Zürcher Hochschule für Angewandte Wissenschaften School of Engineering

[ONLINE ADMINISTRATION PRAKTISCHE ARBEITEN]

[DEPT. T ADMIN TOOLS]

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Bachelorarbeit 2022 - FS: BA22_gueu_04

Allgemeines:

Titel:	Network Infrastructure Automation with NetBox
Anzahl Studierende:	1
Durchführung in Englisch möglich:	Ja, die Arbeit kann vollständig in Englisch durchgeführt werden und ist auch für Incomings geeignet.

Betreuer:

HauptbetreuerIn: Gürkan Gür, gueu

Zugeteilte Studenten:

Diese Arbeit ist vereinbart mit:
- Jens Vogler, voglejen (IT)

Fachgebiet:

IS Information Security

Studiengänge:

IT Informatik

Zuordnung der Arbeit :

InIT Institut für angewandte Informationstechnologie

Infrastruktur:

benötigt keinen zugeteilten Arbeitsplatz an der ZHAW

Interne Partner :

Es wurde kein interner Partner definiert!

Industriepartner:

Init7 (Schweiz) AG 8406 Winterthur

Beschreibung:

The goal of this BA is to create a flexible and open source NetBox plugin which facilitates the configuration of network devices through one or more of configuration protocols. Users should be able to easily define how the configuration is generated, compare generated configuration to the running one and also be able to deploy the configuration to the device. Moreover, in order to configure devices, credentials and other secrets are utilized to push the configuration. These information elements must be manageable in a secure manner.

Goals - Authentication to the devices is managed in a secure manner with some form of credential storage.

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- User access to read/write configuration is managed by the built-in NetBox permission model.
- A flexible configuration template can be assigned to devices. These templates are able to be authored by network engineering personnel.
- From the template, a configuration can be generated and pushed to the device.
- From the template, a configuration can be generated and compared to the running configuration
- The solution is contained within a NetBox-Plugin which is installable and usable by the NetBox community.
- The plugin is demonstrated and compared with similar solutions (if any) in terms of features and capabilities.

Tasks - Credential storage solutions to authenticate against the devices shall be compared, evaluated and a fitting solution shall be chosen.

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- Configuration management protocols and frameworks shall be compared, evaluated and the best fit for the industry partner shall be decided.
- The evaluation shall incorporate gathering feedback and use-cases by the network engineering staff of the industry partner.
- The implementation of the configuration management protocol within the plugin should be abstract to some degree to enable implementations of further protocols in the future
- A NetBox-Plugin is developed with the GUI components and business logic.

Voraussetzungen:

- Good programming skills
- A good understanding of network management, data center infrastructure and network protocols
- A good understanding of cybersecurity concepts
- Love for algorithm design, development and testing!
- The project meetings, final report and presentation will be in English.

References

- NetBox documentation, *https://netbox.readthedocs.io/en/stable/*
- Network Automation Using Unified API (Napalm), *https://napalm.readthedocs.io/en/latest/index.html*
- Internet Engineering Task Force (IETF), et al., Network Configuration Protocol (NETCONF), [online] Available: *https://datatracker.ietf.org /doc/html/rfc6241*
- Internet Engineering Task Force (IETF) and M. Bjorklund, Ed., YANG - A Data Modeling Language for the Network Configuration Protocol (NETCONF), [online] Available: *https://datatracker.ietf.org/doc/html/rfc6020*
- Vendor-neutral, model-driven network management designed by users (OpenConfig), *https://openconfig.net/*
- Extensible and flexible Network Source of Truth and Network Automation Platform (Nautobot), *https://www.networktocode.com/nautobot/*
- Rick Donato, How to Build a Network Automation Stack with Nornir, Napalm and Netbox, [online] Available: *https://www.packetcoders.io/how-to-build-a-network-automation-stack-with-nornir-napalm-and-netbox/*

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