# Benchmarking Traffic filtering application on Software-Defined-Networking controller

## Project Description

Software-Defined Networking (SDN) is a network architecture approach that enables the network to be intelligently and centrally controlled, or 'programmed,' using software applications. This helps operators manage the entire network consistently and holistically, regardless of the underlying technology[1].

In traditional network architectures, the data plane (the forwarding plane) and the control planes (the routing function) live together in each network device. This means that routing decisions are distributed around the network. This has several benefits, but one liability is that forwarding decisions are made locally and hop-by-hop. SDN, on the other hand, separates the forwarding and control planes. The forwarding plane is still in each network node (switch, router, etc.), but the control plane is centralised in the SDN Controller [2].

The SDN paradigm introduced new intelligent applications that can be implemented at the Edge and the Fog networks, which were previously only available at the cloud infrastructure.

In the last few years, many initiatives have been started to build open-source and neutral vendor-free SDN software for any whitebox hardware. The two de facto implementations are the Open network operating system (ONOS) and OpenDaylight [3].

### *Role*

In this internship, the student is expected to set up ONOS on a hardware device (e.g., raspberry pi - 4 ) and manage a small network running a heterogeneous network containing software switches (e.g., Open vSwitch, implemented in open off-the-shelf software-switches (e.g., TP-Link, etc.)) and other low-cost devices (e.g., Raspberry Pi), dedicated hardware devices (e.g., NetFPGAs); and OpenFlow-compliant switches (e.g., Cisco) and evaluate a network traffic filtering application and provide benchmarking performance (throughput, packet loss, latency and bootstrapping delay, etc.) by running the packet filtering applications.

## Skills required:

Programming (Java, Python), knowledge of computer networking and Linux

**Learning outcome for the student:**

Hands on experience on setting up a SDN controller and data planes and research skills in devising network measurement experiments.

**Timings & Pay**

The internship should take place during the summer vacation (i.e. start on or after Monday 27 June and end no later than Friday 23 September, at the very latest).

The project is expected to be full time (37hours per week) and last 10 weeks and the successful intern will be paid £9.96per hour.

**Deadline for Applications is 22nd of June 2022**

**How to Apply**

Applicants should complete this google form including attaching a copy of their transcript.

**Supervisors**

Dr Poonam Yadav poonam.yadav@york.ac.uk, Department of Computer Science

**References and Further Reading**

1. https://en.wikipedia.org/wiki/Software-defined_networking, accessed on 26/04/2022

2. https://gonorthforge.com/using-onos-to-deliver-high-availability-scalability-performance-and-abstraction-for-service-provider-networks/, accessed on 26/04/2022

3. R. A. Addad, D. L. C. Dutra, M. Bagaa, T. Taleb, H. Flinck and M. Namane, "Benchmarking the ONOS Intent Interfaces to Ease 5G Service Management," 2018 IEEE Global Communications Conference (GLOBECOM), 2018, pp. 1-6, doi:10.1109/GLOCOM.2018.8648078.