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Computer and  
Informatics  
Engineering  
Projects

# SOFTWARE DEFINED NETWORKS MONITORING SYSTEM

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# Requirement elicitation



Sources for this requirements came from:

- ✓ Study of similar implementations;
  - ✓ Brainstorming sessions;
  - ✓ Task Analysis;
  - ✓ Domain Analysis;
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# Functional Requirements

## Management

- ❑ **Device** - Add and remove network devices.
- ❑ **Network Entities** - subdivisions like vlans or subnets are treated as entities.
- ❑ **Users** - The network can have multiple admins.

## Measurements

- ❑ **Configurability** - user can set its own set of metrics.
- ❑ **Sample size** - can be set per device or has an globally measure value.

## Atomicity

- ❑ **Network devices** - devices should require little no none initial configuration.
- ❑ **Metrics** - metrics should be device independent.

# Non-Functional Requirements

## Capacity

- ❑ **Bandwidth** - stable width.
- ❑ **Response** - agent number or environment agnostic.
- ❑ **Size** - usable for a large number of agents

## Reliability

- ❑ **Stability** - links do not disconnect.
- ❑ **Solidity** - lost of packs is minimized.

## Availability

- ❑ **Access** - user access individuality.
- ❑ **Grouping** - device organization by common qualities.
- ❑ **Device type** - device agnostic.
- ❑ **Topologies** - topology structure agnostic

# Non-Functional Requirements

## Security

- ❑ **Privacy** - Guarantee data privacy.
- ❑ **Protection** - Ensuring the data is not compromised.

## Usability

- ❑ **Customization** - Create a group of rules to simplify common operations.
- ❑ **Multi-Task** - Access multiple networks.
- ❑ **Multi-User** - Network accessible by multiple users.

# State of the Art

Monitoring  
&  
Inband Network Telemetry

“P4-powered” SDN monitoring is mainly academic.

All monitoring solutions with P4 is based on the implementation of INT

Some of the work focus on what type of metrics to collect

What is not seen is the implementation of a proprietary header type.

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# Expected Use & Results

Deployment on **new** network or **existing ones**.

Use **simultaneously** with other SDN **controllers** or as a **standalone** solution.

**Observer** role over a network.

Autonomous **reactive** topology **reconfiguration**.

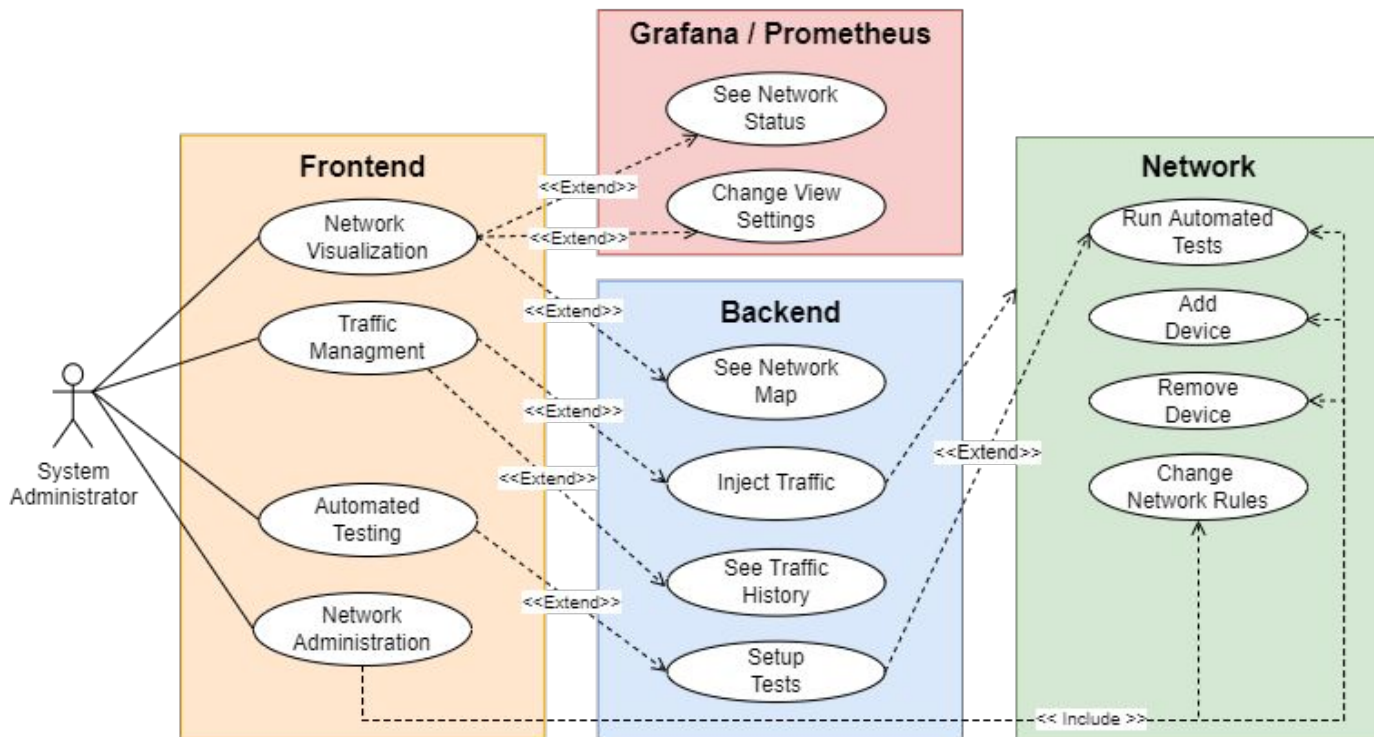
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# Use Cases

