

# I2NSF Project @ IETF-100 Hackathon



**IETF 100, Singapore**

**November 12, 2017**

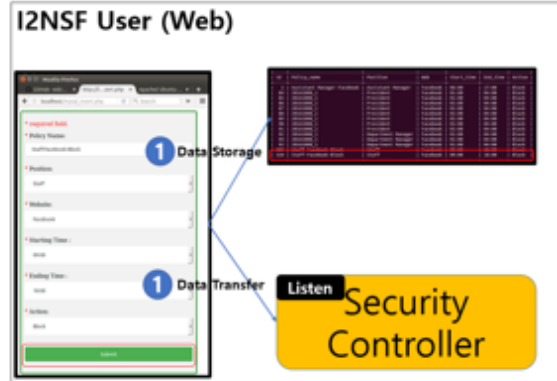
**Sangwon Hyun**  
Sungkyunkwan University

# Why Did We Do this Project?

- ❖ **I2NSF: Use NETCONF, RESTCONF, YANG Data Models**
  - Is I2NSF reasonable for management of network security functions?
  - Can we implement I2NSF using open source software?
  
- ❖ **This work is a student project!!**
  - 7 graduate students at Sungkyunkwan University
  - Source Code on Github

# IETF I2NSF (Interface to Network Security Functions) Working Group: I2NSF Framework Project

Champions: Jaehoon Paul Jeong, Sangwon Hyun, and Jinyong Tim Kim (SKKU)



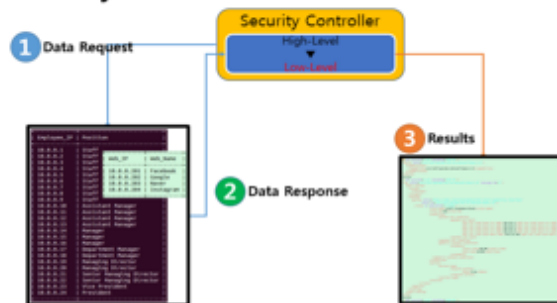
## Where to get code

- Github – Source code
  - ✓ <https://github.com/kimjinyong/i2nsf-framework/tree/master/Hackathon-100>

## What to pull down to set up an environment

- OS: Ubuntu 14.04TL
- Confd for NETCONF: 6.2 Version
- Apache2: 2.4.7 Version
- MySQL: 14.14 Version
- PHP: 5.5.9 Version
- Mininet: 2.2.1 Version
- OpenDaylight: Distribution-karaf-0.4.3-Beryllium-SR3
- XSLT (Extensible StyleSheet Languages Transformations)
- Jetconf: Jetconf is a python Open API for RESTCONF.

## Security Controller



## Manual for Operation Process

- README.txt

## Professors

- Jaehoon (Paul) Jeong (Sungkyunkwan)
- Hyoungshick Kim (Sungkyunkwan)
- Sangwon Hyun (Sungkyunkwan)

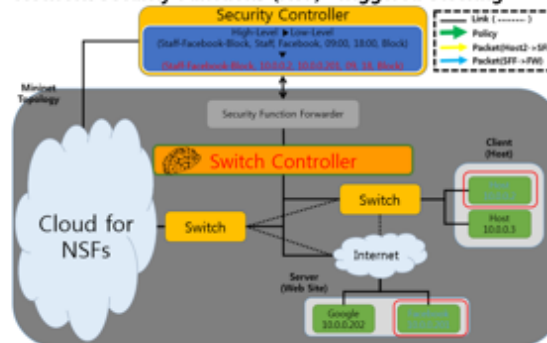
## Collaborators

- Jung-Soo Park (ETRI)
- Tae-Jin Ahn (Korea Telecom)

## Students

- Jinyong Tim Kim
- Daeyoung Hyun
- Eunsoo Kim
- Dongjin Hong
- Tae-Kyun Roh
- Sarang Wi
- Seungjin Lee

## Network Security Functions (NSF) -Triggered Steering



## Contents of Implementation

- I2NSF Framework for provisioning Network Security Functions (NSF)
  - ✓ Consumer-Facing Interface via RESTCONF/YANG
  - ✓ NSF-Facing Interface via NETCONF/YANG
  - ✓ Registration Interface via NETCONF/YANG
- Network Security Functions
  - ✓ Firewall using SDN and Suricata
  - ✓ Deep Packet Inspection (DPI) using Suricata
- Advanced Functions
  - ✓ NSF-triggered Traffic Steering using SFC
  - ✓ YANG Data Modeling for NSF Monitoring
  - ✓ Dynamic Policy Configuration

