



Berner Fachhochschule  
Haute école spécialisée bernoise  
Bern University of Applied Sciences

# Linux Infrastructure and Monitoring

Friday, 21th October 2016 13:00-15:30

BFH - Conference Room HAL 9000 (Dammweg 3, 1st. Floor, Bern)

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# Overview

## **Part 1**

- ▶ Introduction
- ▶ Linux Container
- ▶ Monitoring

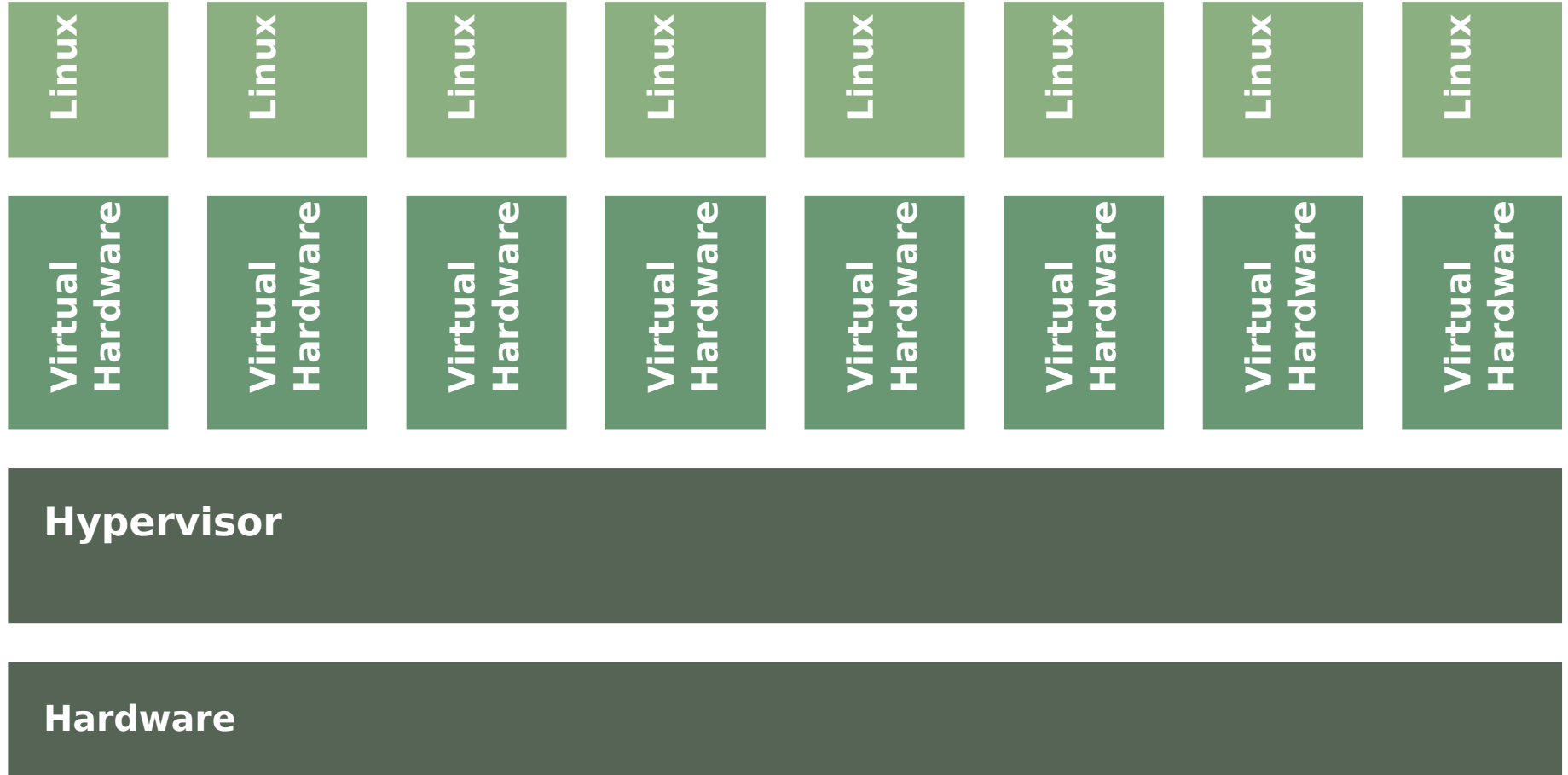
## **Break**

## **Part 2**

- ▶ Logging
- ▶ Near Future (2017)
- ▶ Proposals for possible collaboration

# Linux Container

# Virtualization



# Isolation

Linux (Container)

