

Breaking with conventional Configuration File Editing

Puppet with a Key/Value API in a User Study

FOSDEM 2018

Config Management devroom

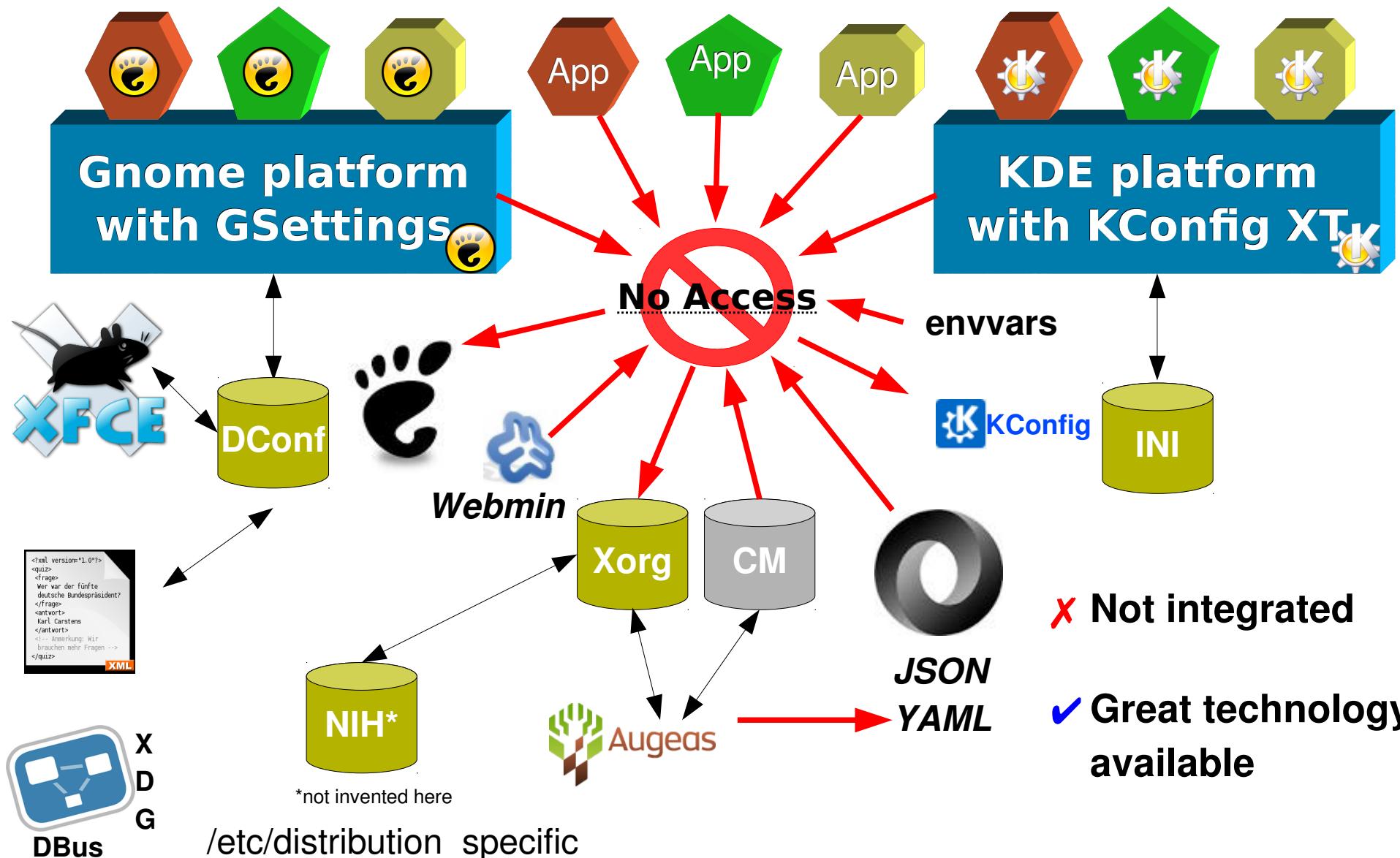


Bernhard Denner (Author of the Study)
<bernhard.denner@gmail.com>
Markus Raab <markus@libelektra.org>

