IETF-112

I2NSF Hackathon Project

1-5 November 2021

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I2NSF (Interface to Network Security Functions) Framework Project

Champion: Jaehoon (Paul) Jeong

IETF-112 I2NSF Hackathon Project

Professors:
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Researchers:
- Jung-Soo Park (ETRI)
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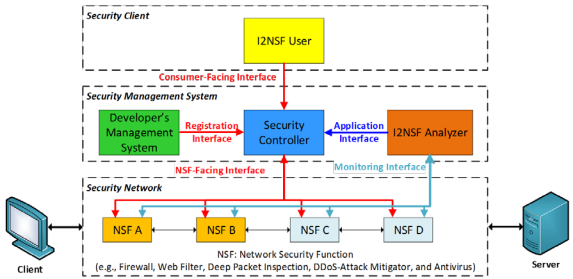
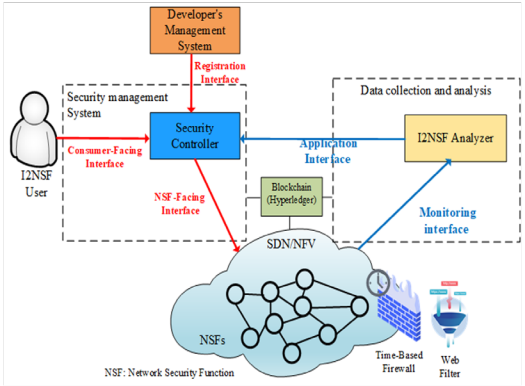
Students:
- Jeonghyeon Kim (SKKU)
- Patrick Lingga (SKKU)
- Kyungsik Kim (KNU)
- Cheolmin Kim (KNU)

I2NSF Framework



I2NSF with Distributed Database System



Where to get Code and Demo Video Clip
- GitHub – Source Code
  - ✓ https://github.com/jaehoonpaul/i2nsf-framework
- YouTube – Demo Video Clip
  - ✓ https://youtu.be/dAA1WTGhlXE

What to pull down to set up an environment
- OS: Ubuntu 16.04 LTS
- ConfD for NETCONF: 6.6 Version
- Jetconf for RESTCONF
- OpenStack: Queens version
- NSF: Suricata
- Hyperledger Fabric: 2.2 version

Manual for Operation Process
- I2NSF-Manual-Hackathon-IETF112-v1.md contain detailed description about operation process. (It can be found in the GitHub)

