Bringhenti Daniele

Dissemination activities

PitchD by IEEE Student Branch
- **Date**: 30th March 2022
- **Title**: Automating Security Configuration in Virtualized Computer Networks
- **Abstract**: Network virtualization introduced higher flexibility and dynamicity, but at the same time it led to new threats and challenges. The traditional approach of a manual configuration of Network Security Functions (NSFs) such as firewalls and VPN gateways is not feasible anymore, since it is not adequate to the ever-changing nature of modern networks and it is prone to human errors. To overcome this problem, the native flexibility provided by virtualization could be exploited to automate security configuration. However, achieving a high level of automation while providing formal assurance that the security configuration fulfills some security properties is still an open research challenge. Therefore, this speech presents a novel approach combining automation, formal verification and optimization for the allocation and configuration of NSFs in virtualized networks. Specifically, this approach pursues "security by construction", avoiding a traditional a-posteriori formal verification, and fulfills optimality criteria to improve the efficiency of the security operations.
- **Youtube link**: https://www.youtube.com/watch?v=W957uYSpUqg
- The certificate of attendance is attached at the end of this document.

DAUIN Ph.D. Day for Companies 2021
- **Date**: 24th November 2021
- **Topic**: Improving the dependability and resilience to cyberattacks of next generation computer networks
- **Website link**: http://www.phd-dauin.polito.it/phd-day-for-companies-2021.html
- **Youtube link**: https://www.youtube.com/watch?v=QugI-NOAPDU

Demonstrations

Demonstration of VEREFOO (VErified REFinement and Optimized Orchestration)
- **Date**: 10th June 2022
- VEREFOO is an open-source project on which I have been actively working during my PhD program. It is a framework that combines automation, formal verification and optimization for the configuration and orchestration of network security functions in virtualized computer networks. A full-fledged version of the framework that can automate the configuration of virtual packet filtering firewalls is available in the Github repository of the project (https://github.com/netgroup-polito/verefoo/tree/Budapest). A complete demo of this version has been presented in a Youtube video.
- **Youtube link**: https://www.youtube.com/watch?v=QCFNLE2gHgE

Demonstration of an automatic security orchestrator for smart cities
- **Date**: 22nd October 2021
- In the context of the European project CyberSec4Europe (https://cybersec4europe.eu/), VEREFOO has been used to automate access control security configuration in a use case based on a realistic smart city. A complete demo of this VEREFOO's application has been presented in a Youtube video.
- **Youtube link**: https://www.youtube.com/watch?v=PXM5rcJWYc0

Presentations of conference papers

- "Towards a fully automated and optimized network security functions orchestration", presented in ICCCS 2019: 4th IEEE International Conference on Computing, Communication & Security, Roma (IT), October 10-12, 2019
- "Automatic optimized configuration of network security functions", presented in the PhD Forum co-located with ITASEC20: the Italian Conference on CyberSecurity 2020, Ancona (IT), February 6, 2020
- "Automated optimal firewall orchestration and configuration in virtualized networks", presented in NOMS 2020: IEEE/IFIP Network Operations and Management Symposium, Virtual Event, April 20-24, 2020
- "Introducing programmability and automation in the synthesis of virtual firewall rules", presented in SecSoft 2020: 2nd International Workshop on Cyber-Security Threats, Trust and Privacy Management in Software-defined and Virtualized Infrastructures, co-located with NetSoft 2020: IEEE Conference on Network Softwarization, Virtual Event, July 3, 2020
- "Short Paper: Automatic Configuration for an Optimal Channel Protection in Virtualized Networks", presented in CYSARM 2020: 2nd workshop on cybersecurity arms race, co-located with ACM CCS 2020: ACM Conference on Computer and Communications Security, Virtual Event, November 13, 2020,
- "Automated optimal firewall orchestration and configuration in virtualized networks", presented in ITASEC 2021: Italian Conference on Cybersecurity, Virtual Event, April 7 – 9, 2021
- "A novel approach for security function graph configuration and deployment", presented in SecSoft 2021: 3rd International Workshop on Cyber-Security Threats, Trust and Privacy Management in Software-defined and Virtualized Infrastructures, co-located with NetSoft 2021: IEEE Conference on Network Softwarization, Virtual Event, July 2, 2021,
- "Automated optimal firewall orchestration and configuration in virtualized networks", presented in ITASEC 2021: Italian Conference on Cybersecurity, Virtual Event, April 7 – 9, 2021
- "Optimizing distributed firewall reconfiguration transients", presented in ITASEC 2022: Italian Conference on Cybersecurity, Rome, Italy, June 20 – 23, 2022

Politecnico di Torino
IEEE Student Branch

PhD
the PhD's pitch

IEEE
Italy Section

CERTIFICATE OF ATTENDANCE

This is to certify that:

Daniele Bringhenti

has presented an oral contribution entitled

Automating Security Configuration in Virtualized Computer Networks

during the special event:

PitchD - the PhD's pitch

organised by the Politecnico di Torino IEEE Student Branch

March 30, 2022 - Politecnico di Torino

Carmine Paolino
Politecnico di Torino IEEE Student
Branch Chair

Paolo MARESCA
IEEE Italy Section
Student Activity Committee Chair

Maurizio MARTINA
Politecnico di Torino IEEE Student
Branch Counselor