Linux (Container)

Linux (Container)

Linux (Container)

Linux (Container)

Linux (Container)

Linux (Container)

Linux (Container)

Linux (Host System with systemd-nspawn)

Hardware

# Isolation

Service

Service

Service

Service

Service

Service

Service

Service

Isolation

Virtualization

# Separation

Data

Data

Data

Data

Data

Data

Data

Data

Service

Service

Service

Service

Service

Service

Service

Service

Isolation

Virtualization

# Linux Container

Data

Data

**Host:**  
/srv/data/\$fqdn

**Container:**  
/srv/\$fqdn

Service

Service

**Host:**  
/srv/container/\$fqdn

**Container:**  
/

Isolation

**Host:**  
/

**Container:**  
*n/a*

Virtualization

**Host:**  
*n/a*



# **container-tools and container-shell Demo**

# Monitoring

# Different kinds of Monitoring

## **Real-time Monitoring**

- ▶ Give out mesure data in realtime, no/not much history
- ▶ Software like Netdata

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- ▶ Software like Icinga

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## **Whitebox monitoring**

- ▶ Object checked give out measure data
- ▶ Software like Grafana

# Different kinds of Monitoring

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## **Whitebox monitoring**

- ▶ Object checked give out measure data
- ▶ Software like Grafana
  
- ▶ We use whitebox and blackbox for longtime monitoring

# Realtime Monitoring with Netdata

# Netdata

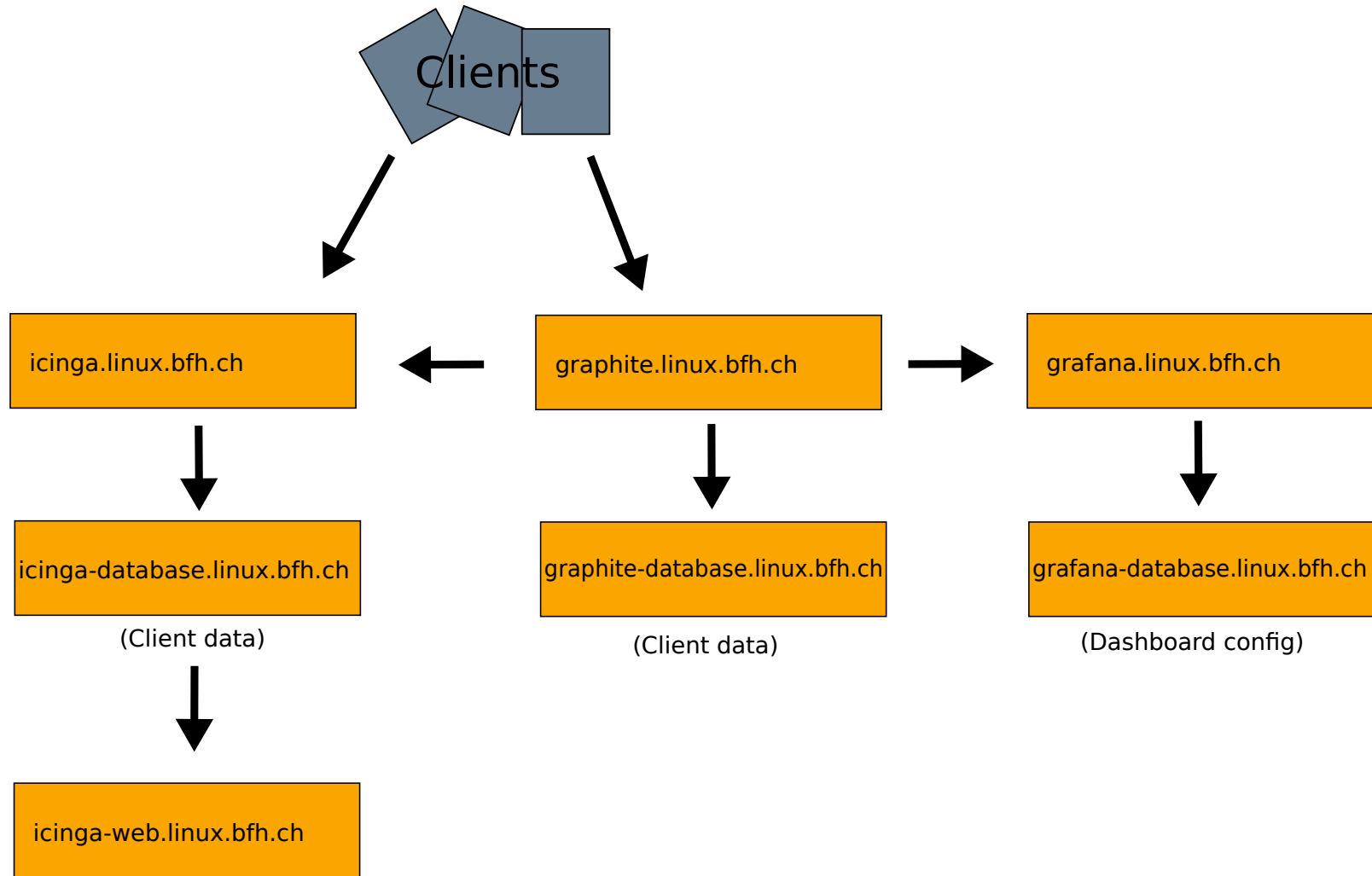
- ▶ Simple
- ▶ Realtime
- ▶ Distributed



# Netdata Demo

# Blackbox Monitoring with Icinga

## How it works



# Icinga 2

## **Powerful**

- ▶ supports basically any device with network
- ▶ integrates with Mail, SMS, Voice, and Ticketing
  
- ▶ Scalable (distributed)
- ▶ High availability (clustered)
- ▶ Self healing
- ▶ Icinga Web 2