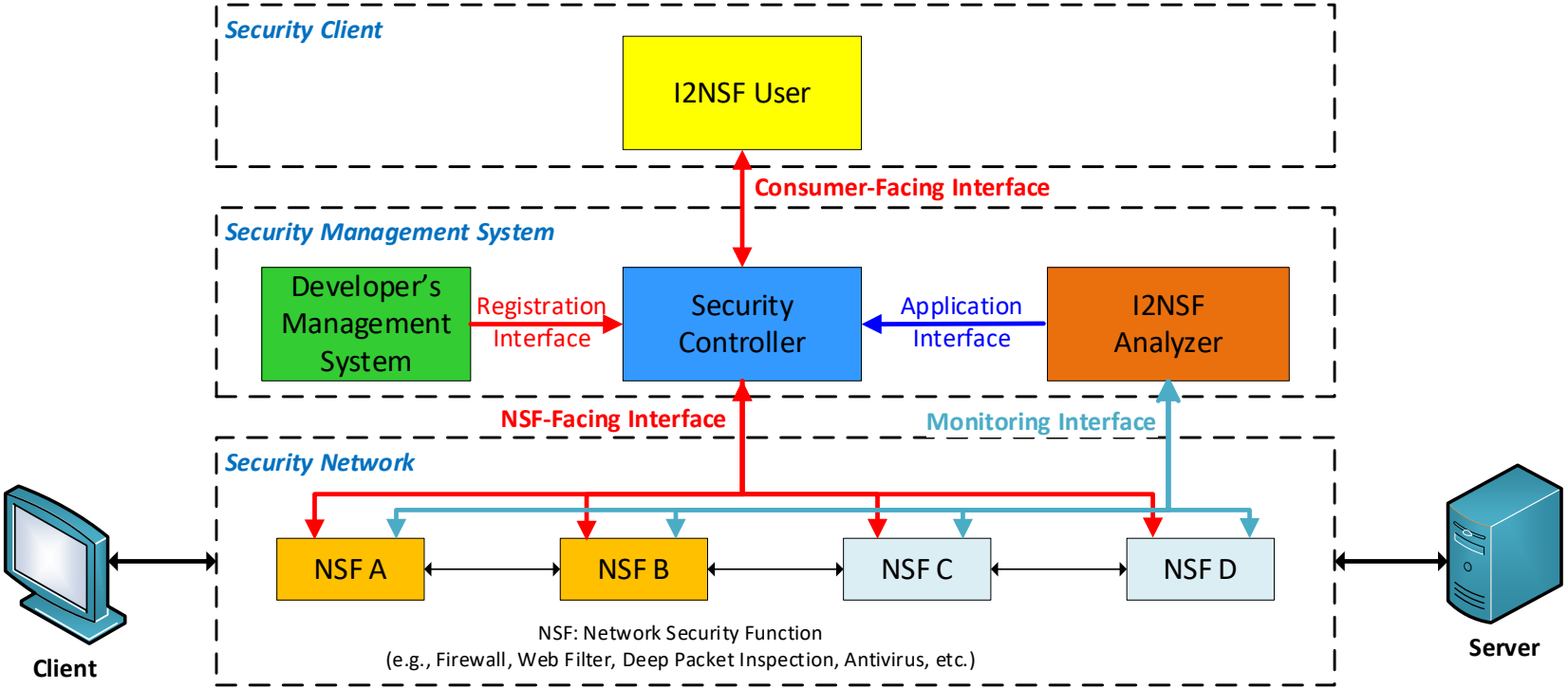
Contents of Implementation
- Cloud-based Security Service System using I2NSF Framework
  - ✓ Web-based I2NSF User
  - ✓ Console-based Security Controller
  - ✓ Console-based Developer's Management System
  - ✓ I2NSF Framework in OpenStack NFV Environment
  - ✓ I2NSF Capability YANG Data Model
  - ✓ Registration Interface via NETCONF/YANG
  - ✓ Consumer-Facing Interface via RESTCONF/YANG
  - ✓ NSF-Facing Interface via NETCONF/YANG
  - ✓ Monitoring Interface via NETCONF/YANG
  - ✓ Web-based NSF Monitoring
  - ✓ Application Interface as Feedback from I2NSF Analyzer
- Network Security Functions
  - ✓ Firewall and Web-filter using Suricata
- Advanced Functions
  - ✓ Security Policy Translation with Automatic Data Model Mapper
  - ✓ Security Policy Provisioning
  - ✓ Distributed Database for NSF Monitoring Data

Hackathon Plan (1/2)

- The Implementation of the Internet Drafts for the I2NSF System for Cloud-based Security Services:
  - draft-ietf-i2nsf-capability-data-model-20
  - draft-ietf-i2nsf-consumer-facing-interface-dm-15
  - draft-ietf-i2nsf-nsf-facing-interface-dm-15
  - draft-ietf-i2nsf-registration-interface-dm-13
  - draft-ietf-i2nsf-nsf-monitoring-data-model-11
  - draft-yang-i2nsf-security-policy-translation-09
  - draft-jeong-i2nsf-security-management-automation-02

