**Advanced Cyberinfrastructure**

**Research & Education Facilitators**

**Virtual Residency 2015**

**Lab 2: Exploring OpenDaylight**

# Purpose:

The purpose of this lab is to introduce the OpenDaylight (<http://www.opendaylight.org)> project. The user will become familiar with the OpenDaylight software defined networking controller.

**Goals:**

After completing this lab, users will be familiar with:

* Exploring APIs
  + Viewing information via API

# Prerequisite Knowledge:

The user should have a basic knowledge of:

* Operating System (OS) Graphical User Interface (GUI) navigation.
* Comfort with typing text into a command or shell window.
* Basic grasp of computer networking terms such as “host”, “switch”, and “IP Address”.

# Lab Requirements:

* A laptop, mobile device, or access to a remote device that meets the basic hardware requirements for running Oracle’s Virtual Box.
* A functioning installation of the latest version of Oracle’s Virtual Box, available via: <https://www.virtualbox.org/wiki/Downloads>. Depending on your host device, you should also load the VirtualBox Extension Pack, located at the same URL.
* A copy of the “All-in-one SDN App Development Starter VM” 64bit virtual machine image, provided on a USB device, and also available within the download section here: <http://sdnhub.org/tutorials/sdn-tutorial-vm/>
* A functioning Internet connection.

