FDP Tutorial

A Teaching and Demonstration Platform for Networking

Example FDP Experiment at: https://flightplan.cis.upenn.edu/sigcse21/

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Create a BMV2 Experiment

This is an example experiment for the BMV2 switch created on Mininet platform in P4 Language.

This experiment demonstrates the effect of Tunneling. Rather than following the original path, the packets follow a new path as a result of tunneling.

You can find the P4 code for the experiment on the following link

https://github.com/eniac/flightplan/blob/master/Wharf/splits3/ALV_bt_1/ALV_bt_1_split1.p4

Topology File

This experiment uses a Topology file as an input. File is given on the following link:

https://github.com/eniac/flightplan/blob/master/Wharf/splits3/ALV_bt/alv_k%3D4.yml

This is a yml file. It contains the following information:

- Each node in the network.
- Linking between two nodes, specified by link.
- MAC address of each node, specified by mac.
- Port number of the node, specified by port.
- IP address of each host, specified by ip.
- Commands given externally to each host, specified by cmd.
- Commands given externally to each switch, specified by cmds.
- JSON program running on each switch, specified by cfg.

You can find FDP specific details on the template given in repo, on the following link:

https://github.com/eniac/fdp/blob/flightPlanDemo/visual/topology.yml

Generating Packet Capture (pcap) Files

We have created a script to run the Tunneled Traffic experiment on a virtual BMV2 switch on the Mininet platform.

This experiment uses a Topology file as an input as described in the previous slide.

The instructions to run this experiment is given on the following link:

https://github.com/eniac/flightplan/tree/master/Wharf/splits3/ALV_bt

After running this experiment, we will have the whole directory having pcap files for each node in the system.

Generating Graph Log Files

Tunneling experiment doesn’t use graphs.

However, here we are giving an example of, how can we create graph log files using the script for the other experiment.

The link for the example code is as follows:

https://github.com/eniac/flightplan/blob/master/Wharf/splits/ALV_Complete/tests.sh#L337

After running this piece of code, you will have the graph log files with txt extension.

Images as Visual Cues

You can create and/or take snap shots of images you like to show in the animation. There is no rule to create these. You can use any image you find appropriate and best describes the events happening in the experiment.

You can use either the graph or the Images as visual cues, but not both.

Configuration File

Configuration File allows the user to customize info tags and event tags, Introduction screen text, graph parameters, Image Parameters, and few others.

Detailed description of each field is given in the template config file on the following link:

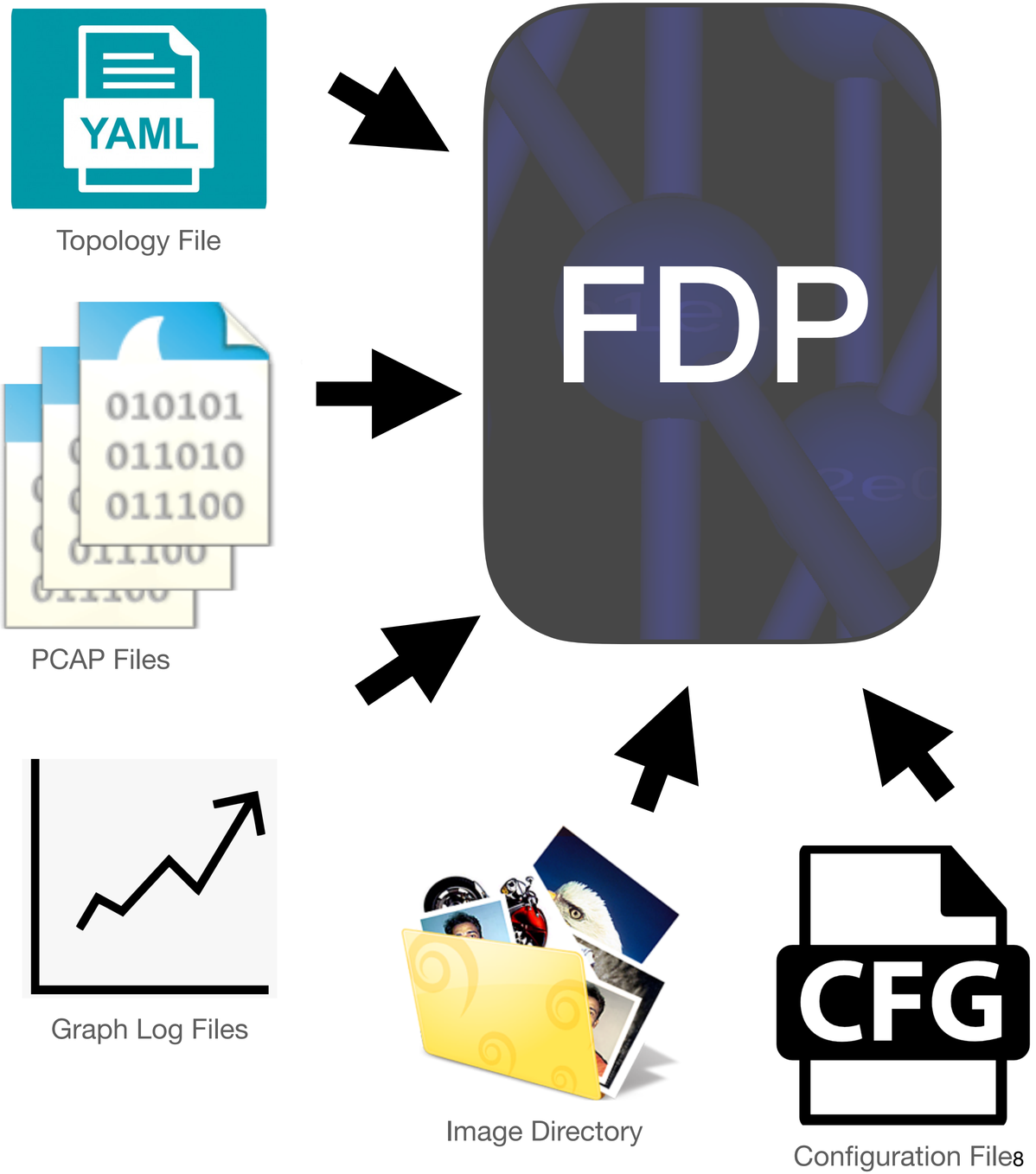
https://github.com/eniac/fdp/blob/flightPlanDemo/visual/config.yml

Generating FDP Experiment

Feed all the files and directories we mentioned before to the FDP.

The instructions are given on the following link:

https://github.com/eniac/fdp/tree/flightPlanDemo/visual/README.md



Adding Time Stamps to Config File

Once the FDP experiment is generated, follow these steps:

- Open the directory FDP_Release/StreamingAssets/<experiment name>/metadata.txt
- Pick the time stamp from the first column of the desired packet.
- Add that time stamp to config file, wherever is needed.

Adding Animation Duration to Config File

Once the FDP experiment is generated, follow these steps:

- Initially place null in front of `animation_time` in config file.
- Run the experiment in browser.
- Time slider will not move, but experiment will progress. You may speedup the animation using speed slider. At the end of the experiment, a pop-up will be shown on the screen with the animation time. Record this time and click <OK> button there.
- Open the config file from FDP_Release/StreamingAssets/<experiment name>/config.yml
- Enter the recorded time from of animation_time field and run the experiment. This time time slider will show the recorded time of animation.

NOTE: Currently this process is manual. However, in future we will make this process automated.

Running FDP In-Browser

- Simply Open the web browser (Chrome / Firefox / Safari / MS Edge).
- Go to the FDP hosted website.
- Choose the experiment from the drop down menu.
- There you have, a rich interactive 3D network.