

IETF-116

I2NSF Hackathon Project

March 25-26, 2022

Champion: Jaehoon (Paul) Jeong

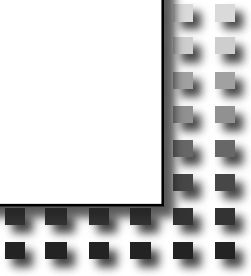
Presenter: Yiwen (Chris) Shen

Members: Patrick Lingga, Jeonghyeon Kim, and Linda Dunbar

Sungkyunkwan University, Kyungsung University, and Futurewei



I E T F



Champion: Jaehoon (Paul) Jeong



I2NSF Hackathon Project

Professors:

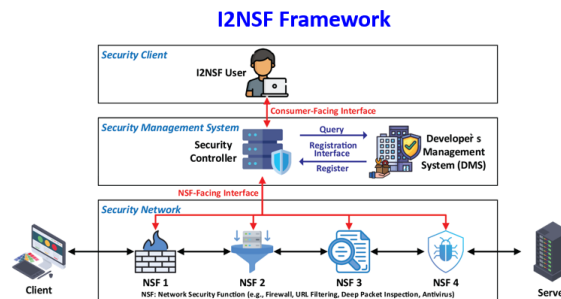
- Jaehoon (Paul) Jeong (SKKU)
- Younghan Kim (SSU)
- Yiwen (Chris) Shen (KSU)

Researchers:

- Jung-Soo Park (ETRI)
- Yunchul Choi (ETRI)

Students:

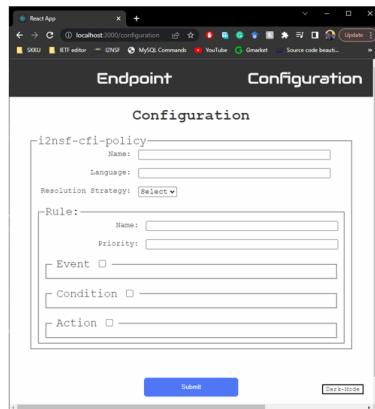
- Patrick Lingga (SKKU)
- Jeonghyeon Kim (SKKU)



Updated Registration Interface



User-Friendly Consumer-Facing Configuration



Where to get Code and Demo Video Clip

- Github – Source Code
 - ✓ <https://github.com/jaehoonpaul/i2nsf-framework>
 - ✓ <https://github.com/patrick8link/i2nsf-ipsec/tree/wldyd>
 - ✓ <https://www.youtube.com/watch?v=l-bSMxOs7zw>

What to pull down to set up an environment

- OS: Ubuntu 16.04
- DockerHub: sysrepo/sysrepo-netopeer2:legacy
- Libyang v1.0.184
- Strongswan v5.5.0