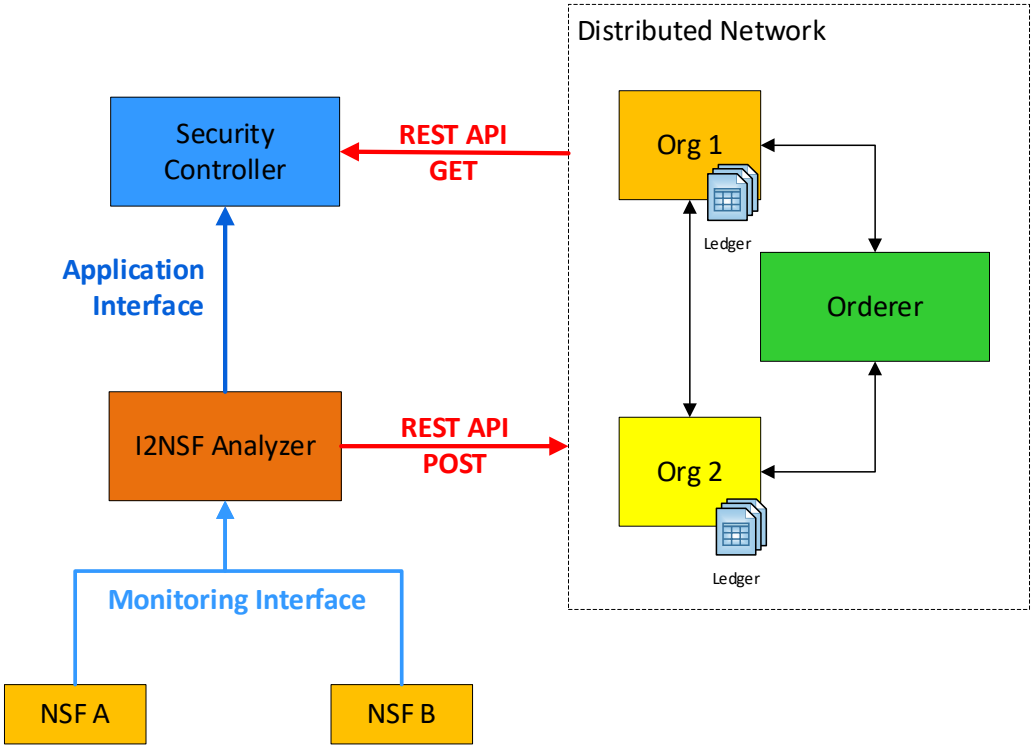
- Implementation of Distributed Network Auditing System for I2NSF Framework.
  - HyperLedger Fabric is used for Distributed Network Auditing System.

Hackathon Plan (2/2)

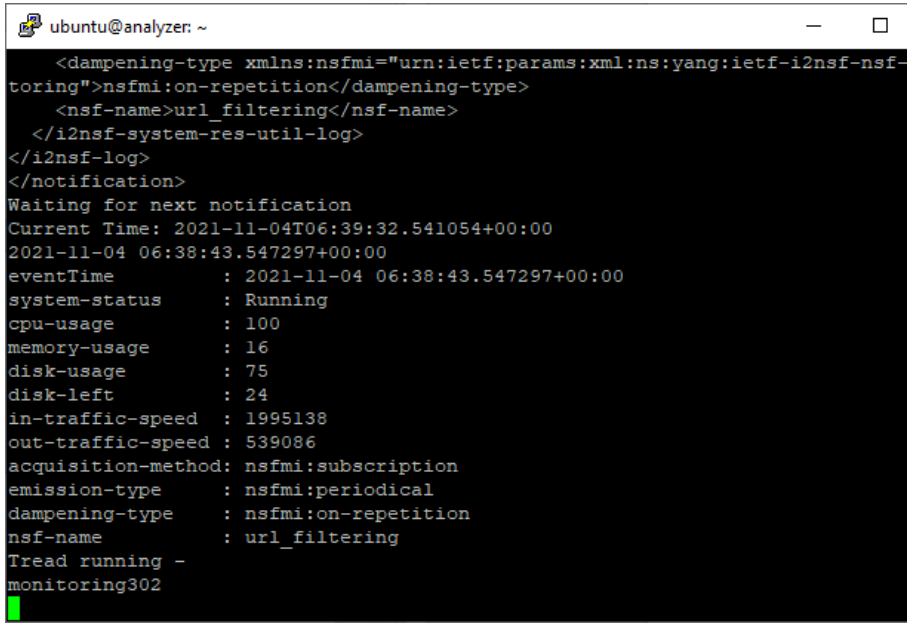


What got done (1/3)