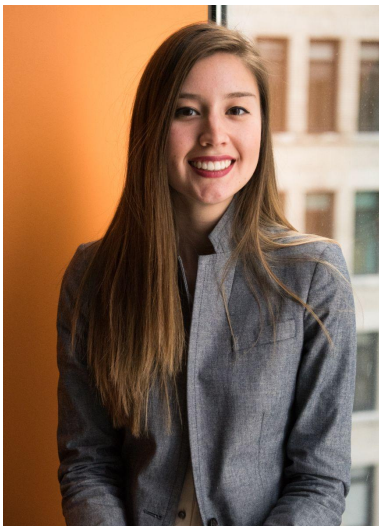
Interaction only has one actor, the **system administrator**, which in production environments can have multiple **roles**.

In production, a network can have **multiple administrators**.





# Personas

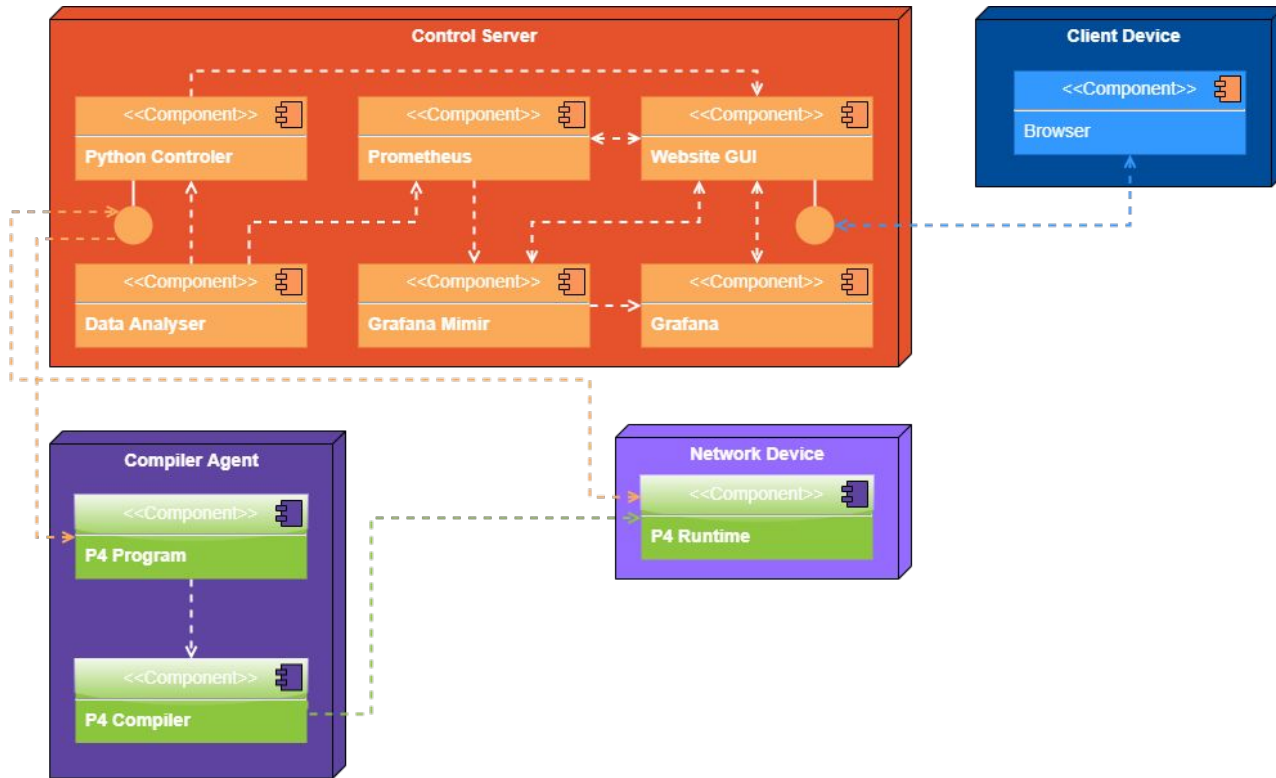


Name	Diana Silva	Age	27
Job	Network Engineer	Location	Braga
Context Challenges &	The company where she currently works deals with a <b>variety of projects</b> at a given time. It wants to begin transitioning to virtualized services, but doing so “in-house”, so they tasked Diana with developing a <b>network structure</b> for the upcoming virtualized environment.		
Goals	Diana need to <b>keep a close eye</b> on the network of services, but not only that, she needs a solution that actively <b>alerts</b> her to whatever <b>parameter she defines</b> and that she can define to <b>react</b> to certain events.		