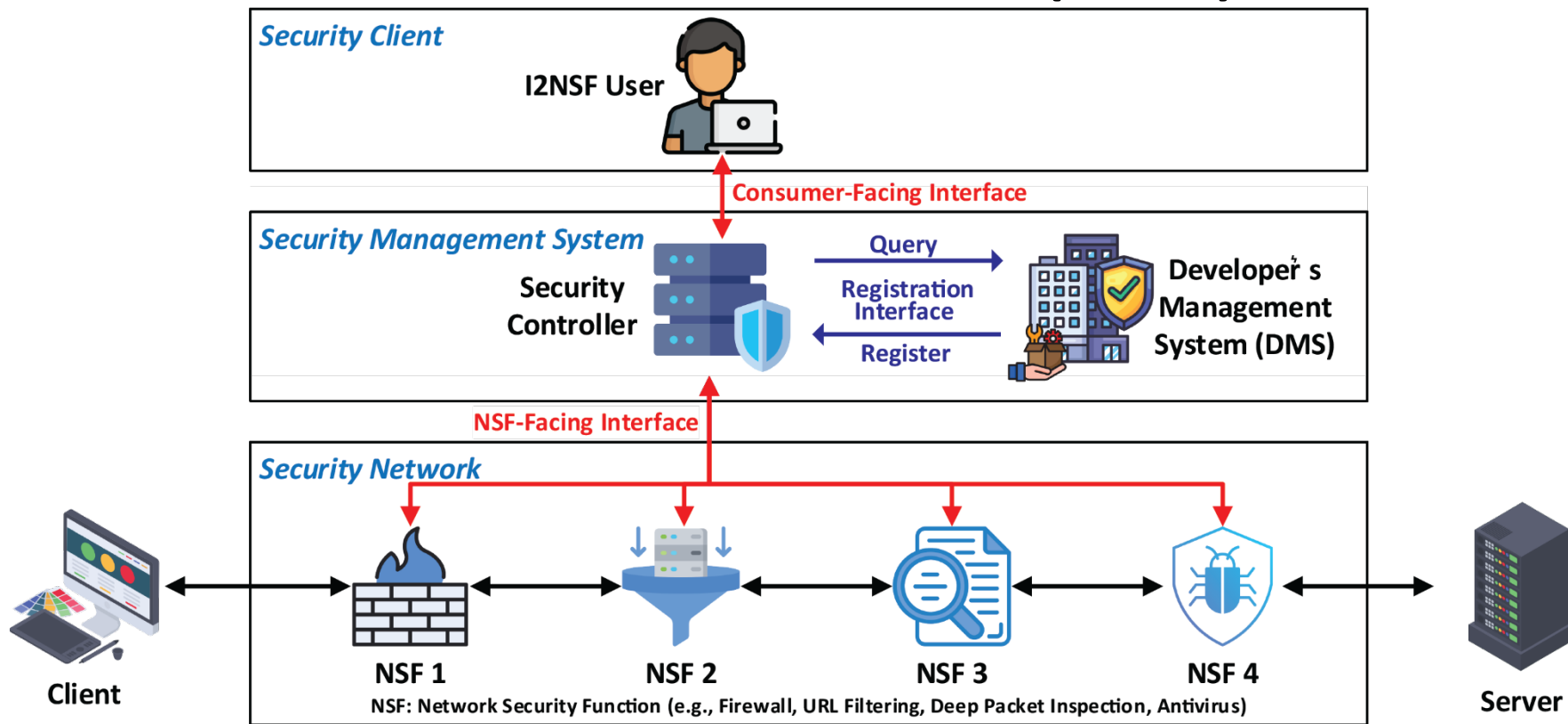
Manual for Operation Process

- README.md contains detailed description about operation process. It can be found in the GitHub.

Contents of Implementation

- IPsec Flow Protection based on SDN for I2NSF Framework
 - ✓ SPD, PAD, IKE parameters for IPsec Configuration according to RFC 9061
 - ✓ IPsec tunnel configuration using IKEv2 protocol
 - ✓ Console-based Developer's Management System
 - ✓ I2NSF Framework in Docker Container
 - ✓ I2NSF Capability YANG Data Model
 - ✓ IPsec SA establishment through Security Controller via NETCONF/YANG
 - ✓ Latest Registration Interface via NETCONF/YANG
 - ✓ Latest Consumer-Facing Interface via RESTCONF/YANG with Interactive Client
 - ✓ NSF-Facing Interface via NETCONF/YANG
- West/Eastbound Interface (Security Controller-Facing Interface)
 - ✓ IPsec SA establishment across different Domains
 - ✓ IPsec tunnel configuration between two Security Controllers via NETCONF/YANG

Hackathon Plan (1/2)



Hackathon Plan (2/2)

- ❖ **Implementation of latest version of [Consumer-Facing Interface YANG Data Model](#) for I2NSF Framework:**
 - draft-ietf-i2nsf-consumer-facing-interface-dm-26
- ❖ **Implementation of latest version of [Registration Interface YANG Data Model](#) for I2NSF Framework:**
 - draft-ietf-i2nsf-registration-interface-dm-23

What got done (1/4)