# Goal of I2NSF Project

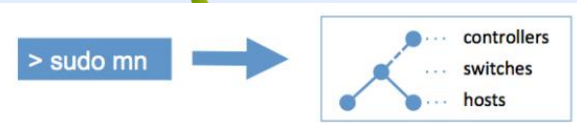
I2NSF Framework is extended with

1. **Consumer-facing interface** based on RESTCONF and YANG.
2. **Registration interface** based on NETCONF and YANG.
3. **Service Function Chaining (SFC)** based on Network Service Header (NSH) and tunneling protocol (e.g., GRE)

# Hackathon Development

## Build Environment

1. OS
  - Ubuntu 14.04TL
2. Netconfd
  - 6.2 Version
3. Apache2
  - 2.4.7 Version
4. MySQL
  - 14.14 Version
5. PHP
  - 5.5.9 Version



5. Mininet
  - 2.2.1 Version
6. OpenDaylight
  - Distribution-karaf-0.4.3-Beryllium-SR3
7. Suricata
  - 3.2.1 RELEASE



ubuntu



# Network Configuration for Hackathon



I2NSF User

Security Controller

NSF1  
(Firewall)

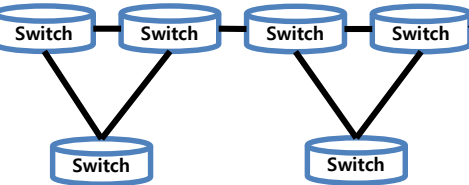
SFF

NSF2  
(Web Filter)

SDN Controller



Host  
10.0.0.1  
(Employee)



Gateway  
(NAT)