# Personas



Name	Diogo Ferreira	Age	34
Job	SOC Analyst	Location	Aveiro
Context Challenges &	Diogo works as part of a “blue team” for the security division of his company, one of his task is to <b>monitor</b> the impact of different types of traffic, the time periods during the day with <b>large bandwidth demands</b> , <b>detect and act</b> upon attacks like <i>DDOS</i> or even perform some <b>vulnerability isolation</b> .		
Goals	Diogo needs a solution that enables him to <b>automate</b> some of this tasks in his company’s virtual networks. He needs a system that not only detects but also is capable of <b>reconfigure</b> routes (or even vlans) when certain <b>types of traffic are detected</b> .		

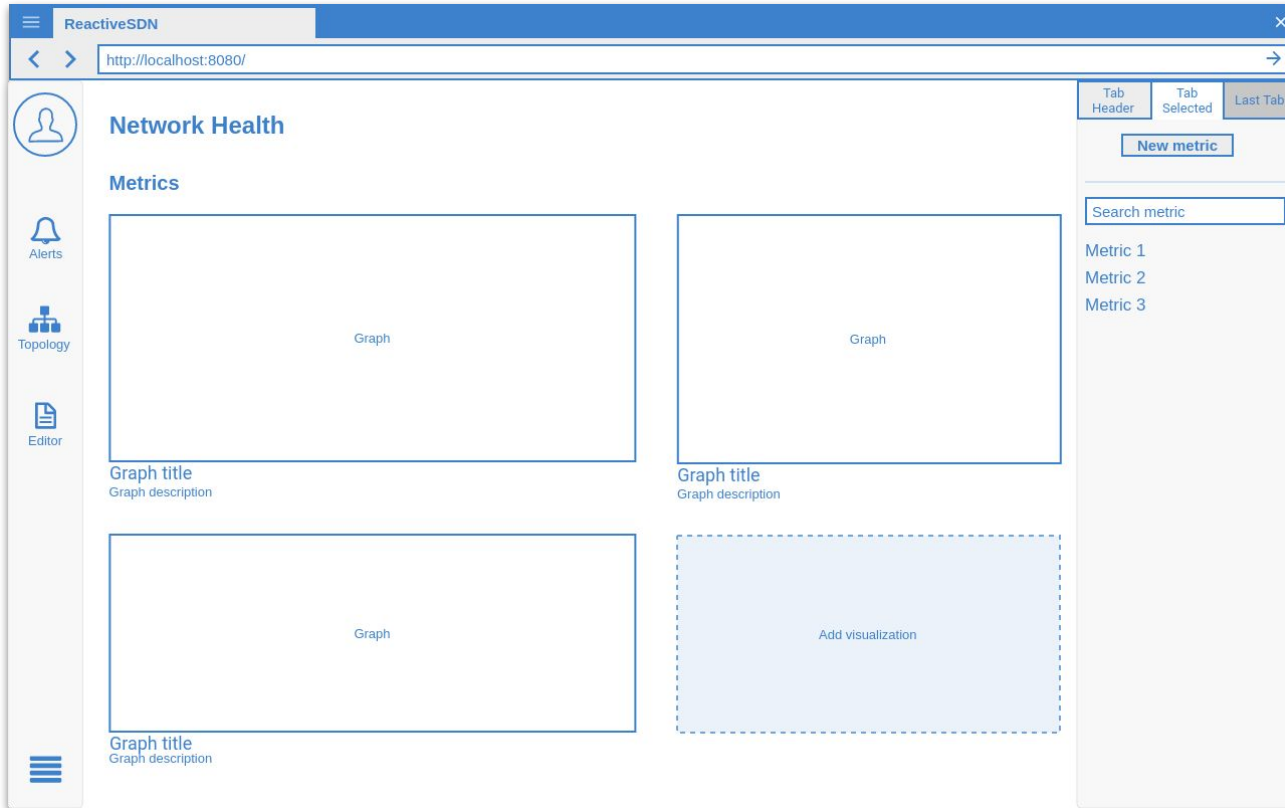


## System Architecture

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# System Mockup

Metric visualization & Device management



Overview of the network

The screenshot shows the ReactiveSDN web interface in a browser window. The address bar displays `http://localhost:8080/`. The interface has a blue header with the title "ReactiveSDN" and a hamburger menu icon. A left sidebar contains icons for a user profile, Alerts, Topology, and Editor. The main content area is titled "Topology" and "Devices". Under "Devices", there are tabs for "Routers", "L3 Switches", and "+ New Category". Below these tabs is a "+ New Device" button. The "Marketing" device is selected, showing details: Name: Marketing, Addresses: 20.56.89.124 | 14:2d:27:e4:36:0f, Subnet, Seniors, Hosts: 8, and a "List all" link. The "Secretary" device is also listed below it. Both devices have a "Configure" button.

ReactiveSDN

http://localhost:8080/

Topology

Devices

Routers L3 Switches + New Category

+ New Device

Marketing Configure

Name Marketing

Addresses 20.56.89.124 | 14:2d:27:e4:36:0f Subnet Seniors

Hosts 8 List all

Secretary Configure

Topology and network devices listing