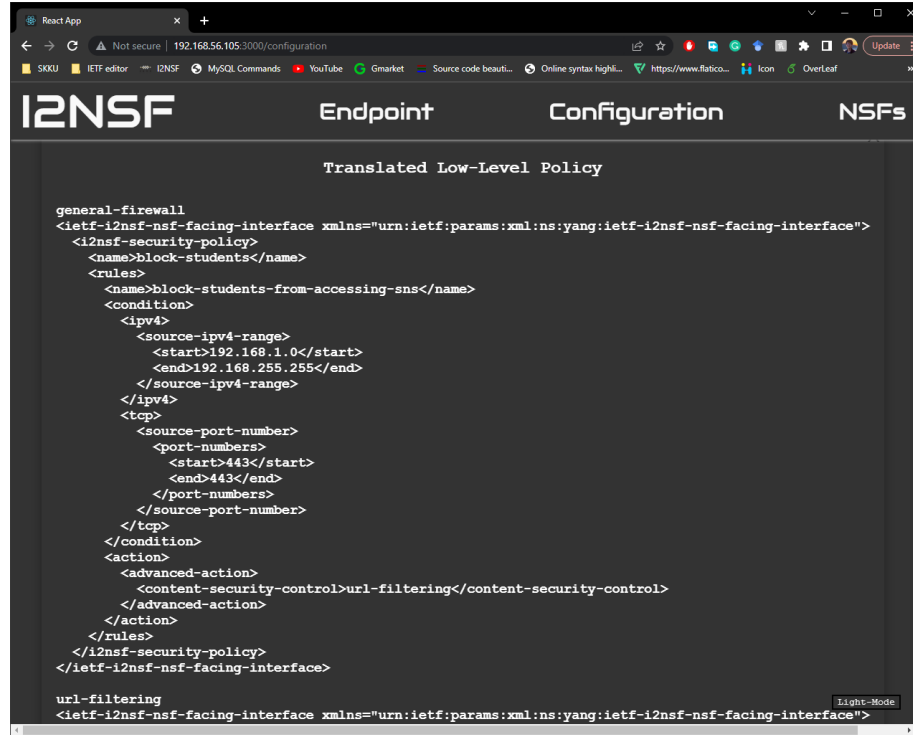
The screenshot shows the I2NSF web application interface. The top navigation bar includes the I2NSF logo and three tabs: 'Endpoint', 'Configuration', and 'NSFs'. The 'Endpoint' tab is currently selected. The main content area displays four white buttons stacked vertically: 'User Groups', 'Device Groups', 'Location Groups', and 'URL Groups'. The browser's address bar shows the URL '192.168.56.105:3000/registration'. A 'Light-Mode' toggle is visible in the bottom right corner.

Endpoint Registration

The screenshot shows the I2NSF web application interface with the 'Configuration' tab selected. The main content area is titled 'Configuration' and displays a form for configuring a policy. The form is titled 'i2nsf-cfi-policy' and includes fields for 'Name', 'Language', and 'Resolution Strategy' (a dropdown menu). Below these is a 'Rule' section with a 'Name' field, a 'Priority' field, and three checkboxes labeled 'Event', 'Condition', and 'Action', each followed by a text input field. A blue 'Submit' button is located at the bottom of the form. The browser's address bar shows the URL '192.168.56.105:3000/configuration'. A 'Light-Mode' toggle is visible in the bottom right corner.

High-level Configuration

What got done (2/4)



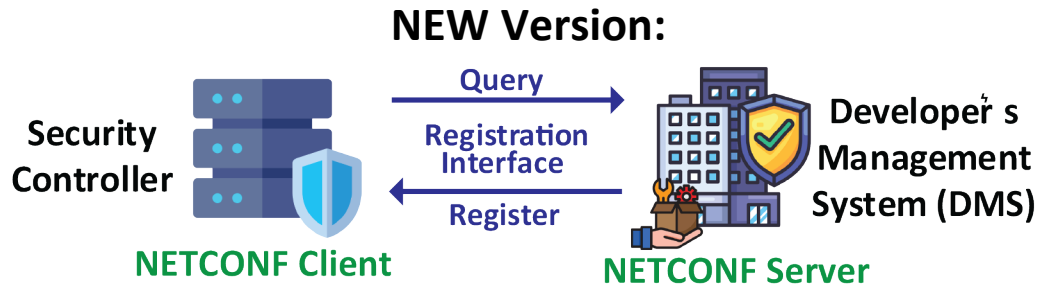
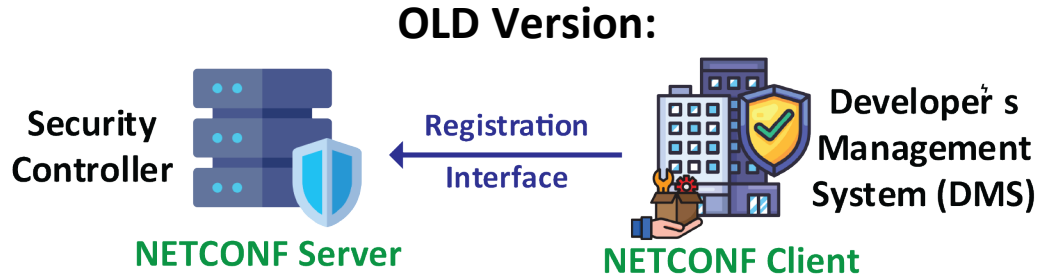
```
general-firewall
<ietf-i2nsf-nsf-facing-interface xmlns="urn:ietf:params:xml:ns:yang:ietf-i2nsf-nsf-facing-interface">
  <i2nsf-security-policy>
    <name>block-students</name>
    <rules>
      <name>block-students-from-accessing-sns</name>
      <condition>
        <ipv4>
          <source-ipv4-range>
            <start>192.168.1.0</start>
            <end>192.168.255.255</end>
          </source-ipv4-range>
        </ipv4>
        <tcp>
          <source-port-number>
            <port-numbers>
              <start>443</start>
              <end>443</end>
            </port-numbers>
          </source-port-number>
        </tcp>
      </condition>
      <action>
        <advanced-action>
          <content-security-control>url-filtering</content-security-control>
        </advanced-action>
      </action>
    </rules>
  </i2nsf-security-policy>
</ietf-i2nsf-nsf-facing-interface>

url-filtering
<ietf-i2nsf-nsf-facing-interface xmlns="urn:ietf:params:xml:ns:yang:ietf-i2nsf-nsf-facing-interface">
```

