LS Lab 1: Containerization and application layer load balancing

In this lab, we will focus mainly on Docker engine and L7 load balancer, which will be covering the below topics:

- Docker images
- Docker containers
- Docker volumes
- Docker network
- Docker-compose
- Nginx Application Layer Load balancing

Task 1: Get familiar with Docker Engine

1. Pull *Nginx v1.23.3* image from *dockerhub* registry and confirm it is listed in local images
2. Run the pulled *Nginx* as a container with the below properties
    a. Map the port to 8080.
    b. Name the container as *nginx:<stX>.*
    c. Run it as daemon .
    d. Access the page from your browser.
3. Confirm port mapping.
    a. List open ports in host machine.
    b. List open ports inside the running container.
4. Create Dockerfile similar with below properties (let's call it container A).
    a. Image tag should be *Nginx v1.23.3.*
    b. Create a custom *index.html* file and copy it to your docker image to replace Nginx default web page.
    c. Build the image from the *Dockerfile*, tag it during build as *nginx:<stX>*, check/validate local images, and run your custom made docker image.
    d. Access via browser and validate your custom page is hosted.

Task 2: Work with multi-container environment

1. Create another Dockerfile similar to step 1.4 (Let's call it container B), and an *index.html* with different content.
2. Write a docker-compose file with below properties
    a. Multi-build: Builds both Dockerfiles and run both images.
    b. Port mapping: Container A should listen to port 8080 and container B should listen to port 9090. (They host two different web pages)
    c. Volumes: Mount (bind) a directory from the host file system to Nginx containers to replace the default Nginx web page with the two index.html files created in Steps 1.4.b and 2.1 .
3. Run the docker compose file and validate you have access to both Nginx web pages in your browser via their respective ports.

4. **Configure L7 Loadbalaner**
    a. Install Nginx in the host machine, and configure it in front of two containers in a manner that it should distribute the load in RR approach.

5. **Automate everything in a Bash script (Optional)**
    - Automate all of the process in a bash script
    - Push your code to Version Control Systems (VCS)