Internet

Block the access to  
Facebook from 9am to 6pm

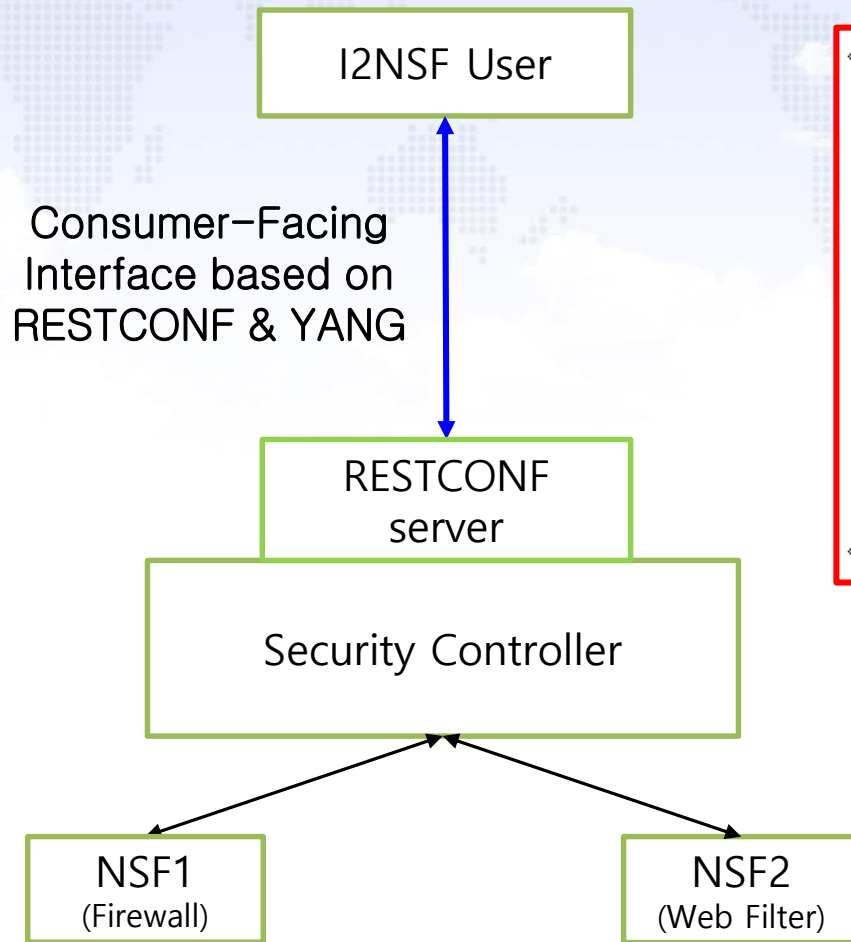


facebook

Enterprise Network

# Consumer-Facing Interface Implementation

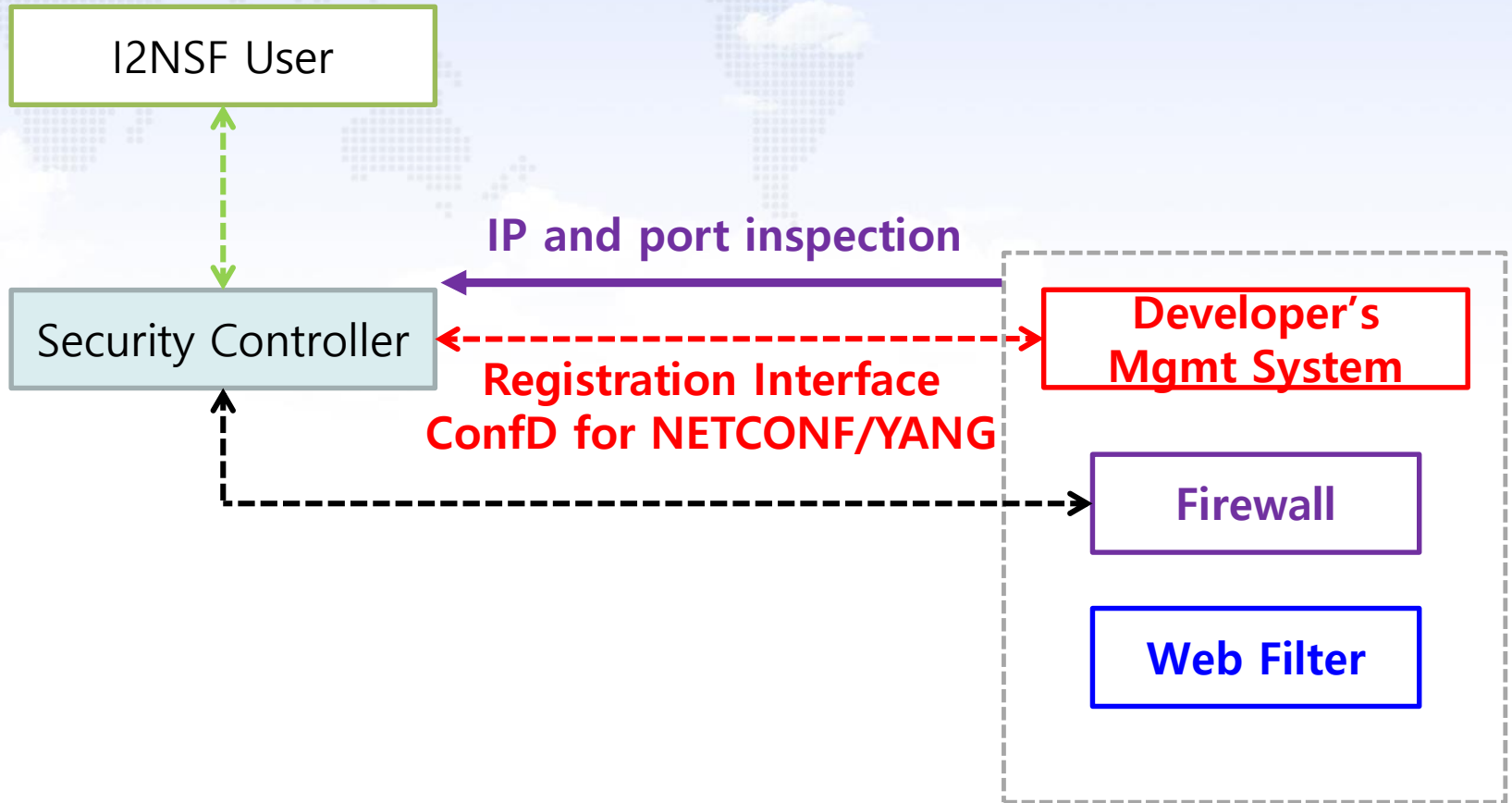
*“Block the access of staff to Facebook from 9am to 6pm”*



```
<i2nsf:Policy_web>
  <rule>
    <rule-id>1</rule-id>
    <rule-name>example</rule-name>
    <event>
      <time-information>
        <start-time>09:00</start-time>
        <end-time>18:00</end-time>
      </time-information>
    </event>
    <condition>
      <source>Staff</source>
      <destination>www.facebook.com</destination>
    </condition>
    <action>
      <action-name>drop</action-name>
    </action>
  </rule>
</i2nsf:Policy_web>
```