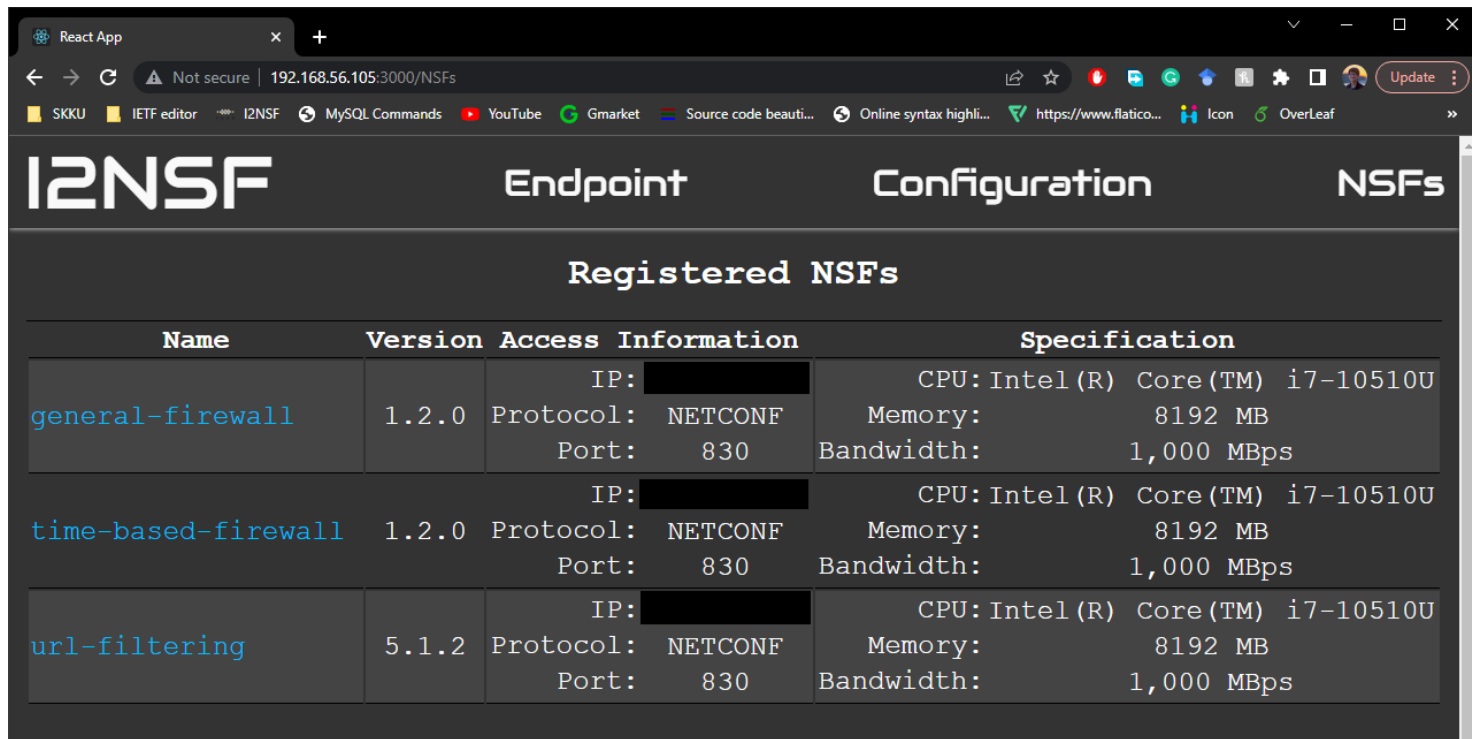
Translated Security Policy for Confirmation

