabled	enable
0000000000000003	disabled	enable
0000000000000004	disabled	enable
0000000000000005	disabled	enable
0000000000000006	disabled	enable
0000000000000007	disabled	enable

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