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Assignment no: 03

Name of the assignment: Controller Rest API

Objectives:

- ✓ Understand the working principles of Controller Rest API.
- ✓ Understand the difference between proactive and reactive installation flows.

Theory of Controller Rest API:

What is API ?

Ans:

Application program interface (API) is an interface presented by software (such as a network operating system) that provides the capability to collect information from or make a change to an underlying set of resources.

APIs in the context of SDN:

APIs in the context of SDN: In an open SDN model, a common interface discussed is the northbound interface (NBI). The NBI is the interface between software applications, such as operational support systems, and a centralized SDN controller. One of the common API technologies used at the northbound interface is the Representational State Transfer (REST) API. REST APIs use the HTTP/HTTPS protocol to execute common operations on resources represented by Uniform Resource Identifier (URI) strings. An application may use REST APIs to send an HTTP/HTTPS GET message via an SDN controller's IP address. That message would contain a URI string referencing the relevant network device and comprising an HTTP payload with a JSON header that has the proper parameters for a particular interface and statistic.

Datapath Identifier of Openflow Switch:

Datapath Identifier of Openflow Switch: Each OpenFlow instance on a switch is identified by a Datapath Identifier. This is a 64 bit number determined as follows according to the OpenFlow specification: "The datapath_id field uniquely identifies a datapath. The lower 48 bits are intended for the switch MAC address, while the top 16 bits are up to the implementer. An example use of the top 16 bits would be a VLAN ID to distinguish multiple virtual switch instances on a single physical switch."

Using REST APIs:

REST API can be used in different ways:

1. A tool to generate REST API calls:

The Chrome browser, for example, has multiple plug-ins to generate REST API messages.

These include Postman and the Advanced REST Client. Firefox has the RESTClient add-on for the same functionality.

2. Command-line interface, the curl utility may also be used

ryu.app.ofctl_rest provides REST APIs for retrieving the switch stats and updating the switch stats. This application helps to debug application and get various statistics. Valid actions are:

1. Retrieve the switch stats

- Get all switches
- Get the desc stats
- Get all flows stats
- Get flows stats filtered by fields
- Get aggregate flow stats
- Get aggregate flow stats filtered by fields
- Get table stats
- Get table features
- Get ports stats
- Get ports description
- Get queues stats
- Get queues config
- Get queues description
- Get groups stats
- Get group description stats
- Get group features stats
- Get meters stats
- Get meter config stats
- Get meter description stats
- Get meter features stats

2. Update the switch stats

- ◆ Add a flow entry
- ◆ Modify all matching flow entries
- ◆ Modify flow entry strictly
- ◆ Delete all matching flow entries
- ◆ Delete flow entry strictly
- ◆ Delete all flow entries
- ◆ Add a group entry
- ◆ Modify a group entry
- ◆ Delete a group entry
- ◆ Modify the behavior of the port
- ◆ Add a meter entry
- ◆ Modify a meter entry
- ◆ Delete a meter entry
- ◆ Modify role

3. Support for experimenter multipart

- Send a experimenter message

4. Reference: Description of Match and Actions

- Description of Match on request messages
- Description of Actions on request messages

Question 5.1: Explain the advantages of REST API of the Controller.

Ans:

- Flexible
- Easy to use
- Faster

Question 5.3: Provide two real service examples for explaining the usage of reactive flow instantiation.

Ans:

Any service that require authentication or security check is valid

Question 5.4: Provide two real service examples for explaining the usage of proactive flow instantiation.

Ans:

- a) Any service that does not authentication or security check is valid
- b) Any service with short delay requirement is valid

Question 5.5: what is the difference between sdn and openflow?

Ans:

OpenFlow is just a protocol of SDN.

Exercise 4.1.1: Connect Zodiac FX to the lab PC using the same configuration and topology of lab 5 as show in the figure.



Ping zodiac using the command line ping 10.0.1.Zodiac_IPV4. If the ping is not working, it means that the setup is wrong. Fix the configuration until get the ping.

Ans:

We don't have any zodiac FX for this reason we can't complete the exercises.

Since we don't have any zodiac FX which will connect with the computer through a USB cable for this reasons we couldn't complete other exercises of the question.

Conclusion:

When i try to complete the assignment i found several problems. Such as I need a zodiac FX but I don't have any zodiac FX to connect with pc and can't configure ryu graphical interface. According the exercise given in this assignment we need a Zodiac Fx(which will connect with a computer through a USB cable) to complete the assignment . But we don't have any zodiac Fx. The following error occur when I try to configure the putty software because zodiac FX are not connected to the computer.