

Simple Segmentation of Small Networks (S3N)

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Objective

To provide operators of small computer networks with an easy to use service to improve network security through simple segmentation of network devices. Using a hierarchical security model, S3N will greatly simplify operation of network security by untrained users. It is our hope that S3N is simple enough for operators of any skill level to use.

Motivation

Currently available network security services for small networks are complex and often require a detailed understanding of how networks operate. This often means small networks are left vulnerable to attacks on all attached devices, especially IoT devices.

Software Tools

Spring Boot – JVM Application Framework that handles integration of dependencies, database ORM + migrations, REST API creation, Service management, and JSON marshalling.

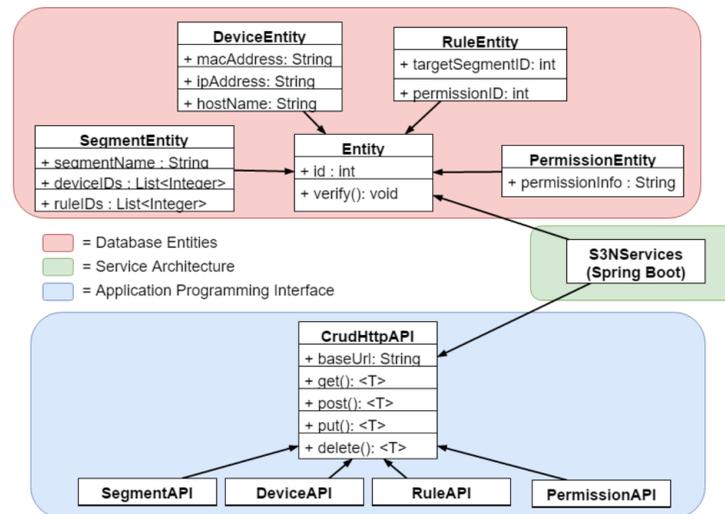
AngularDart – Dart is the language of our web interface. AngularDart is built by the Angular team entirely in Dart and compiles to JavaScript to run all of our front-end logic.

ISC-DHCP – A DHCP service provider with an Object Management API for easy use with JAVA.

IpTables – Linux tool for managing network and routing rules on a device.

NMAP – Network Mapper (NMAP) is a tool used by S3N's Categorization service to scan devices for their OS and NMAP listed type.

Software Design



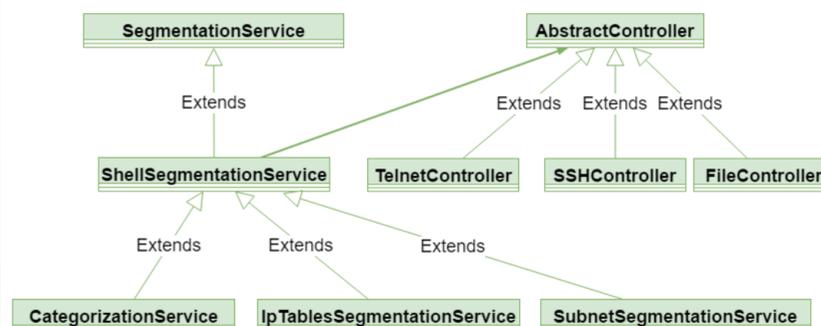
Service Architecture

Core API – Responsible for providing the Web UI access to S3N data and services.

Services – Services operate on the S3N data through the core API in order to provide some function, managed by Spring Boot.

Segmentation Service – Creates and deletes segments, places devices in a segment, and ensures the integrity of the routing rules.

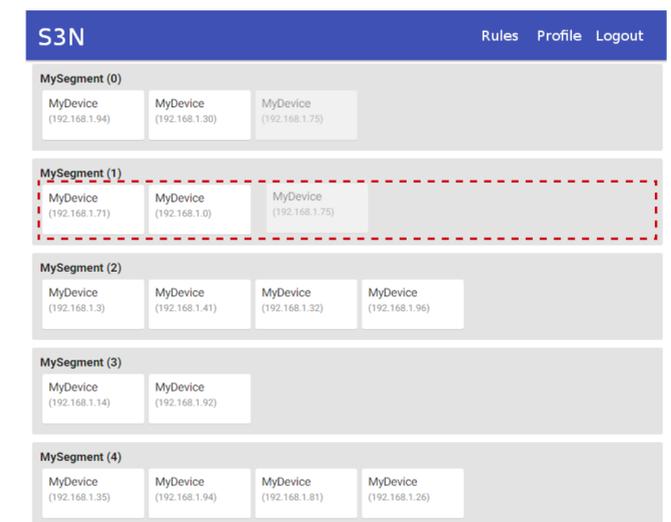
Categorization Service – Responsible for detecting information about devices and tagging devices with various labels to identify their types.



User Operation

Trimmed Interface – A single page dashboard, designed to follow the 13 principles of display design, provides the user a clear view of the system that is reinforced by the visual elements.

Hierarchical Model – This model of segmentation helps users understand the access rules in S3N. This also limits the number of configurations rather than allowing complex rule control.



Segmentation

DHCP – Using DHCP, each segment is mapped to a subnet (192.168.1.0/24, for example) and devices in that segment are assigned an IP address from that subnet.

Routing Rules – Using IpTables, rules are added to the router to keep devices from accessing unauthorized segments.

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