**Assumptions**

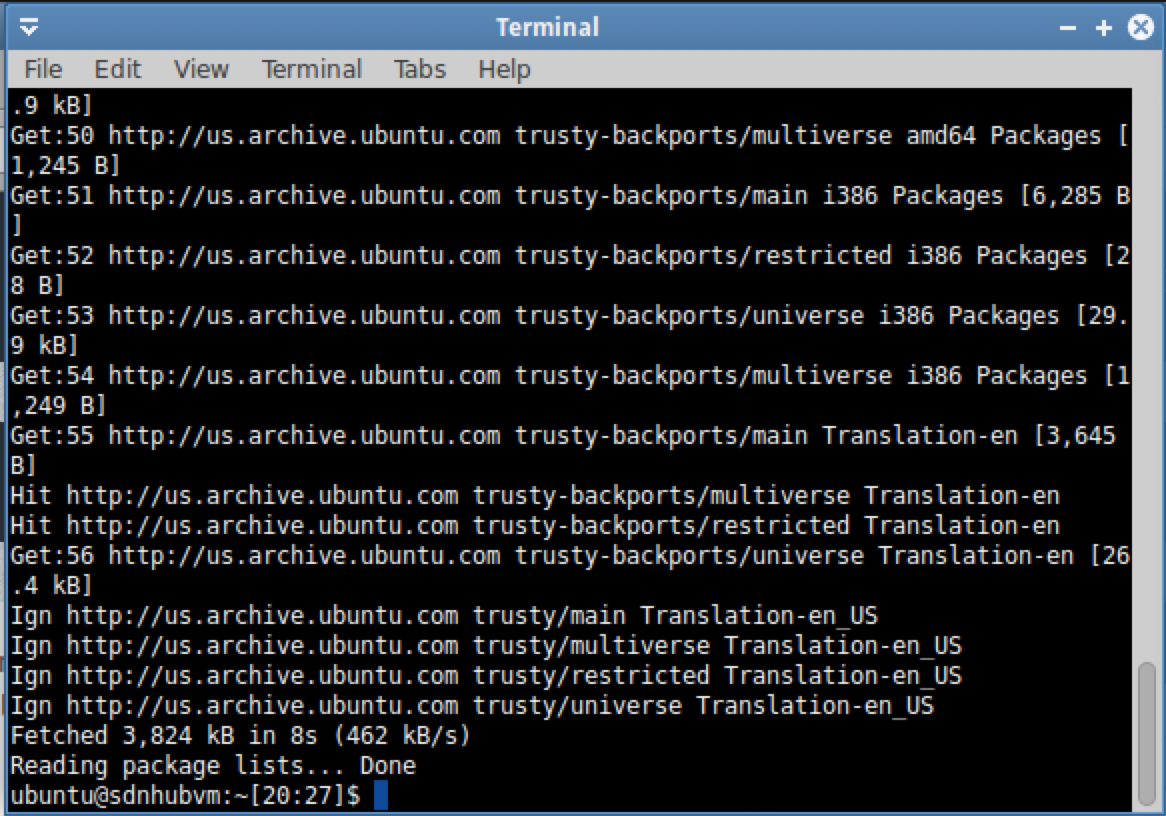
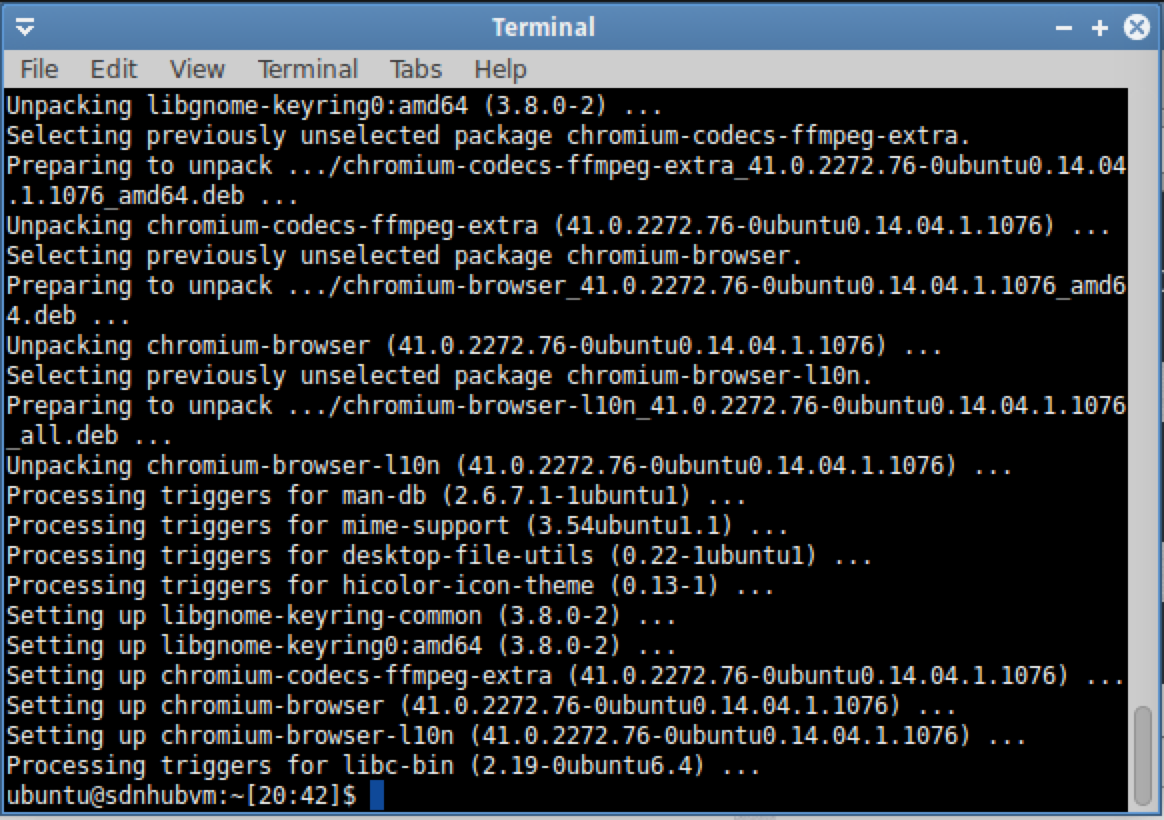
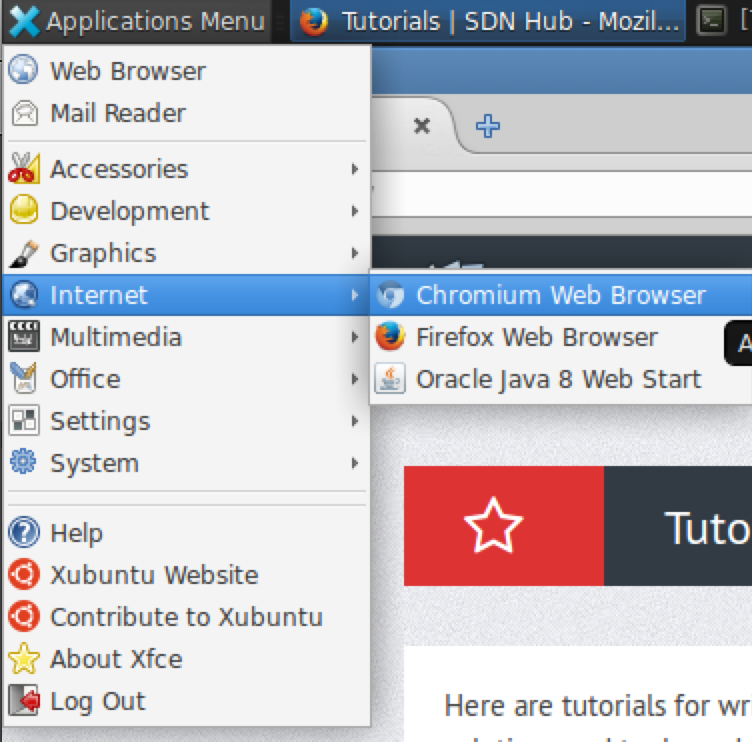
* Lab 1 has been completed