- ▶ Multi-tenant
- ▶ Business process integration
- ▶ and much more...



# Icinga Client

## **Monitoring possible via**

- ▶ Icinga Agent on Linux and Windows (Server 2008/Vista or newer with .NET 2.0 required)
- ▶ NRPE
- ▶ NSClient++ (Windows)
- ▶ SSH
- ▶ SNMP

# Front Ends

▶ Icinga 2 ClassicUI  
(Basic Authentication)

The screenshot displays the Icinga 2 ClassicUI interface. At the top, there are status indicators: 28 UP, 0 DOWN, 0 UNREACHABLE, 0 PENDING, 4/30 TOTAL. Below this, a 'Current Network Status' section shows the last update time and version. The main area features a table titled 'Host Status Details For All Hosts' with columns for Host, Status, Last Check, Duration, and Attempt. A sidebar on the left contains navigation menus for General, Status, Problems, System, Reporting, and Configuration. On the right, there is a 'Select command' dropdown menu with various actions like 'Add a Comment to Checked Host(s)', 'Disable Active Checks Of Checked Host(s)', etc.

▶ Icinga Web 2  
(LDAP Authentication)

The screenshot shows the Icinga Web 2 interface. The top navigation bar includes 'Current Incidents', 'Overdue', 'Muted', and 'Host'. The main content area is divided into several sections: 'Service Problems' with a list of critical and unknown issues; 'Plugin Output' showing a load average; 'Problem handling' with options to acknowledge or add comments; 'Performance data' with a table of metrics; and 'Notifications' with a 'Send notification' button. A sidebar on the left contains a 'Dashboard' and various navigation links like 'Problems', 'Overview', 'History', 'Reporting', 'Documentation', 'System', 'Configuration', and 'icingadmin'.

# Extensions

## **Plugins**

- ▶ Hunderts of plugins available
- ▶ Deeply application specific (Moodle, Ceph, OpenStack, etc.)

