

Research Project VERCA: Master Research Project / Seminar

VERCA is a BMBF-funded research project for developing an intelligent and collaborative intrusion detection system focusing on detecting attacks on highly distributed and shared IT- infrastructures. The project VERCA addresses this problem by means of a novel collaborative and multi-level intrusion detection system. The following topics are currently offered to research assistants and bachelor's or master's theses:

Topic area: Computer Networks

- In-network computing for distributed attack detection and mitigation in a timely manner
- In-band network telemetry for efficient topology and traffic monitoring
- Cooperative SDN-/NFV-based solutions for highly distributed attack remediation

Topic area: IT Security

- Architectural principles for a secure organization of Collaborative Intrusion Detection/Prevention Systems
- Analysis and modelling/detection of highly distributed attack scenarios
- Evaluation and generation strategies for attack datasets

Working Title of the Master Research Project/Seminar

Programmable Data Plane Solutions to Improve the Detection and Mitigation of Distributed Network Attacks

Topic and Related Technologies

- Software-defined Networking (e.g., SDN, P4)
- Network Functions Virtualization (i.e., NFV)
- Machine Learning (ML, DL, AI)

Research Motivation and Tasks

Survey of the state of the art in intrusion detection using SDN and network programmability. Testing and evaluation of existing solutions by means of experiments (e.g., based on tutorials and papers mentioned below). Joint further development of network management and monitoring solutions for the detection and mitigation of attacks (e.g., DDoS).

Related Work

- <https://github.com/opennetworkinglab/ngsdn-tutorial>
- Lewis, Benjamin, Matthew Broadbent, and Nicholas Race. "P4ID: P4 Enhanced Intrusion Detection." *2019 IEEE Conference on Network Function Virtualization and Software Defined Networks (NFV-SDN)*. IEEE, 2019.
- da Silveira Ilha, Alexandre, et al. "Euclid: A Fully In-Network, P4-based Approach for Real-Time DDoS Attack Detection and Mitigation." *IEEE Transactions on Network and Service Management* (2020).
- Musumeci, Francesco, et al. "Machine-learning-assisted DDoS attack detection with P4 language." *ICC 2020-2020 IEEE International Conference on Communications (ICC)*. IEEE, 2020.

Contact and Additional Information

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Further information regarding our research project VERCA: <http://hs-fulda.de/verca>