What got done (3/4)

- Update of Registration Interface in the I2NSF Framework



What got done (4/4)



The screenshot shows a web browser window with the URL `192.168.56.105:3000/NSFs`. The page title is "I2NSF" and the navigation bar includes "Endpoint", "Configuration", and "NSFs". The main content area is titled "Registered NSF's" and contains a table with the following data:

Name	Version	Access Information	Specification
<code>general-firewall</code>	1.2.0	IP: [REDACTED] Protocol: NETCONF Port: 830	CPU: Intel (R) Core (TM) i7-10510U Memory: 8192 MB Bandwidth: 1,000 MBps
<code>time-based-firewall</code>	1.2.0	IP: [REDACTED] Protocol: NETCONF Port: 830	CPU: Intel (R) Core (TM) i7-10510U Memory: 8192 MB Bandwidth: 1,000 MBps
<code>url-filtering</code>	5.1.2	IP: [REDACTED] Protocol: NETCONF Port: 830	CPU: Intel (R) Core (TM) i7-10510U Memory: 8192 MB Bandwidth: 1,000 MBps

Registered NSF's from the DMS

What we learn

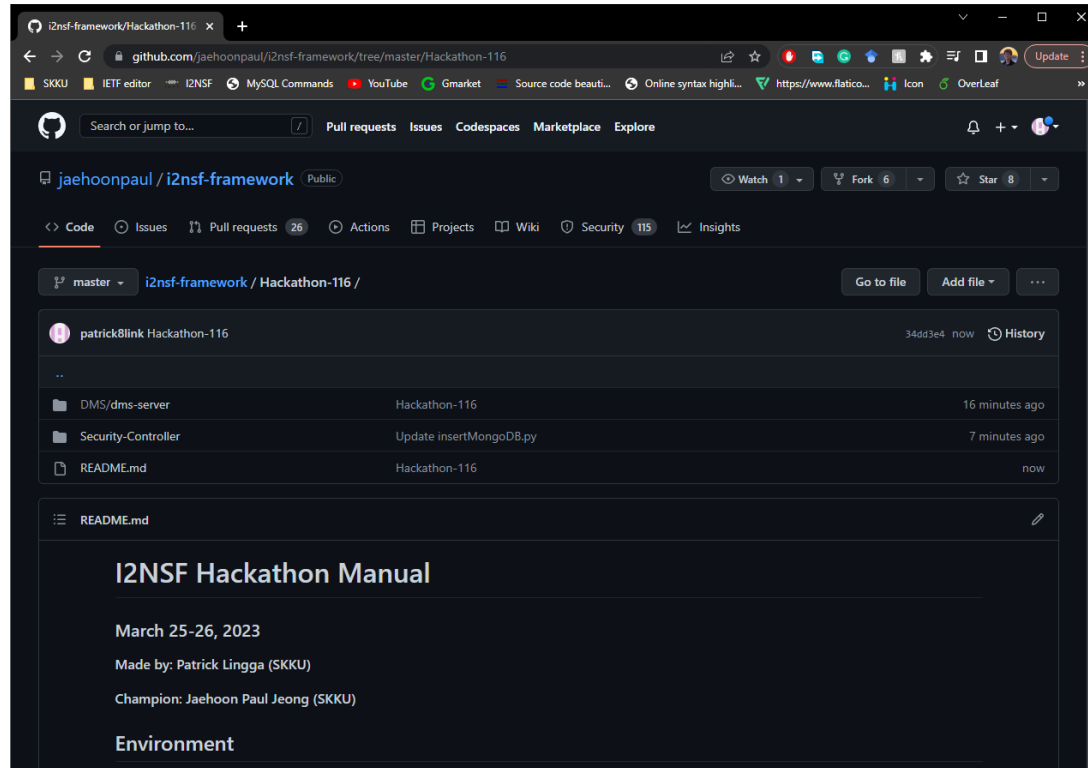
- The latest version of Consumer-Facing Interface YANG Data Model **enables easy configuration** for an I2NSF User.
 - The YANG data model **provides necessary high-level information** for NSFs configuration to the I2NSF User.
 - The high-level security policy **can be translated** to the low-level security policy.
- The latest version of Registration Interface YANG Data Model **simplifies the architecture** of the I2NSF Framework.
 - The YANG data model **allows both registration and query** of NSFs' capabilities as a simple and consistent way.