## **Add-ons**

### **Modules for Icinga Web 2**

- ▶ Business Process
- ▶ Generic TTS
- ▶ PNP
- ▶ NagVis
- ▶ Boxydash
- ▶ Director

# Icinga Demo



# Whitebox Monitoring with Grafana

# Grafana



# Features

## **Data Sources**

- ▶ Supports Graphite, Elasticsearch, Prometheus, InfluxDB, OpenTSDB, and KairosDB out of the box

## **Authentication**

- ▶ like Icinga: LDAP, Basic Auth, and Auth Proxy

## **Dashboards**

- ▶ scripted (static) vs. database (dynamic)

## **Snapshot Sharing**

- ▶ Create and share a fully-interactive graph in 1-click and share with only your team or the world!

# Grafana Demo

Let's take a break...

# Centralized Logging with Elastic Stack

# Overview

## **What?**

- ▶ Centralizing Logs from different sources

## **How?**

- ▶ Logstash
- ▶ Elasticsearch
- ▶ Kibana

## **Show me some!**

- ▶ Let's find some infos
- ▶ And draw some graphs

# Centralized Logging

## **What do we want?**

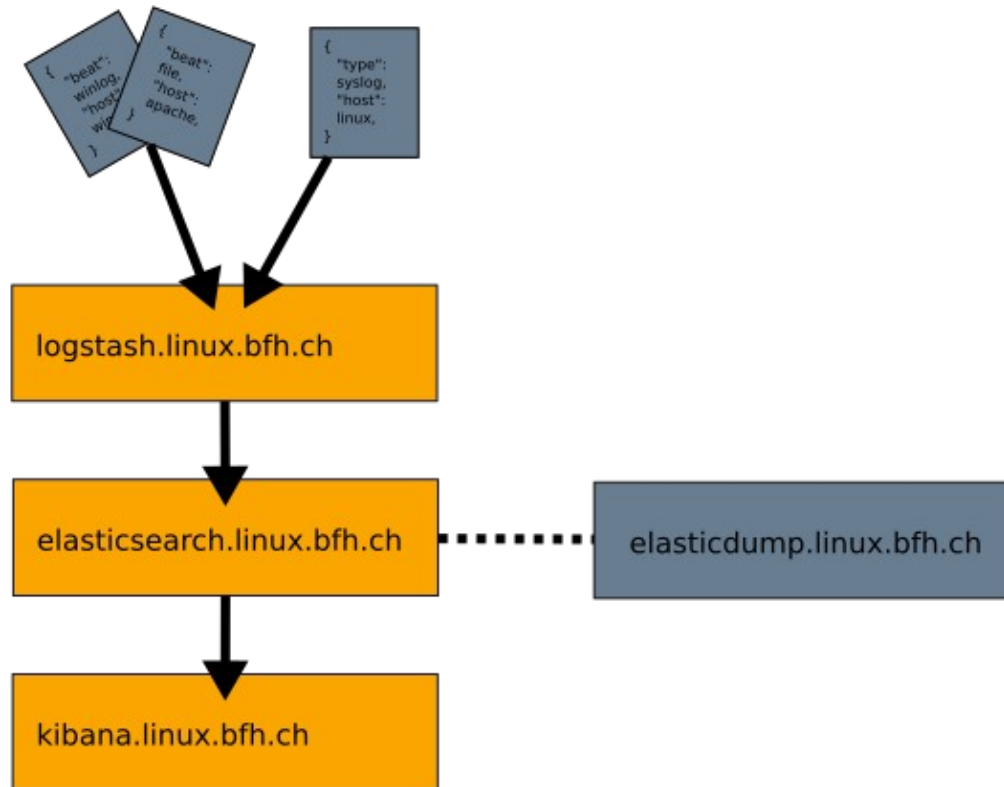
- ▶ Gather logfiles from any source
- ▶ Put them on a centralized place
- ▶ Parse, filter and display the received data

