POLITECNICO DI TORINO

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Lab #3 on Traffic Scheduling

"Computer network design and control" module of
Communication and network systems

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Chapter 1

Laboratory #3

The aim of this lab is to experiment with the behavior of various scheduling algorithms using a network simulation library called ns.py, available from https://github.com/TL-System/ns.py. Unlike Mininet, which emulates real hardware, ns.py simulates the essential components for the tests, including multiple flows and schedulers.

The lab's primary goal is to familiarize students with the use of network simulation tools, focusing on the performance and behavior of scheduling algorithms. The `ns.py` library automates the execution of predefined experiments, along with the collection and display of experiment results.

1.1 Starting the lab

To start the lab, follow the same procedure outlined in Lab 1 (also provided below for convenience).

1. Navigate to the CrownLabs website: https://crownlabs.polito.it/
2. Click on the "Login @Polito" button.
3. On the login page, click on the "PoliTo SSO" button at the bottom of the form.
4. Log in using your PoliTo credentials (the same credentials used to access the "Portale della didattica").
5. Once logged in, you will be on the "Dashboard" tab. You should see the "Computer Network Design" workspace on the left side of the user interface (UI).
6. Click on that workspace to reveal a new section containing the VM called "Lab".
7. Click the "Create" button to instantiate a new VM. Once creation is complete, the "Connect" button will become active.
8. When the "Connect" button becomes active, click it. A new browser tab will open, connecting you to the VM desktop.

For detailed instructions on using CrownLabs, please refer to the full guide provided in Lab 1.

Once you are connected to the VM, open a terminal and run the following command:

```
start-lab3
```

This will start a Jupyter Notebook and open the web browser on the associated link.

NOTE: It may take some time to start and open the web browser. Please be patient and wait for everything to be ready.

Once the browser page is ready, it will list the contents of the `lab3/sdn_lab` directory. Click on the `schedulers.ipynb` Jupyter Notebook.

An interactive Python environment will open. The file `schedulers.ipynb` is a Jupyter Notebook containing both text sections and Python code sections that can be edited and run on the fly (e.g., similar to a MATLAB environment).

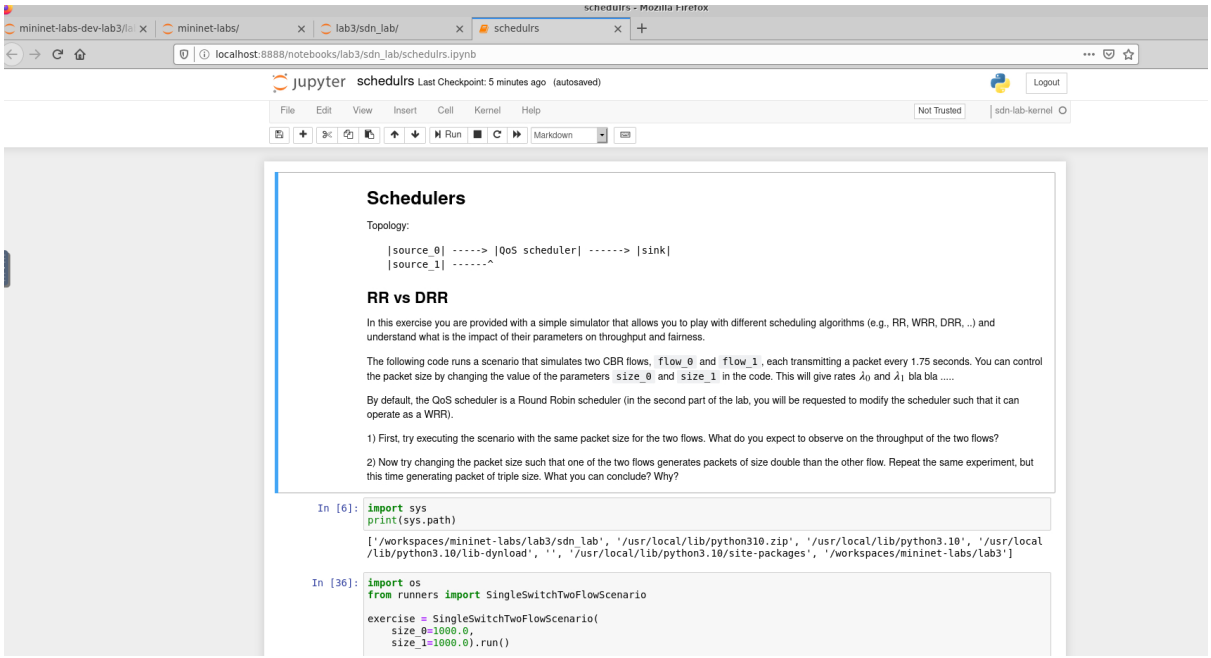

Figure 1.1: Jupyter notebook `schedulers.ipynb`

From this point on, **follow the instructions in the Jupyter Notebook**. It is designed to be self-explanatory, so all the information and steps you need are provided directly in the notebook.

1.2 Finishing the Lab

Once you complete the assignment, remember to **download your work**. We recommend that you save the Jupyter Notebook file and export it to PDF.

The Notebook file can be found at `~/Desktop/lab3/sdn_lab/schedulers.ipynb`. You can either copy it from there or download it from the Jupyter interface via `File > Download`. This will download the file to the `~/Downloads` directory.

To export it to PDF, you have two options. Select the one you prefer:

- **Direct PDF export:** From the Jupyter interface, select `File > Save and Export Notebook As > PDF`. This will take some time to generate a PDF of the Notebook

using LaTeX. The PDF will then be downloaded to the `~/Downloads` directory.

- **Export via HTML:**
  1. From the Jupyter interface, select `File > Save and Export Notebook As > HTML`. This will generate and download an HTML version of the Notebook.
  2. Open the downloaded HTML file with the browser.
  3. Print the web page as a PDF via the browser by pressing `CTRL+P`.
  4. Select the location on the VM disk where you want to save the file.
  5. Verify that the printed output appears as expected (you may optionally zoom out to less than 100% in the printing settings).

Once you have both files, upload them to external storage. For this, we suggest storing the files in the "MyDrive" directory on the VM Desktop. That directory is connected to persistent storage you can access from CrownLabs. For detailed instructions, please refer to the guide in Lab 1.