User Manual
NEMASOF
IDE for Network Service Chaining

INSTALLATION

INSTALLATION OF NETWORK SIDE

The first step is to import "Tesis VM 64-bit with Docker.ova" file in a virtual machines manager (VirtualBox, VMWare, etc.). This virtual machine contains all needed things to config a listening server, it may launch a topology with Mininet and a SDN controller like RYU.

INSTALLATION OF IDE SIDE

It is necessary an environment capable of running Django applications, so it is necessary Python 3, Django 1.10 and MySQL. The installation steps are here: https://docs.djangoproject.com/en/1.10/intro/install/

The source code is here: github.com/cngunicauca/NEMASOF

GETTING STARTED WITH NEMASOF

Note: This manual was created using online versión avaliable in: nemasof.pythonanywhere.com and a basic running test avaliable in this video: youtube.com/watch?v=zo5v5FcT19c

The first step is to launch the server located at the virtual machine (network side). In this point, we start the imported virtual machine and write the next command in the console:

```
$ cd Desktop/
$ sudo python tree_1.py
```

To confirm the server is listening, we must see the next message at the console:

`Starting server on port 8081....`

Then, Access to the URL where the IDE is running. We enter to the application main page and we can see the launch and configuration options. From this page, we are going to chain the Virtualized Network Functions (VNFs).
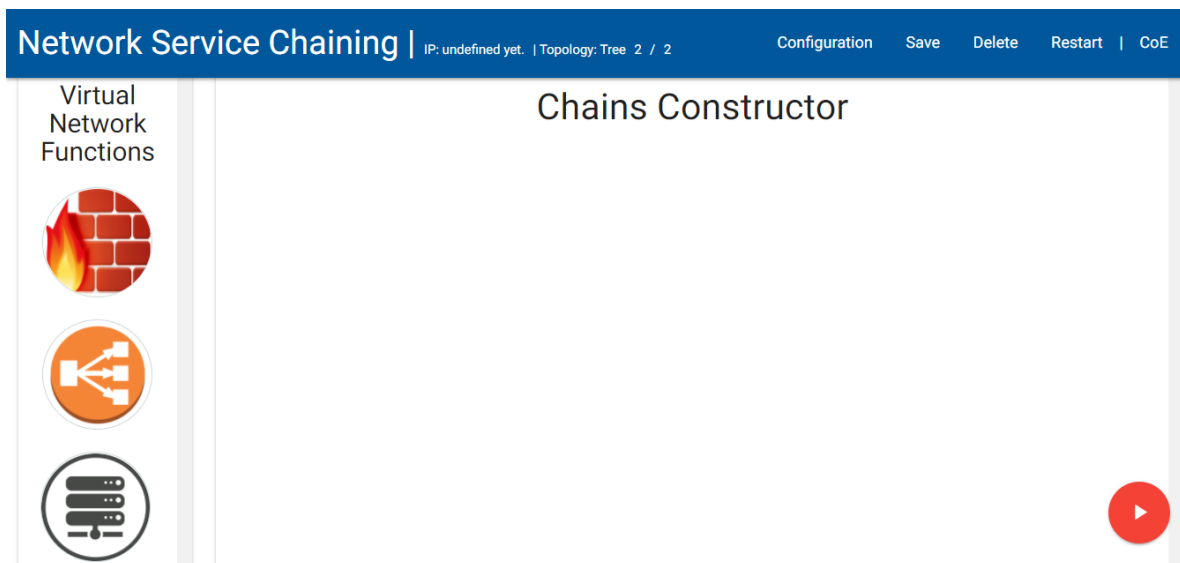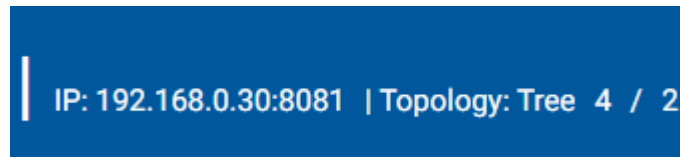

NEMASOF Main Page

On top is the toolbar, this have three sections. The first section is the home button, which will always redirect us to a blank home page.
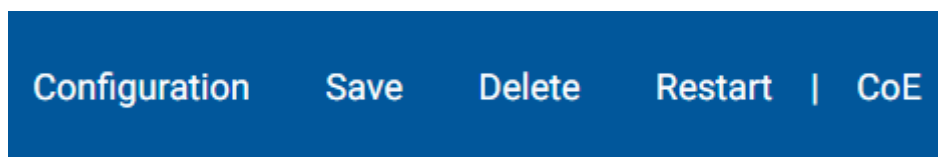