Next Step

- Implementation of security policy **life-cycle** for **dynamic policy updates**.
 - **Verification of security policy** that performs the necessary actions to ensure that requested high-level security policy will be achieved.
 - **Analysis of network behavior** with a machine learning scheme and **Reconfiguration of appropriate security policies** will be performed in real time.

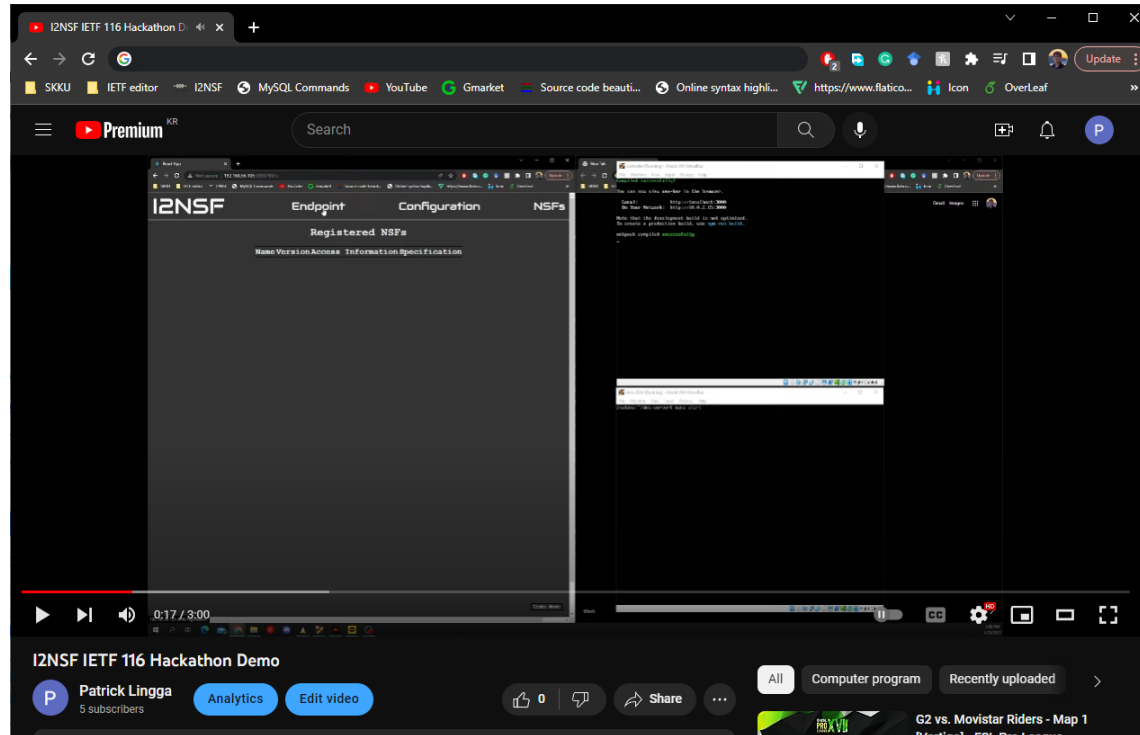
Open-Source Project at GitHub

URL: <https://github.com/jaehoonpaul/i2nsf-framework/tree/master/Hackathon-116>



Demonstration Video Clip at YouTube

URL: <https://www.youtube.com/watch?v=XsKVpMD9s4&t=9s>



Wrap Up

Hackathon Team

Champion:

- Jaehoon Paul Jeong (SKKU)

Professor:

- Younghan Kim (SSU)
- Yiwen (Chris) Shen (KSU)

Members:

- Linda Dunbar (Futurewei)
- Jung-Soo Park (ETRI)
- Yunchul Choi (ETRI)
- Patrick Lingga (SKKU)
- Jeonghyeon Kim (SKKU)
- Nobuo Aoki (National Institute of Informatics)

Hackathon Team Photo

