Prof. Dr. Sebastian Rieger
NetLab – Department Applied Computer Science –
Fulda University of Applied Sciences

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

Scalable SDN/NFV Platforms for
Collaborative Intrusion Detection Systems

Topic and Related Technologies

- Network Functions Virtualization (i.e., NFV)
- Software-defined Networking (e.g., SDN, P4)
- Scalable Container-Platforms using Kubernetes, Apache Kafka, Faust

Research Motivation and Tasks

Survey of the state of the art in intrusion detection using SDN and NFV or scalable container environments. Test and evaluation of existing solutions based on experiments (e.g., based on projects and papers mentioned below). Network and cloud infrastructures based on a Kubernetes testbed are already existing in the research project. If necessary, design or integration of additional hardware-based NFV support, e.g., through SmartNICs, programmable networks and Open Network Operating Systems (e.g., SONiC).

Related Work

- https://github.com/Azure/SONiC/wiki/SONiC-P4-Software-Switch
- https://www.netronome.com/solutions/intrusion-detection-prevention/
- Sultana, Nasrin, et al. "Survey on SDN based network intrusion detection system using machine learning approaches." *Peer-to-Peer Networking and Applications* 12.2 (2019): 493-501.
- Blaise, Agathe, Sandra Scott-Hayward, and Stefano Secci. "Scalable and Collaborative Intrusion Detection and Prevention Systems Based on SDN and NFV." Guide to Disaster-Resilient Communication Networks. Springer, Cham, 2020. 653-673.

Contact and Additional Information

Prof. Dr. Sebastian Rieger (sebastian.rieger@informatik.hs-fulda.de)
Further information regarding our research project VERCA: http://hs-fulda.de/verca