**Lab 2**

**Lab Setup**

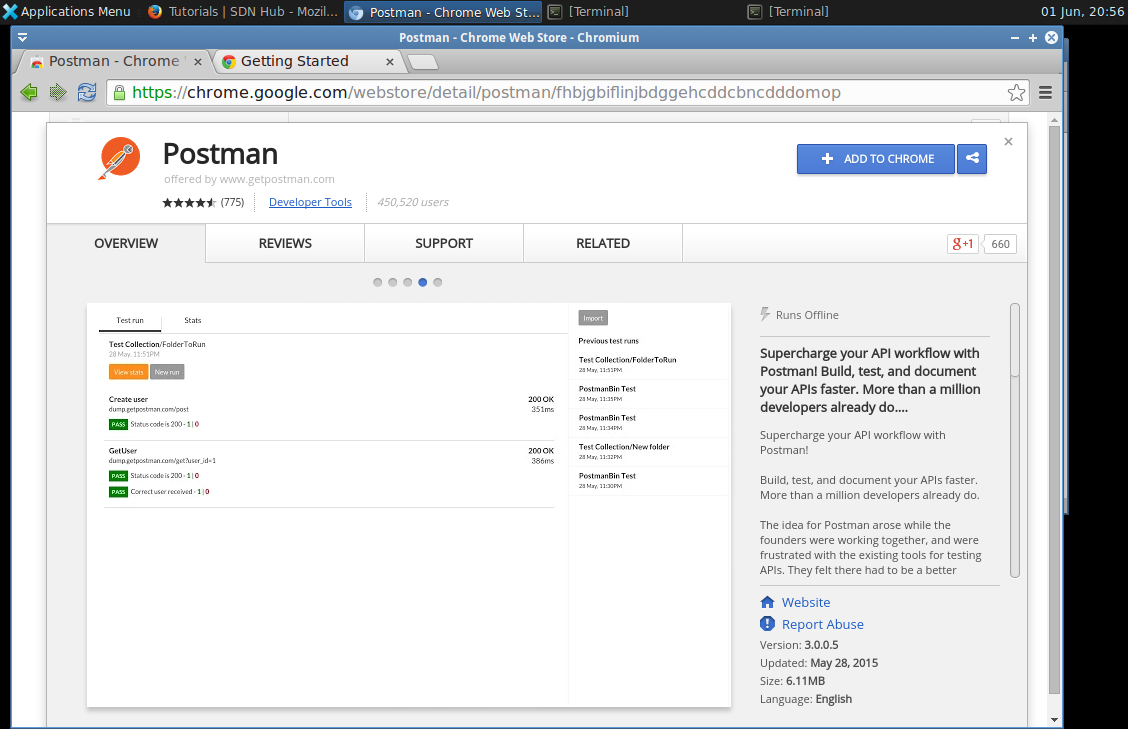
In this section we will install some additional tools we will use in the virtual machine

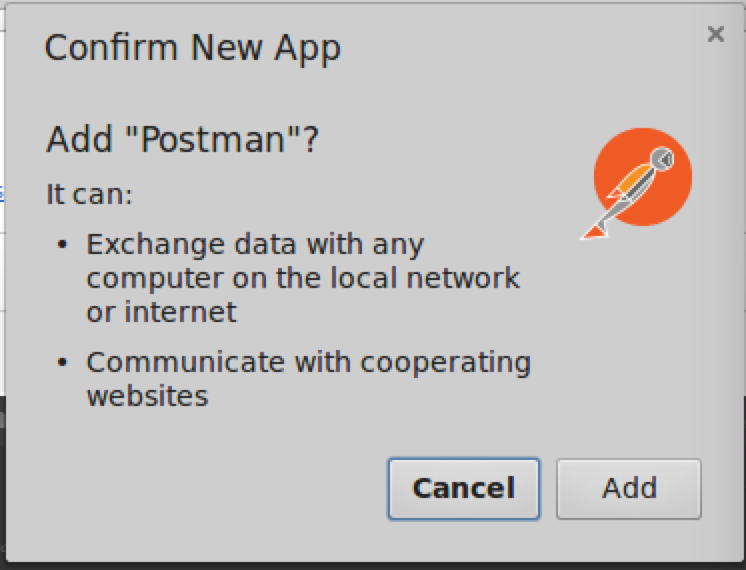
Installng Postman, an API tool (https://www.getpostman.com/)

1. Install Chromium (https://www.chromium.org/)  
   1. Open a terminal session. The Terminal Emulator application icon can be found on the virtual machine desktop.  
        