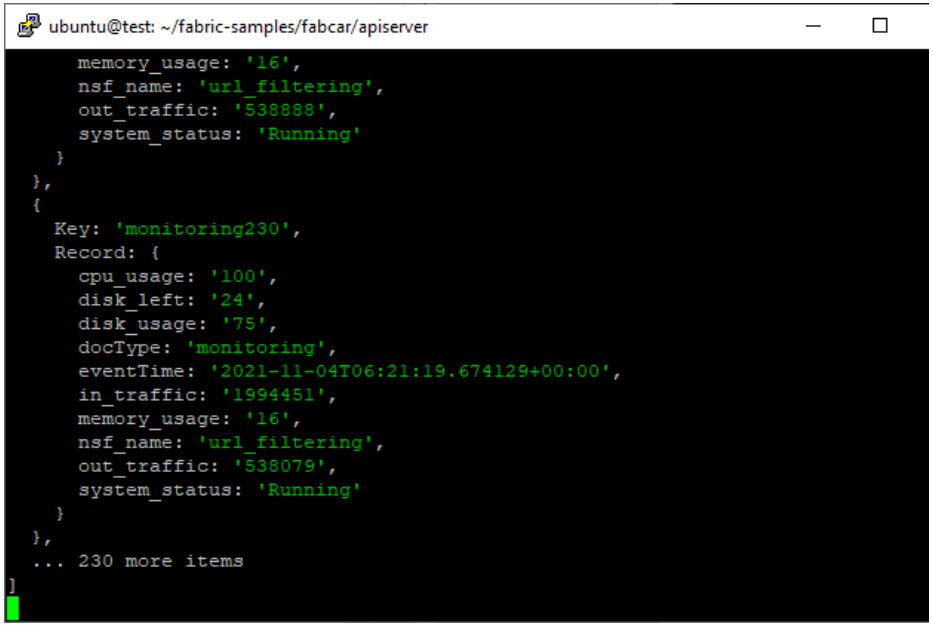
- Implementation of Distributed Database in I2NSF Framework



What got done (2/3)