*\*JetConf* for RESTCONF

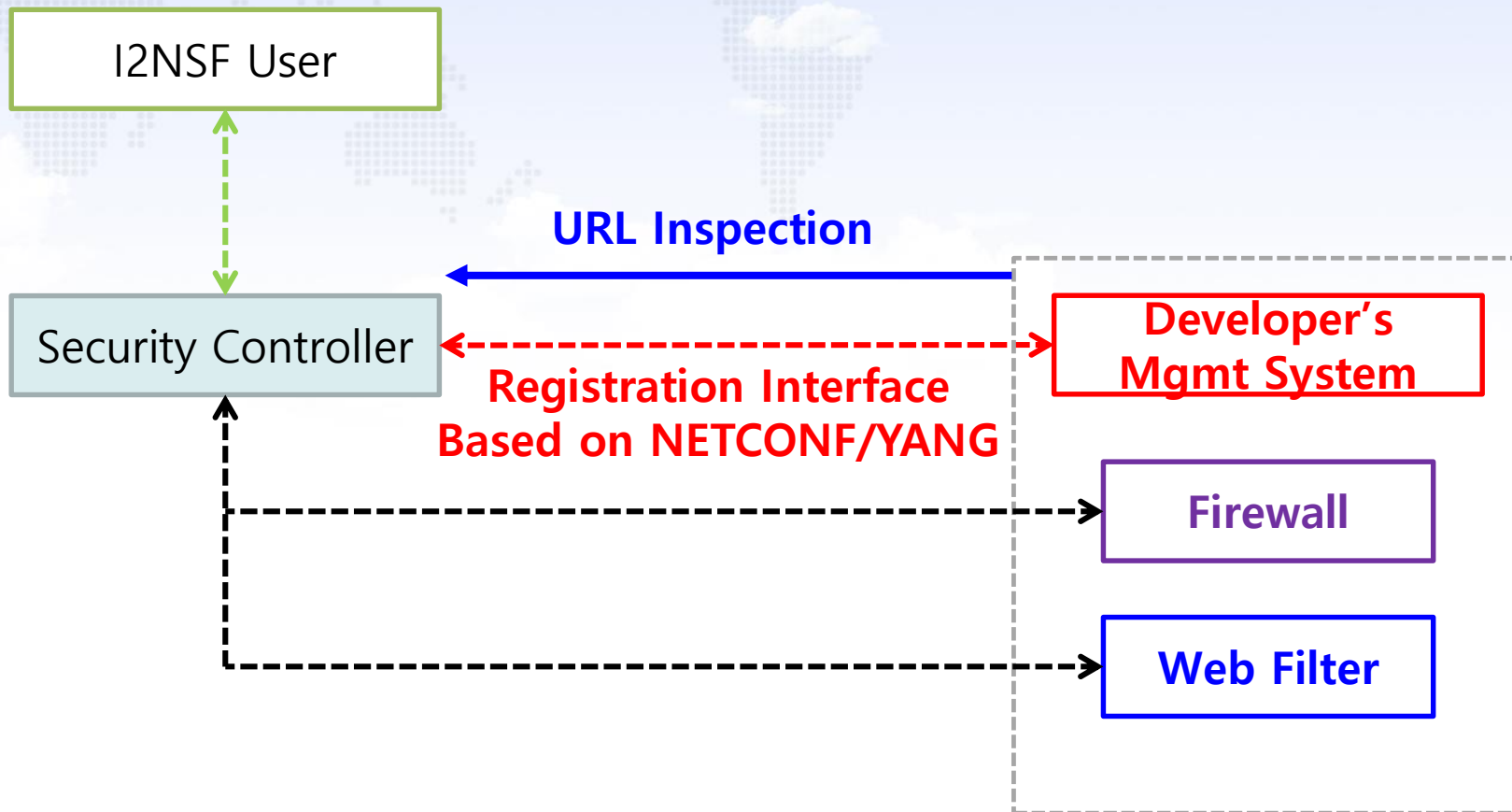
# Registration Interface Implementation (1/2)