<https://www.libelektra.org>



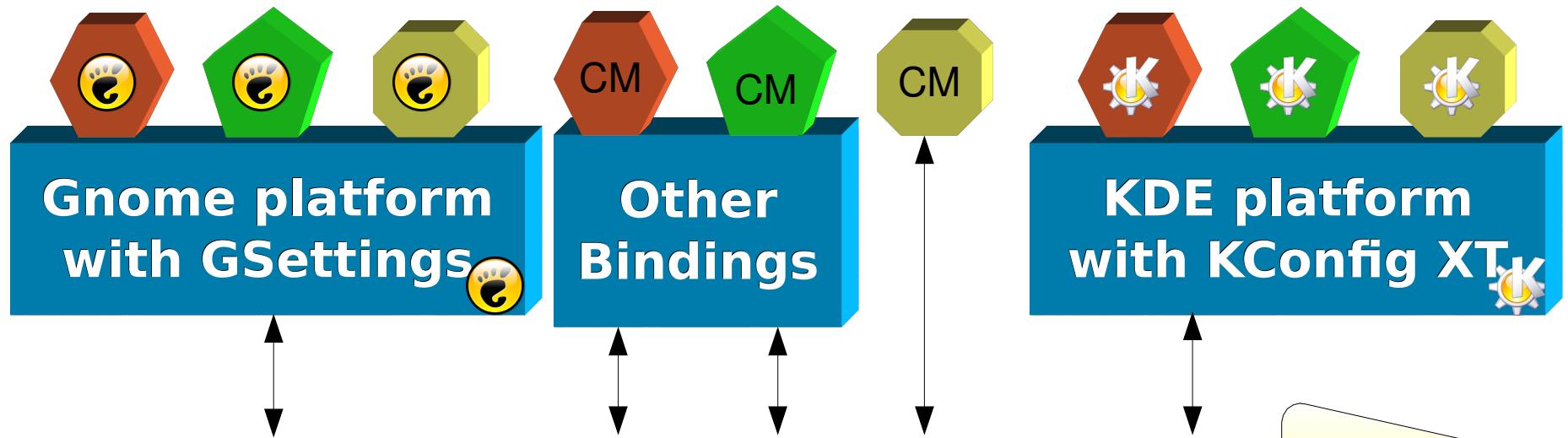
What is wrong with Configuration?