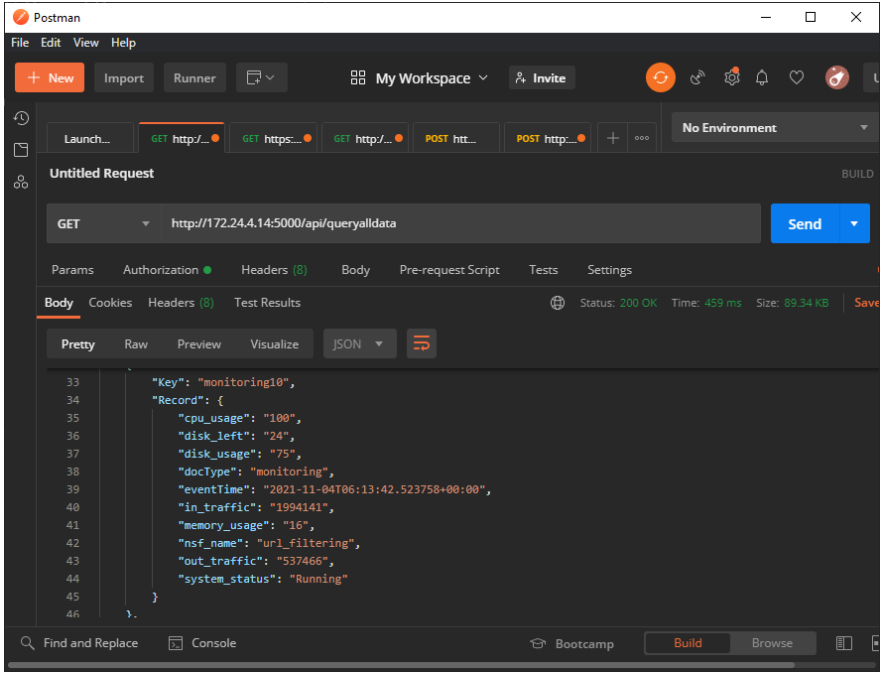


Push of NSF Monitoring Data to Distributed Database using REST API

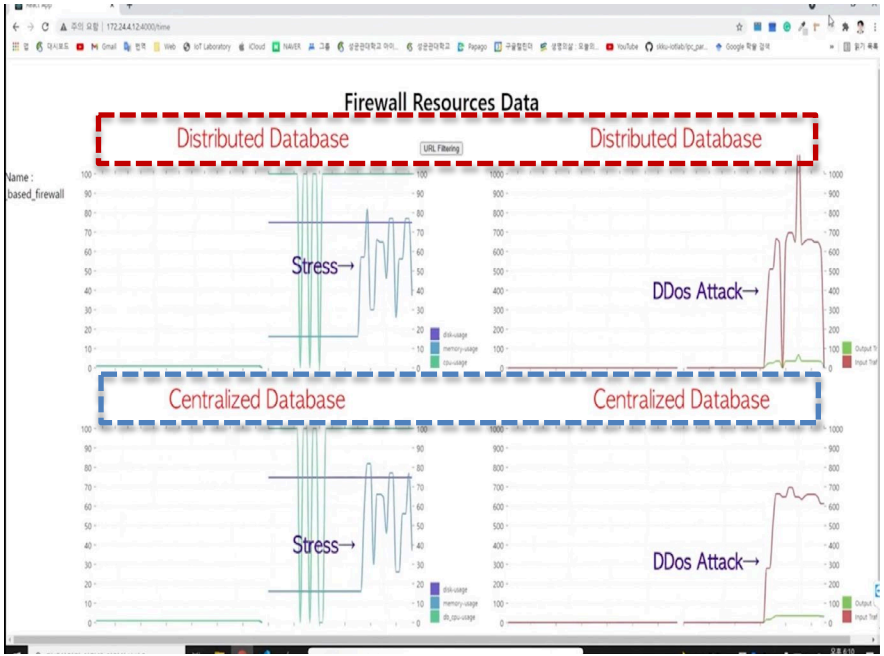


Distributed Database receives NSF Monitoring Data

What got done (3/3)



Pull of NSF Monitoring Data to Distributed Database using REST API



Real-time Visualization of Monitoring Data using Distributed Database

What we learn

- The usage of Distributed Database can tackle the possibility of data tampering in the I2NSF Framework.
- The distributed database system also denies the failure of a single point that is a major problem of a centralized database.
- Overall, the distributed database system can improve the security and reliability of the I2NSF Framework.

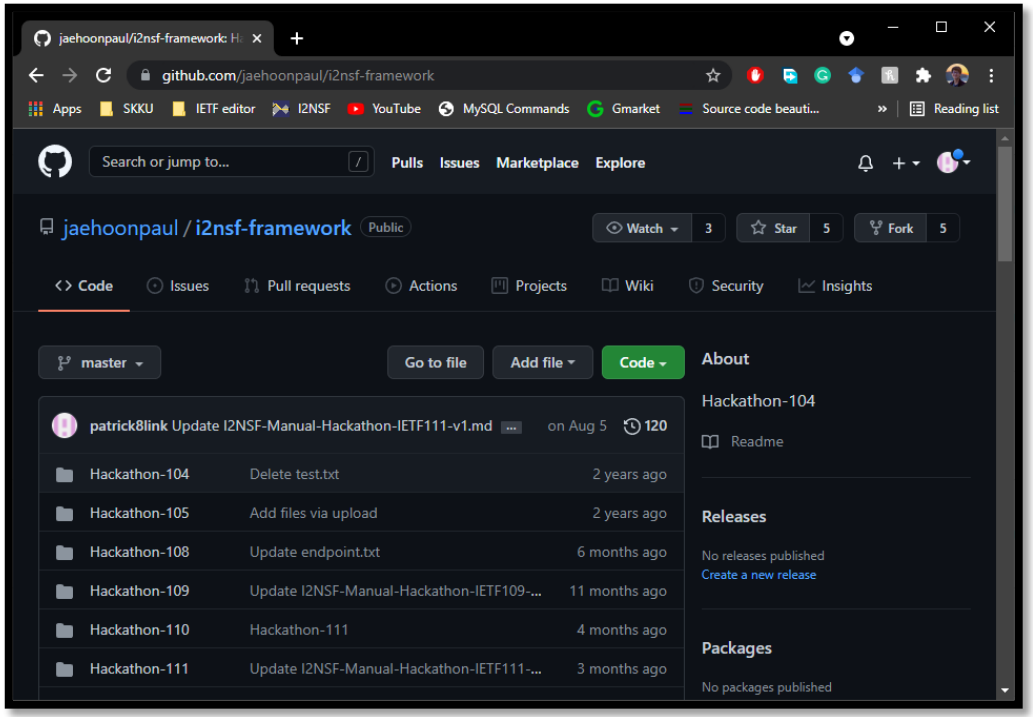
Next Step

- Current implementation only stores NSF monitoring data into the distributed database system.