Home button

Next is the information section, here we found the IP where NEMASOF will search the SDN controller and the network topology.
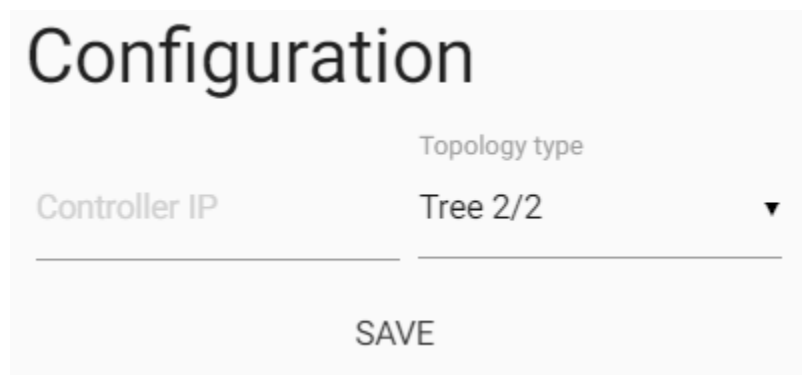

Information section

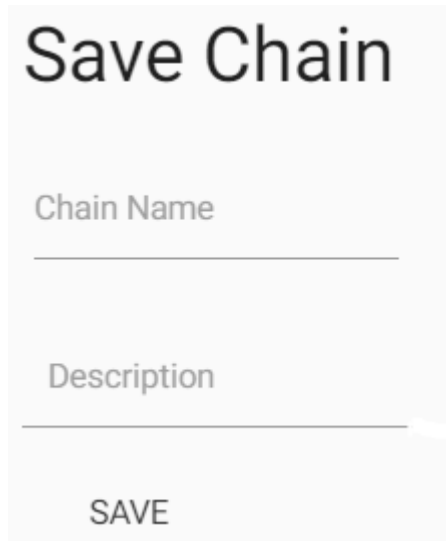The third is the actions section, where we found five buttons as it's shown in the following picture:

Action buttons

"Configuration": It allows to set the data that is displayed in the information section, i.e., SDN controller IP and topology.

Window shown by "Configuration" button

"Save": It allows to save a chain with the VNFs that are in the chains constructor section.
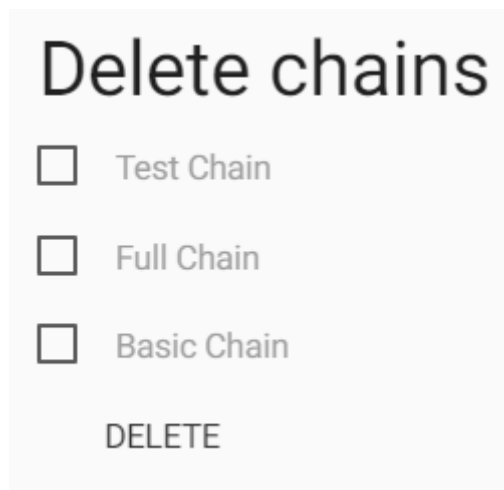
Window shown by "Save" button

"Delete": It allows to delete one or many saved chains.

Window shown by "Delete" button

"Restart": Totally removes the elements that are in the chain construction section.

"CoE": It allows to see the chains that are running, making visible a table with the IP where they are running, the VNFs that make up the running chain and an action button to go to the management screen.

Chains on Execution

IP	Chain	Action
192.160.0.10:8081	firewall, loadBalancer, router	Show

Ventana desplegada por el botón "CoE"

Continuing with the description of the main screen, we have the resources section on the left side of the graphical interface. This section contains the VNFs that are available to be chained. In the image on the right we can see three VNFs, these are: Firewall, Load Balancer and Router, correspondingly. Followed by these, we find the chains previously created, with the title and description assigned at the time of creation.

In the remaining space of the screen is the chain constructor, this space is intended to perform the union of the VNFs that are dragged there from the resources section.

