Gamification of Digital Labs:
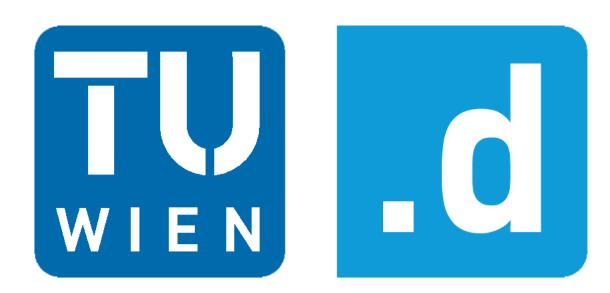# Towards a Multipurpose and Collaborative Virtual Platform
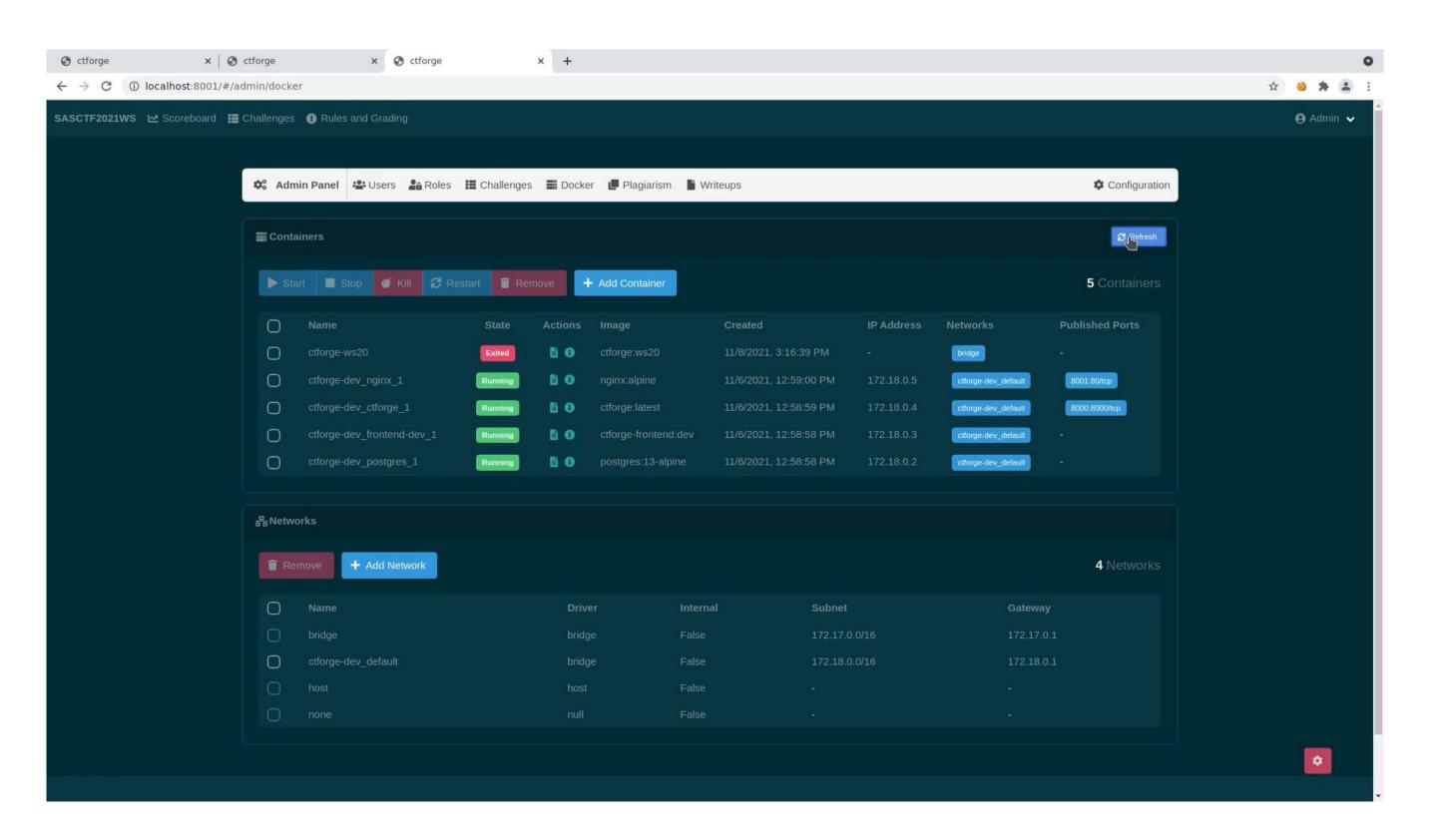
Objectives of the Project

IT security plays a critical role in our society. There is an increasing demand for experts in this field, and universities are coping with this need by offering more courses and specializations in security. One of the challenges that we have to face as educators is how to **reshape teac**hing to combine strong theoretical foundations with hands-on practice. We want to tackle this problem by building a **virtual lab** that revolves around the concept of **learning by doing** where students can experiment with the attacks and protections found in the real world. The lab provides a safe, legal, and remotely accessible environment in which the concepts that we teach are put into practice to develop the analytical skills required to exploit complex vulnerabilities and protect insecure applications.

Project results

The project **reached the expected goals** stated in the original proposal, and it is already **actively used** in four different courses at TU Wien, with the idea of supporting more lectures in the upcoming semesters. The possibilities opened by this platform are especially valuable for new courses developed as part of the recently approved specialization on security in the Software Engineering & Internet Computing Master programs, which will **further increase the demand for this virtual lab**. The aim to create a future-proof, easy to maintain, and extensible framework, mandated a complete redesign of existing platforms. The planned functionalities, i.e., virtualization support, federated authentication, and plagiarism detection, have been integrated, taking advantage of the new modular architecture. At the same time, the platform benefits from a continuous testing phase, embodying the feedback of other lecturers who adopted it for their teaching activities.

Possible follow-up topics

Investigate the requirements of other universities that might be interested in adopting this platform. Share exercises, activities, and in-depth teaching materials with other universities to foster the creation of an **inter-university network** to improve the educational offer in Austria in the field of IT security. Identify **private and public partners** to extend the adoption of this project.