\**ConfD* for NETCONF

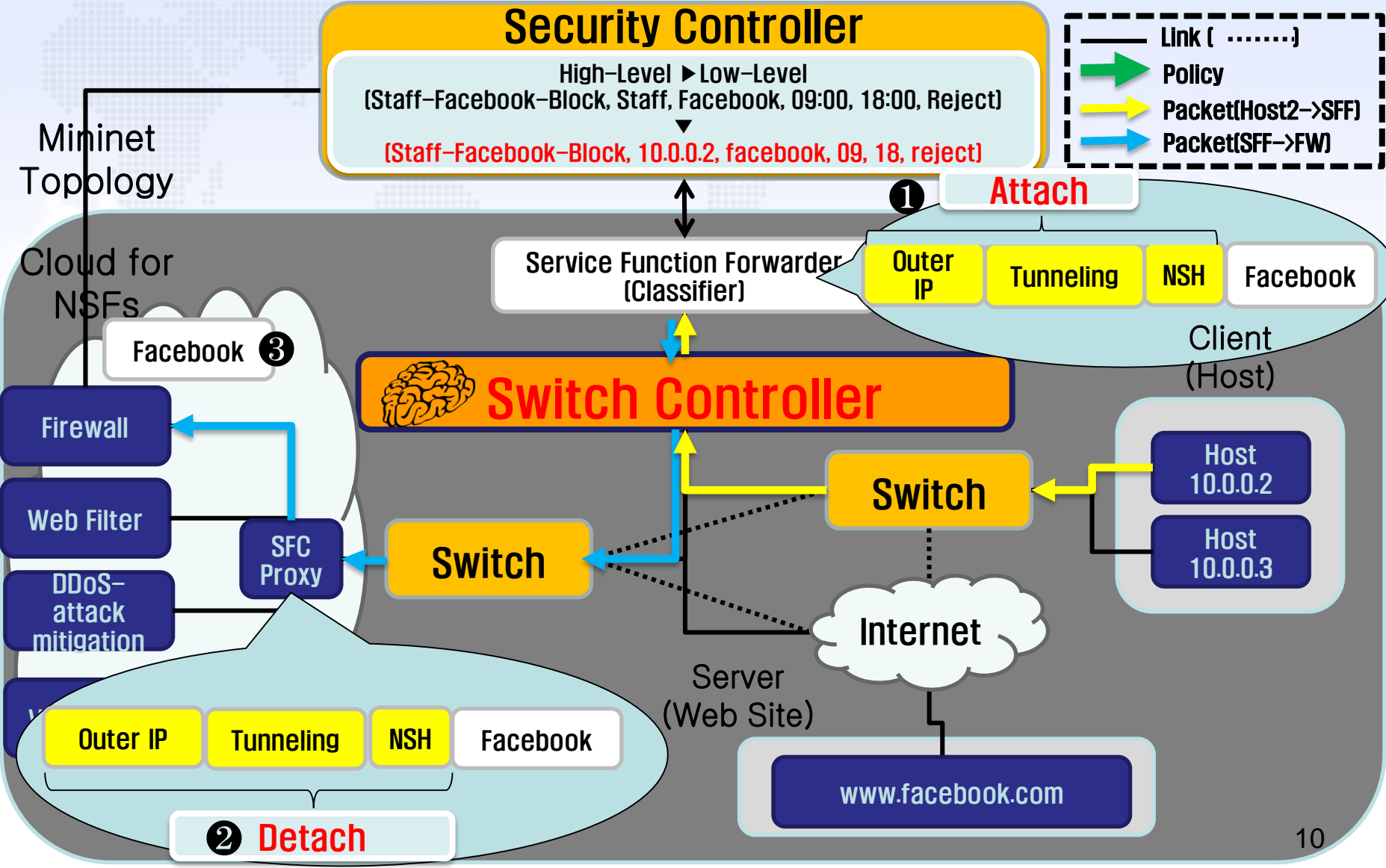


# Registration Interface Implementation (2/2)



# SFC Implementation

## Network Security Functions (NSF) – Triggered Steering



# Information of I2NSF Hackathon Project

## Github for I2NSF Hackathon

➤ **Documents and Source Code**

<https://github.com/kimjinyong/i2nsf-framework>

# Lessons from the Implementation @ Hackathon

- **Proof of Concept (POC) of I2NSF Framework using Open Sources:**
- **Confd** for I2NSF NSF-Facing and Registration Interface
  - **JetConf** for Consumer-Facing Interface
  - **Suricata** for NSFs (i.e., Firewall and Web Filter)
  - **OpenDaylight** for SDN Controller
  - **NSH and tunneling** for packet steering over NSFs
  - **Mininet** for SDN Network