Virtual Network Functions

Basic Chain

A chain with a firewall, a load balancer and a router
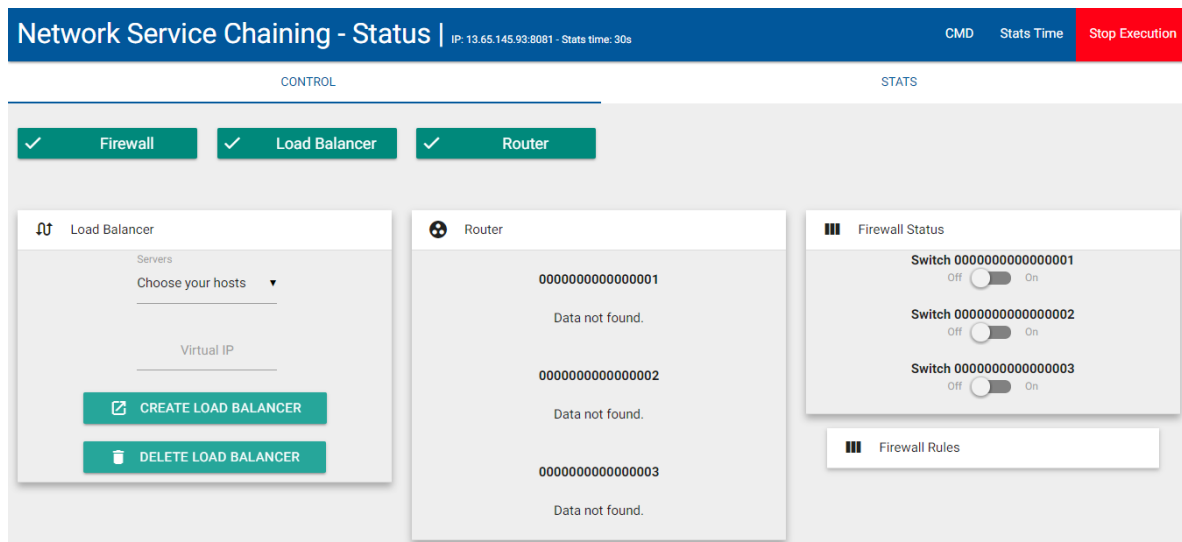
Chains Constructor

Chains Constructor with chaining example of five VNFs

On the bottom right, inside the chains constructor, we found the action button that begins the execution process, sending

a signal to NEMASOF SDN controller and redirecting us to the chain management page that we will describe below.

Chains Manager Page

In the chain management page we can see that the action buttons on the toolbar have changed. Instead of those already explained, we have three action buttons:

"CMD": It allows to send any type of command to any part of the topology, e.g. a host, a switch or even the SDN controller. Bearing in mind that the spaces that the command carries should be replaced by commas ",".
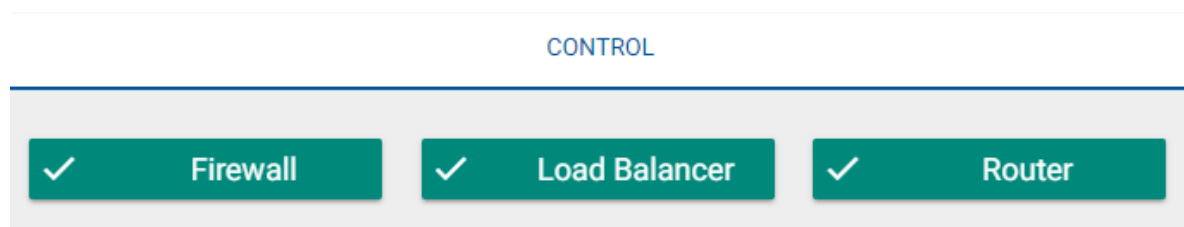
Window shown by "CMD" button

"Stats Time": It allows to choose the time interval with which the statistics will be updated. The possible values are: "10s", "30s", "60s" y "OFF".
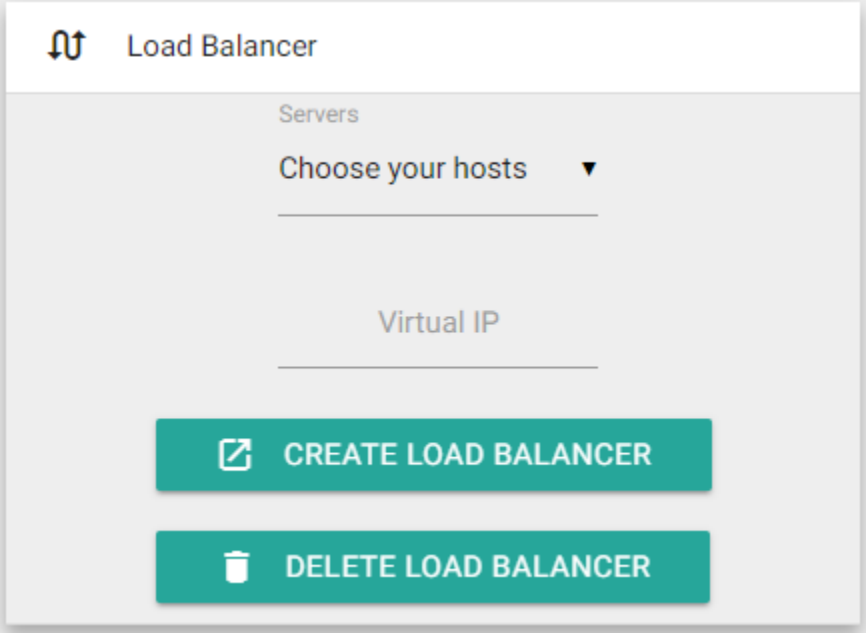
"Stop Execution": Send a signal to the NEMASOF controller that stops all execution, deletes the records and redirects us to the main page.
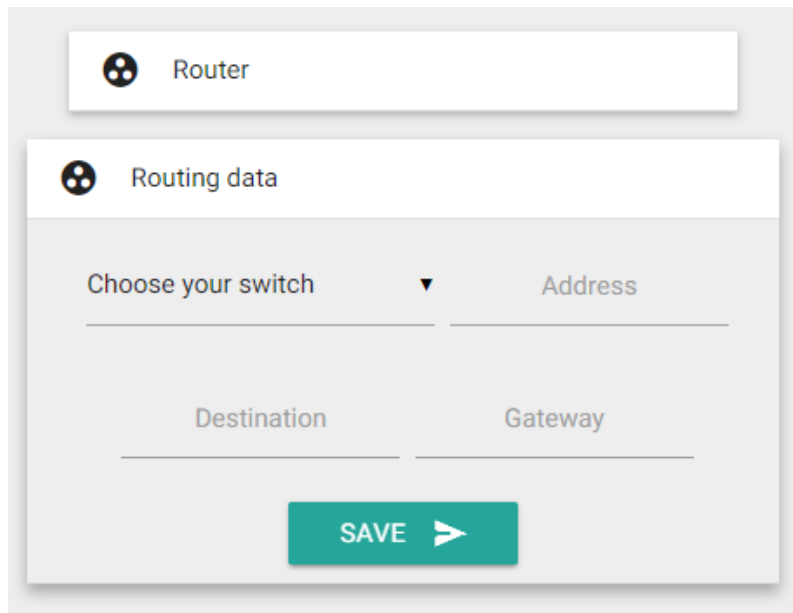