## **How?**

- ▶ Elastic Stack fits all the needs
- ▶ Is open source
- ▶ Large userbase



# Centralized Logging



# Logstash

## **What is Logstash?**

- ▶ Data pipeline to help process logs
- ▶ Normalize data
- ▶ Extend to custom log formats
- ▶ Enrich pipeline with additional plugins
- ▶ Write result to multiple output

## **How do we use it?**

- ▶ With Logstash we are able to process any data from any source and put it on multiple locations
- ▶ At this time we use tcp and udp input as well as winlogbeat and send it to elasticsearch

# Elasticsearch

## **What is Elasticsearch?**

- ▶ Real-time data
- ▶ Massively distributed (not yet used in our case)
- ▶ High available
- ▶ Full-text search (Apache Lucene)
- ▶ Document-oriented (json)
- ▶ RESTful API

## **How do we use it?**

- ▶ Single node cluster
- ▶ Secured behind apache2 (ldap-auth)

# Kibana

## **What is Kibana?**

- ▶ Flexible analytics and visualization platform
- ▶ Intuitive interface
- ▶ Sharing and embedding of dashboards

## **How do we use it?**

- ▶ You Know, for Search! :-)
- ▶ Let the admin choose what, when, and how

Show me some!

**Where can I get it?**

- ▶ <https://elastic.io/products>

**Find data**

- ▶ Use discovery in kibana

**Draw charts**

- ▶ Use visualize in kibana

## Near Future (2017)

# Ceph (1)

## **Facts**

- ▶ Easy scale-out
- ▶ No single point of failure (If properly configured)
- ▶ Replica
- ▶ Self-healing

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## **Distributed Storage vs. Traditional Storage**

- ▶ Data is "distributed"
- ▶ Faster when scale out
- ▶ Not dependend on one supplier (e.g. NetApp)



## Ceph (2)

### **Daemons**

- ▶ ceph-mds
- ▶ ceph-mon
- ▶ ceph-osd
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### **Storage Types**

- ▶ Object Storage
- ▶ Block Storage
- ▶ Filesystem

# OpenStack (1)

## **Facts**

- ▶ Cloud Environment
- ▶ IaaS
- ▶ Modulare Architecture
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## **Core Services**

- ▶ Block Storage (cinder)
- ▶ Compute (nova)
- ▶ Identity (keystone)
- ▶ Image (glance)
- ▶ Networking (neutron)

## OpenStack (2)

### **Optional Services**

- ▶ Bare-Metal Provisioning (Ironic)
- ▶ Containers (Magnum)
- ▶ Dashboard (Horizon)
- ▶ Database (Trouve)
- ▶ DNS Service (Designate)
- ▶ Governance (Congress)
- ▶ Key Management (Barbican)
- ▶ Telemetry (Ceilometer)
- ▶ ...

## OpenStack (3)

### **Advantages**

- ▶ Dashboard is not complicated
- ▶ Fast growing community
- ▶ Fits perfect in an educational institution (for research)
- ▶ Many components & features
- ▶ No license fee
- ▶ Open Source
- ▶ „Self Service“

# Ansible (1)

## **Facts**

- ▶ Configuring and managing computers
- ▶ Free Software platform
- ▶ Manage nodes over SSH

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## **How it works**

- ▶ Manage over SSH
- ▶ No daemon is running
- ▶ Single controlling machine



## Ansible (2)

### **Advantages**

- ▶ Easy to learn
- ▶ No agent
- ▶ No daemon
- ▶ Use SSH for deploy

Let's take a break...

# How can we help you?

## **Proposal 0: Collaboration**

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- ▶ <https://open-infrastructure.net>

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- ▶ We can maintain your servers in your datacenter as container-servers for you
- ▶ 1'000.-/year per machine for maintainance

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### **Proposal 3: Providing Servers for you**

- ▶ We can provide dedicated container-servers in our datacenter for you
- ▶ 1'000.-/year per machine for maintenance, 1'000.-/year per machine for hardware
- ▶ SLA: 5x8 (8:00-12:00; 13:00-17:00), 4h Response, 99.999% Uptime; otherwise best-effort

Thank You for Your Attention.

♥ Source Code is freely available

```
git clone git://git.bfh.ch/git/staff/bad9/other/talks.git
```