      
   2. Within the terminal window, type the following command:  
        
      sudo apt-get update  
        
      
   3. Within the SAME terminal window, type the following command:  
        
      sudo apt-get install -y chromium-browser  
        
      
   4. Start Chromium  
        
        
      
   5. Go to the Postman page in the Chrome Web Store  
      (shortened)  
      <http://bit.ly/1K5ZGHG>

(actual)

<https://chrome.google.com/webstore/detail/postman/fhbjgbiflinjbdggehcddcbncdddomop>



* 1. Select “Add to Chrome” on the upper right  
       
     
  2. Select “Add” to confirm installation
  3. Installation should be complete

Lab 2.1 Exploring the APIs

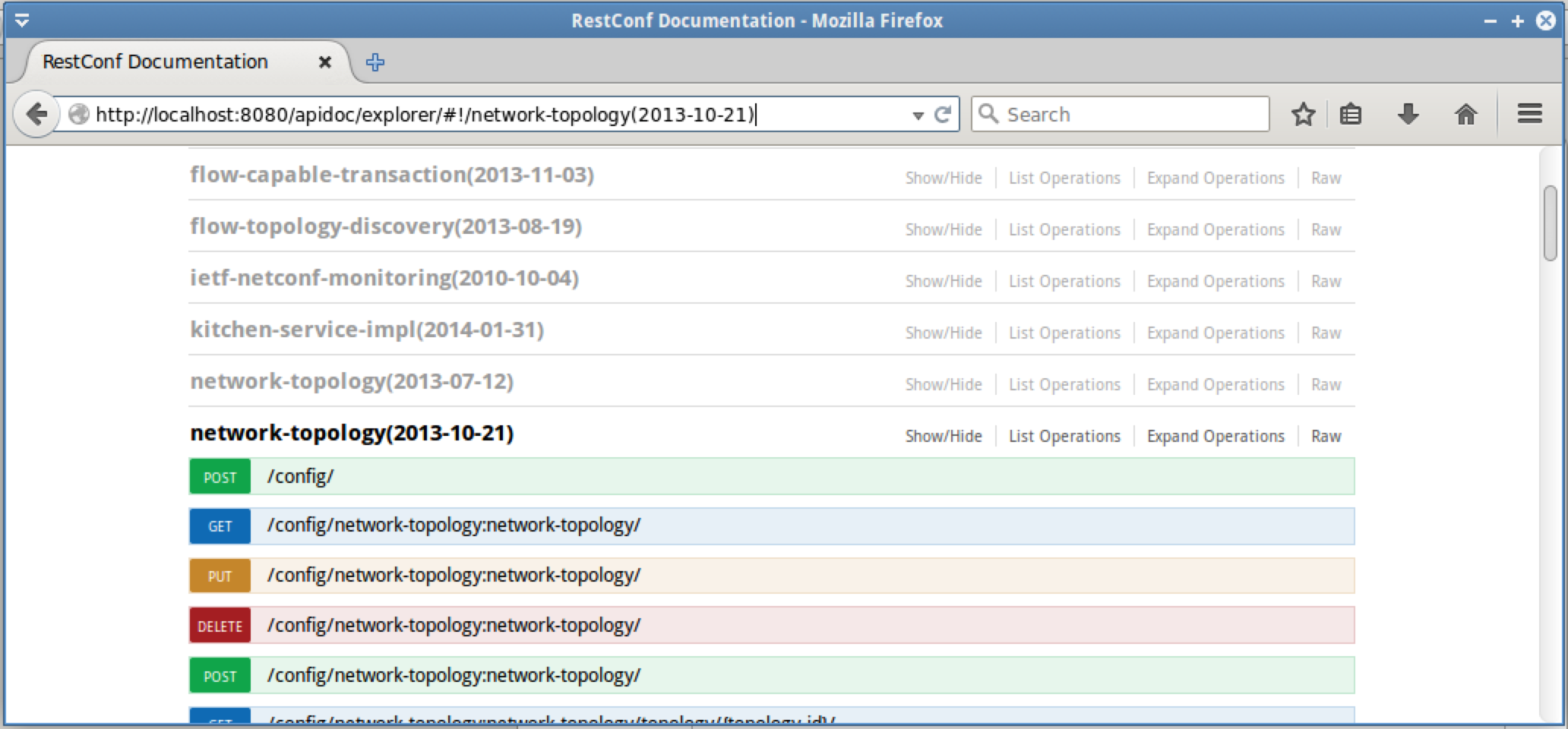
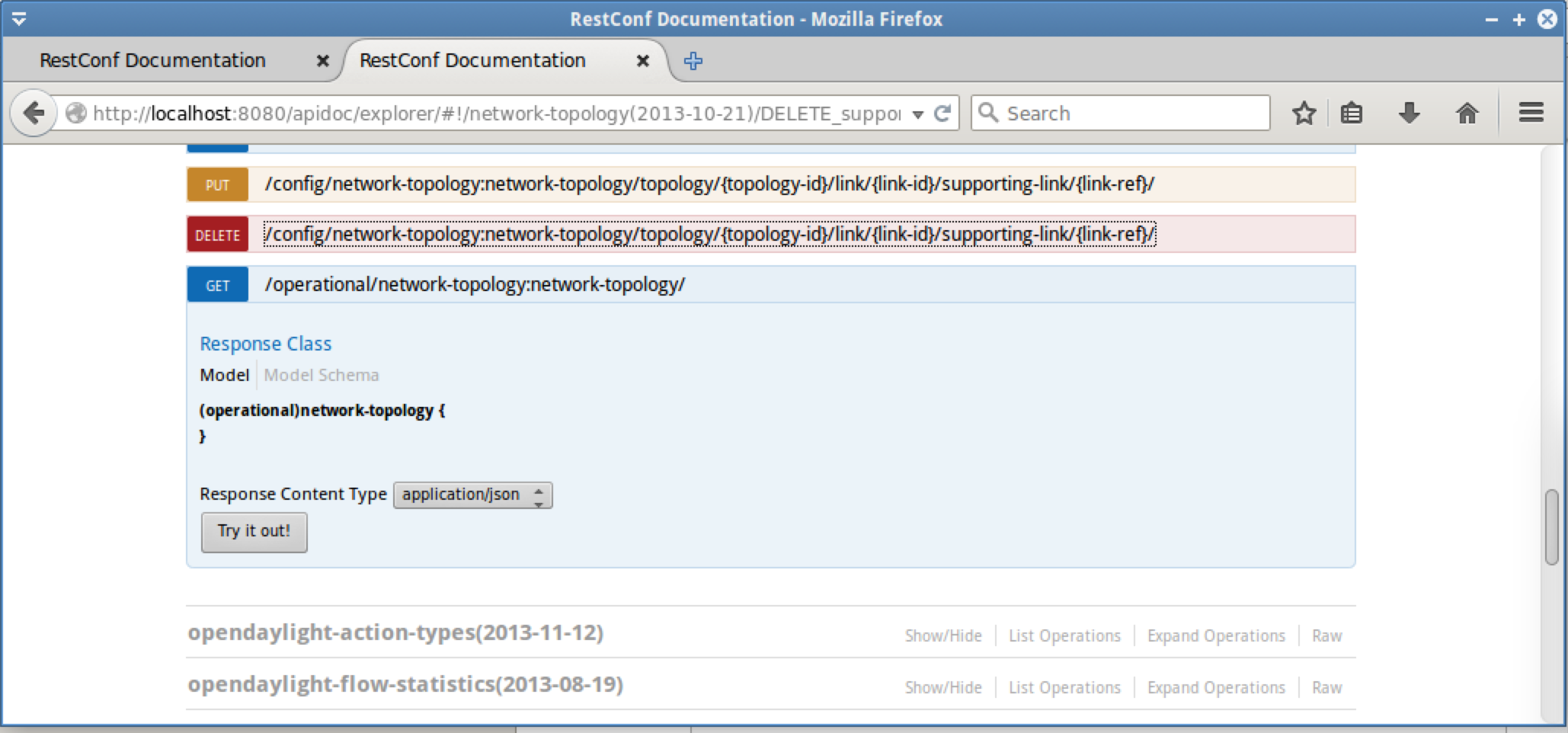
1. Start OpenDaylight in a terminal  
   1. Start the “Terminal Emulator
      1. Select "Applications Menu" --> "Accessories" --> "Terminal Emulator" or the “Terminal Emulator” desktop icon
   2. Enter these commands