- As future work, the whole I2NSF data and information (e.g., NSF monitoring data, security policy, and NSF capabilities) will be stored into the distributed database system.

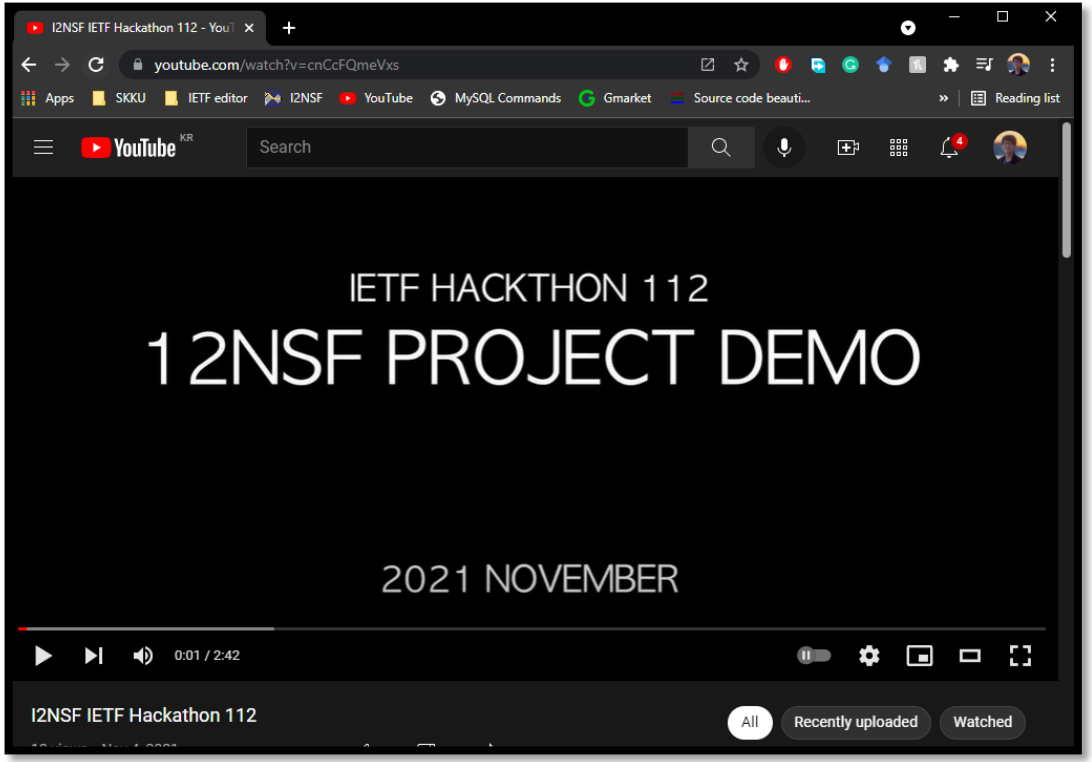
Open-Source Project at GitHub

URL: https://github.com/jaehoonpaul/i2nsf-framework



Demonstration Video Clip at YouTube

URL: https://www.youtube.com/watch?v=cnCcFQmeVxs



Wrap Up

Hackathon Team

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Professor:

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Hackathon Team Photo

IETF-112 Hackathon Korea Teams

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Appendix (1/2)

- The distributed database network is implemented using Hyperledger Fabric version 2.2.
- The setup of Hyperledger can be done by following the steps in https://hyperledger-fabric.readthedocs.io/en/release-2.2/test_network.html
- To configure the data model for the Monitoring Interface YANG Data Model, edit the chaincode with the Monitoring Interface YANG Data Model. See in our GitHub chaincode files.
- In our case, JavaScript is used to edit Hyperledger functions (e.g., initLedger, query, create, and queryAll) for the Monitoring Interface YANG Data Model.

Appendix (2/2)

- To save the monitoring data, we implemented REST API. Run apiserver.js to execute a REST server.

- The URLs for I2NSF User to GET (pull) data using REST API are:
  - http://ip-address:5000/api/queryalldata
  - http://ip-address:5000/api/querylastdata

- The URLs for the I2NSF Analyzer to POST (push) data using REST API are:
  - http://ip-address:5000/api/adddata

  ❖ Note: ip-address means the specific IP address of the distributed database.