

Poster: FDP: A teaching and demo platform for P4-based SDN

Heena Nagda[■], Rakesh Nagda[◆], Isaac Pedisich[◆], Nik Sultana[◆], Boon Thau Loo[◆]

[■]Georgia Institute of Technology [◆]University of Pennsylvania

heenan@gatech.edu {rakeshn, iped, nsultana, boonloo}@seas.upenn.edu

Abstract

There are a wealth of good-quality open-source tools for teaching, learning about, and experimenting with P4-based SDN. But this tooling and its mode of distribution is geared towards usage at the level of “nuts and bolts”, requiring effort to setup even for casual or inexperienced users, and does not give “big picture” insight into the network as the system executes. Our poster describes FDP, a portable platform that builds on existing tooling to enable end-to-end experimentation and zero-effort in-browser interactive visualization, which we envision can benefit teaching of P4-based SDN and research demonstration.

1 Introduction

Teaching and demonstration that involves P4-based software-defined networks (SDN) usually relies on distributing a pre-setup VM for users to run. While this is sufficiently opaque from excessive detail for teaching or demonstration, it still requires effort and adequate resourcing for learners or observers to use these VMs. Further, while the VM approach is adequate for packaging dependencies, it does not provide the teacher nor learner with a network-centric and customizable “big picture” view of how the SDN is behaving.

In this poster we present the Flightplan Demo Platform (FDP). It is designed with the needs of both learners and teachers in mind, including researchers who want to produce an easy-to-access online demo of their SDN system.

Figure 1 shows an experiment in FDP running over a fat-tree topology. FDP’s key features include: **i) easy to host:** the viewer-facing component of FDP runs in the browser at no setup cost; **ii) easy to use:** viewers are presented with an animated and explorable 3D topology enriched with visual cues, to see both the “big picture” of the SDN’s behavior and the important details; **iii) runs offline:** the frontend and backend are decoupled, and demos or teaching examples can be replayed reliably by many users concurrently; **iv) generic:** the network topology, P4 programs, and the visual cues are all pa-

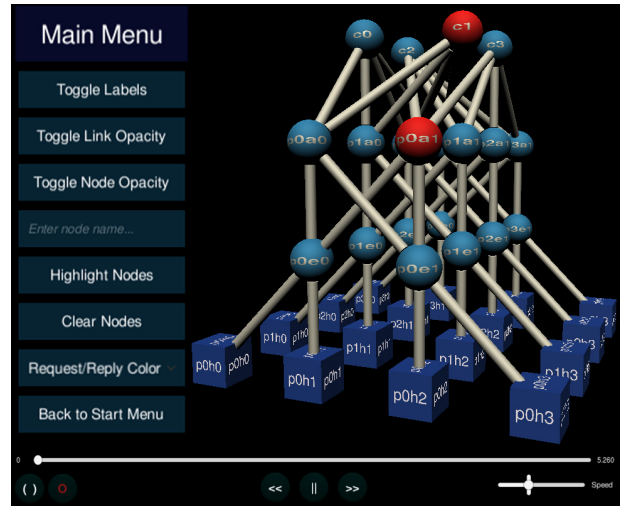


Figure 1: FDP facilitates the creation of 3D animations for viewers, showing the behavior of an SDN network including packet flows. Teachers or demonstrators using FDP can customize the interface or the presentation. This screenshot shows two switches in a fat-tree topology ($k = 4$) being highlighted. Users can change the speed of the visualisation, pause and rewind it, and navigate the 3D space.

rameters to the system; **v) builds on widely-used systems:** such as Unity engine and Mininet, making FDP amenable to extension and customization; **vi) portable:** all the tooling we use and develop is portable across POSIX systems.

2 FDP

FDP is structured into two parts: the **backend** takes experiment descriptions and executes them to produce outputs consisting of pcap files and other logs. The **frontend** takes this output and produces an in-browser 3D rendering of the topology showing the SDN’s behavior. This rendering can be further customized to show graphs and visual cues to help the viewer better understand what they are seeing, or to understand a detail that is not evident from the visualization.