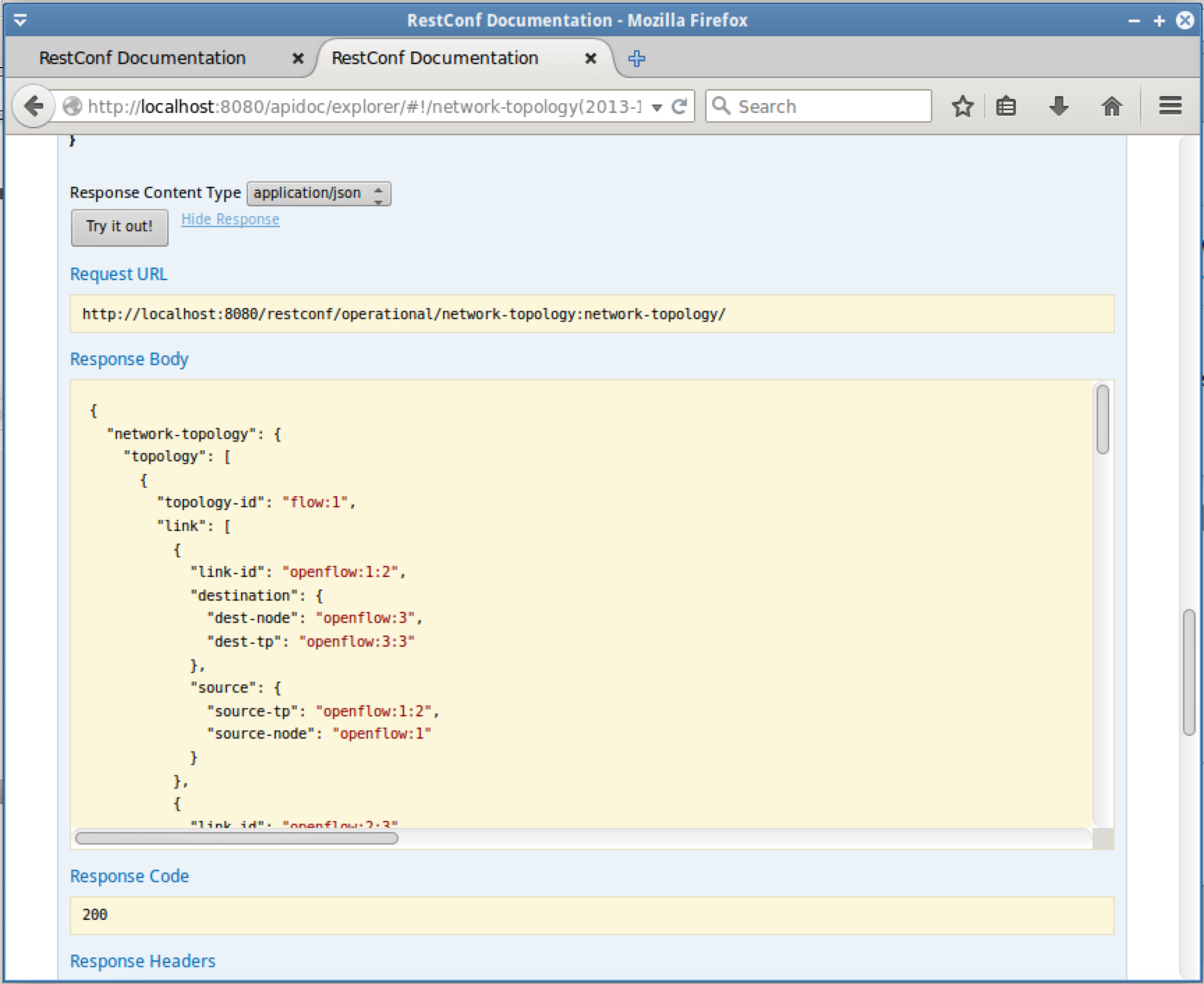
cd ~/SDNHub\_Opendaylight\_Tutorial/distribution/opendaylight-osgi-mdsal/target/distribution-osgi-mdsal-1.1.0-SNAPSHOT-osgipackage/opendaylight

