SDN controller clustering

Computer Networks module - SDN assignment

Michele Zanotti

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Learning objectives

After finishing this lab activity you will be able to:

- Understand why clusters of controller are needed in SDN networks
- Understand which are the most common methods to build a cluster of controllers
- Implement a cluster of controllers using mininet
- Test the performance of a SDN network which uses a cluster of controllers

Overview

The most popular methods for creating a cluster of controllers are:

- by using the ovs-vsctl tool
- by python script

Cluster of controlers can be:

- physically centralized
- physically distributed

1 Task 1: build a cluster of local controllers

In this task we will create a simple network topology with multiple local controllers that make up a cluster (which act as a single entity?).

The topology is the simple linear topology shown in figure *** and it will be created with a python script using the middle-level API provided by mininet. The following script will be used as a template for writing the complete script:

```
#!/usr/bin/python
from mininet.net import Mininet
from mininet.node import Controller, OVSSwitch
from mininet.cli import CLI
from mininet.log import setLogLevel, info

def multiControllerNet():
    net = Mininet( controller=Controller, switch=OVSSwitch )

    "" Create hosts ""



    "" Create switches ""



    "" Create controllers ""



    info( "*** Running CLI\n" )
    CLI( net )

    info( "*** Stopping network\n" )
    net.stop()

if __name__ == '__main__':
    setLogLevel( 'info' )  # for CLI output
    multiControllerNet()
```

Step 1: create a new python script

Create a new python script called *controllers-1.py* and paste into it the template script shown above. The script simply create a new minine network and starts the mininet CLI: we will use it as a start point and in the next steps and we will add code for creating hosts, switches, links and controllers.

Step 2: add host to the network

In the host section of the script add the following lines:

```
h1 = net.addHost('h3')
h1 = net.addHost('h4')
h1 = net.addHost('h5')
h1 = net.addHost('h6')
```

The first line prints to the console that hosts are being created while the others lines add four new hosts to the network.

Step 3: add switches to the network

Now we need to add the two switches to the network, therefore we have to add the following code to the respective section of the template script:

```
info( "*** Creating switches\n" )
s1 = net.addSwitch( 's1' )
s2 = net.addSwitch( 's2' )
```

As in the step 2, the first line print to the console a message to inform the user that the switches are being created, while the next two lines add two new switches to the network.

Step 4: create links between nodes

We have to add the links between hosts and switches and the link between the two switches. For doing that we can add the following lines:

```
net.addLink( h3, s1 )
net.addLink( h4, s1 )
net.addLink( h5, s2 )
net.addLink( h6, s2 )
net.addLink( s1, s2)
```

Step 5: create controllers