Control tab and status indicator

In the control tab, the first thing we find is the status indicator of the VNFs. This indicator visually shows us the functions that are active and those that are not.

Next we find the configuration panels of each VNF. The first is the load balancer consisting of two inputs: the host to be linked, the virtual IP that the load balancer will take and two action buttons, one to create and another to eliminate.
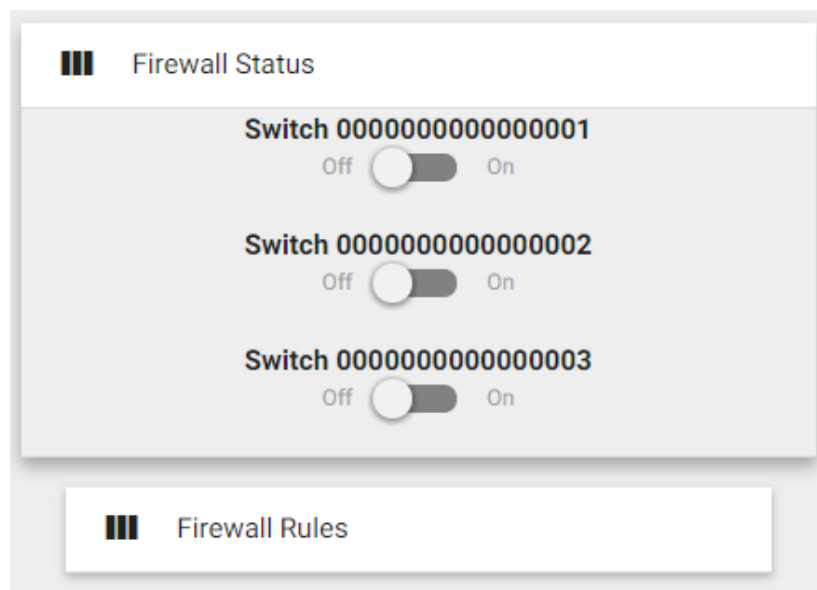

Load Balancer configuration panel

In the case of the router we have two management panels, a configuration panel where we can send the rules we want to configure and another to view or delete the current configurations.

Router management panel

In the Firewall we also have two panels, the first one allows to see and modify the state of the switches (enabled or disabled) and the second allows to see, modify and delete the existing rules in each switch.

Firewall management panel

Finally there is the statistics tab ("Stats"). In this section we will find a table that provides us with information about the packets transmitted and received correctly, the packets lost or with errors in both transmission and reception, the number of bytes transmitted and received, and the time in seconds since activation. The above data is presented for each port of each switch.

	CONTROL					STATS			
Switch	Port	Tx Packets	Rx Packets	Tx dropped Packets	Rx dropped Packets	Tx errors Packets	Rx errors Packets	Tx Bytes	Rx Bytes	Time (s)
1	0	0	0	0	0	0	0	0	0	6683
	1	8	8	0	0	0	0	648	648	6683

Statistics section

Document made by Julian Andres Fuentes Vidal (jufuentes@unicauca.edu.co) and Juan David Salazar Idrobo (juandsalazar@unicauca.edu.co), creators of NEMASOF, in order to guide in the use of this tool and expecting it to be of help for those who wants to use it.