./run.sh

1. Start Mininet in a terminal  
   1. Start the “Terminal Emulator
      1. Select "Applications Menu" --> "Accessories" --> "Terminal Emulator" or the “Terminal Emulator” desktop icon
   2. Enter this command

sudo mn --topo tree,depth=2,fanout=2 --mac --switch=ovsk --controller=remote  
  
Mininet will start with three switches and four hosts

1. View the topology in the OpenDaylight web user interface  
   1. Open Firefox and go to <http://127.0.0.1:8080>  
      1. Username and password are ‘admin’
2. View the OpenDaylight RestConf API Documentation  
   1. In a new Firefox windows or tab, go to <http://localhost:8080/apidoc/explorer/>
   2. Select the “network-topology(2013-1021)” link  
        
      
   3. Scroll down and select the “GET /operational/network-topology:network-topology/ “ link  
        
      
   4. Select the “Try it out!” button and view the results



Notice the “Request URL”

<http://localhost:8080/restconf/operational/network-topology:network-topology/>

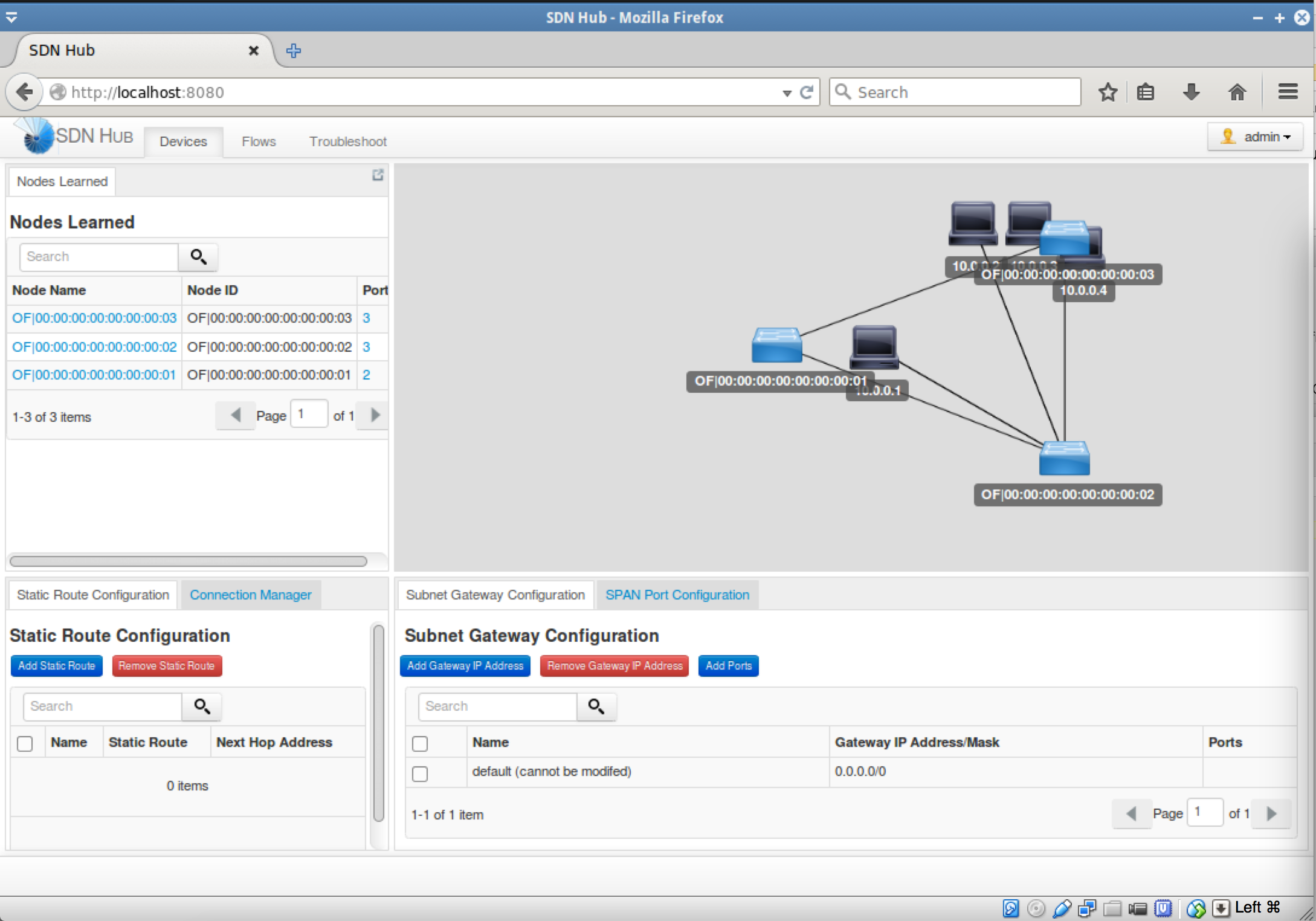
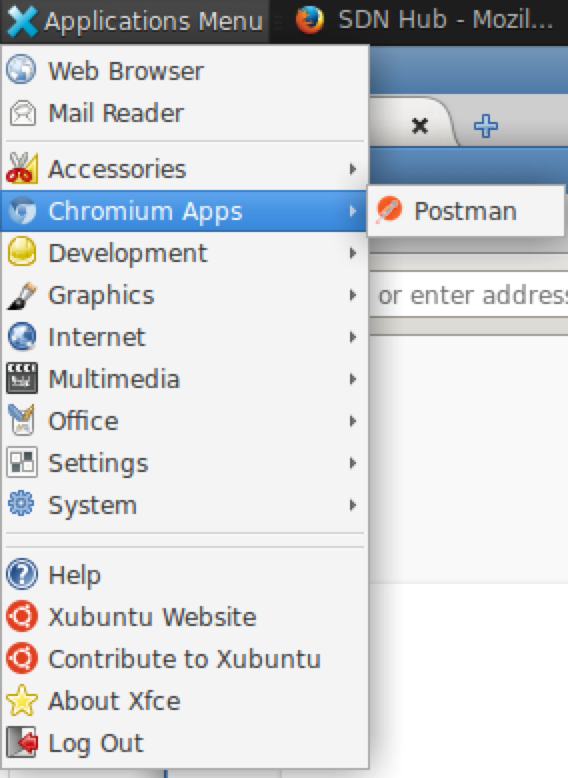
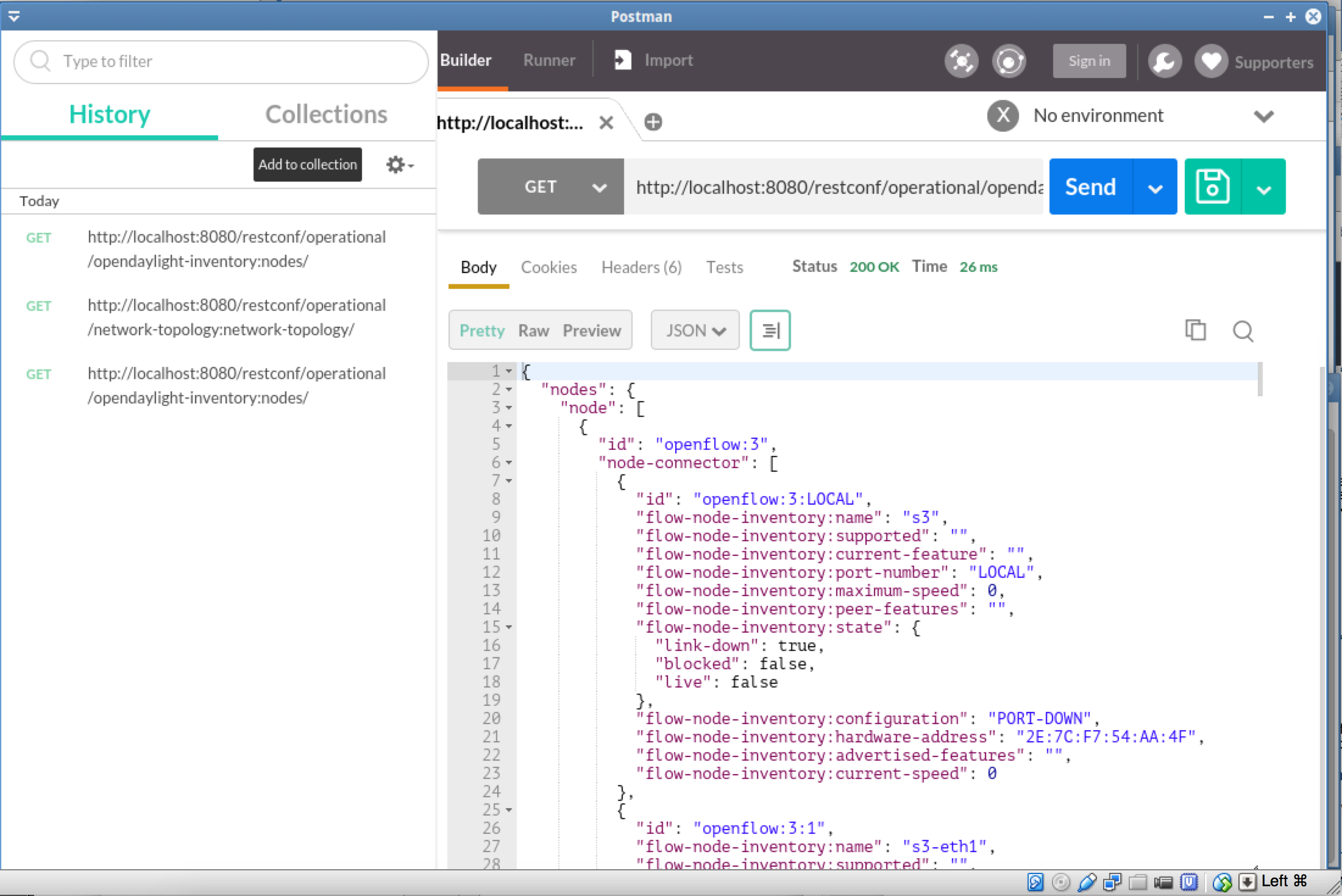
This is the REST API request  
  
Notice the “Response Body”

This is the response from the Open Daylight Controller

* 1. Generate some traffic in Mininet

* + 1. Switch to the Terminal running Mininet
    2. At the “mininet>” prompt, enter this command  
         
       pingall

This will cause all four hosts to ping each other

* 1. Switch to the Firefox browser running the OpenDaylight web user interface and reload the page  
       
     Notice that the hosts have been discovered now  
       
     
  2. Start “Postman”  
     1. Select "Applications Menu" --> "Chromium Apps" --> "Postman"   
          
          
        At startup select “Go to the app”
  3. Lets try a different API, View “GET /operational/opendaylight-inventory:nodes/“ in Postman  
     1. In the “Enter request URL here” field enter http://localhost:8080/restconf/operational/opendaylight-inventory:nodes/  
        You now see information regarding the devices on the network, including the controller  
          
        

**Congratulations!**You have used a REST API to interact with an Open Daylight Controller