

Master Project SoSe 2023

A Cyber Range for Hands-On Security Exercises and CTFs

FG Cybersecurity and Enterprise Security, Prof. Dr. Christian Dörr

Background

Obtaining hands-on practice with computer networks is difficult. Most people do not own multiple, spare computers to setup a scenario at home, while on campus resource-intensive, large-scale exercises can only be provided for a short time and not on demand. This is especially true when it comes to security-related exercises, where part of the assignment — and the excitement — is to experience what happens when things go wrong.

The goal of this project is to build a so-called "cyber range", an environment where each student can create and operate a large-scale realistic network, and experiment with it in a protected environment. We plan to use this cyber range in the upcoming semester(s) to realize hands-on components to the new network security courses, so that students can gain first hand experience how cyber attacks work and how to defend against them.

Project Goal

There exists already a proof-of-concept that demonstrated the possibility to dynamically spin up and configure a set of virtual machine based on a machine-readable configuration file, and make VM topologies available via a personalized VPN entry point.

The aim of this project is to turn this PoC into a deployable cyber range learning environment, where students can select scenarios to play from a scenario library in a cyber range dashboard (for an example see on the right), for which an early prototype exists using the framework Vaadin, with the system commissioning the environment either on local servers or instances leased from cloud providers.

To allow for more interaction, individual exercises can be played in a red team/blue team configuration, and it should be possible to connect physical hardware (such as IoT sensors) into the simulated topology.

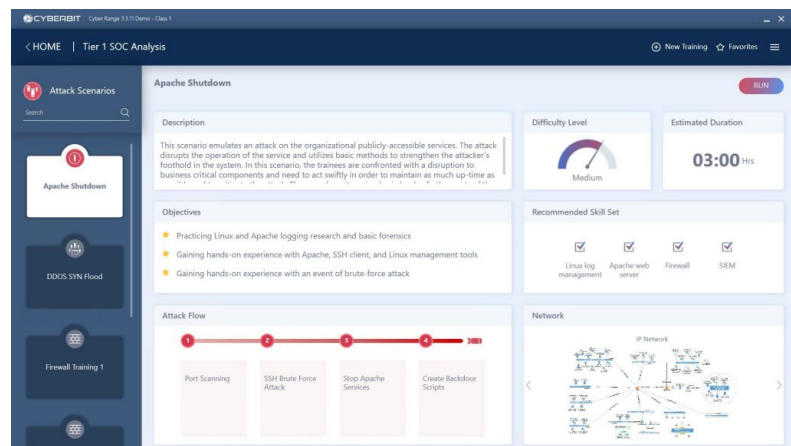


Image: CyberBit Range

Contact Information

Prof. Dr. Christian Dörr

christian.doerr@hpi.de

Haus K, K-1.13