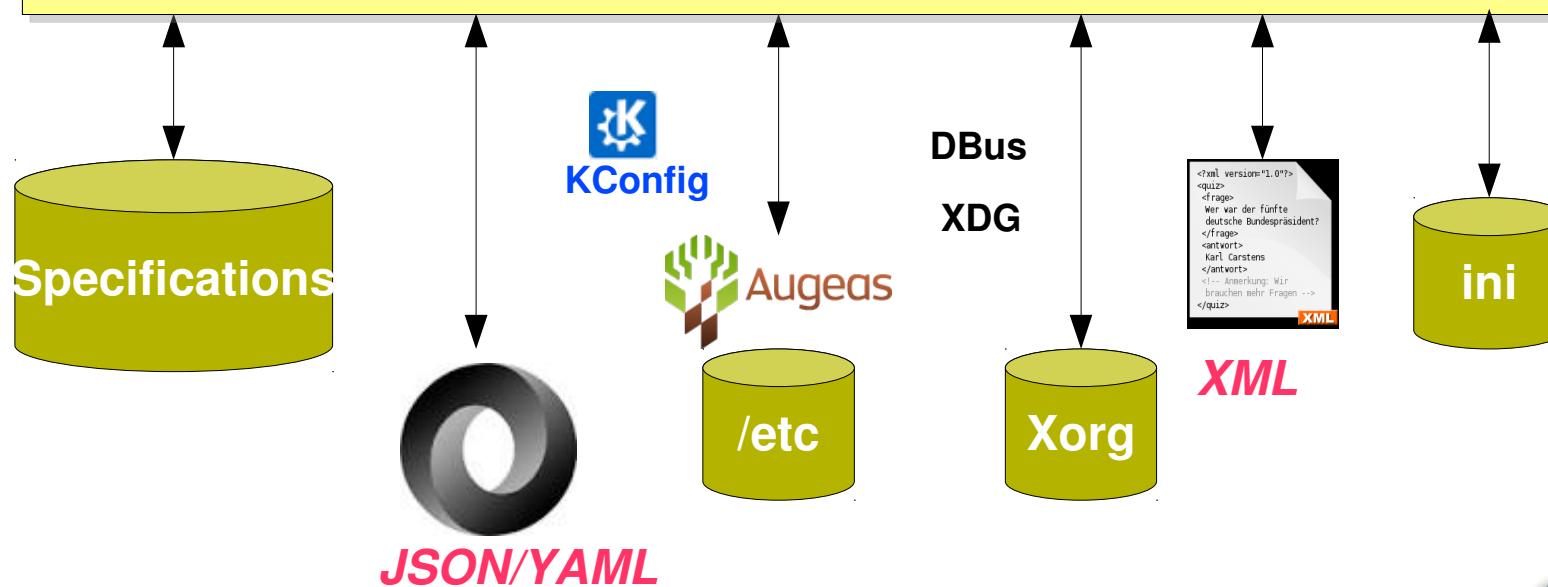
<https://www.libelektra.org>



Goal: Technology Integration



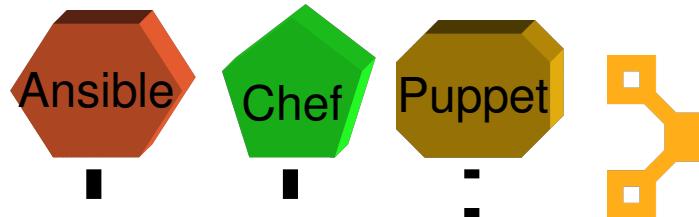
Elektra's Datastructure and Specifications



<https://www.libelektra.org>



Usable in Configuration Management



puppet

Specified Node
Configuration

Specified Node
Configuration

App A

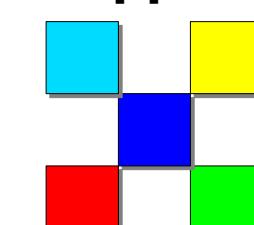
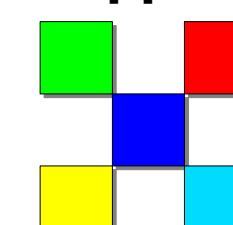
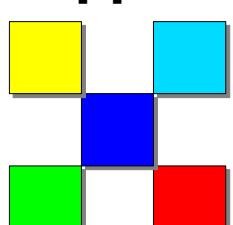
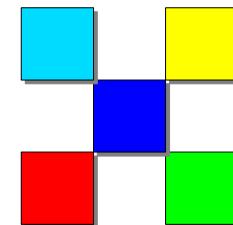
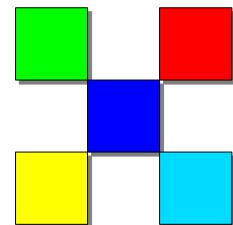
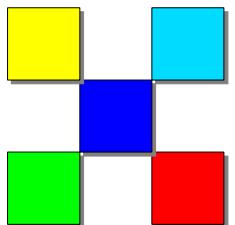
App B

App C

App A

App B

App C



Content for Today

I. *Elektra*

II. *Puppet-Elektra*

III. *Case Study*

- Web+build server

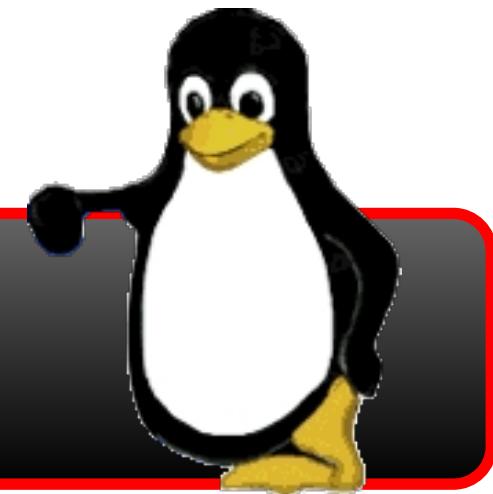
User Study

- 4 Puppet tasks in up to 3 variants
- 14 subjects



What is libelektra?

```
sh$ ldd /lib/libelektra.so
 libc.so.6 => /lib/tls/libc.so.6
 /lib/ld-linux.so.2 => /lib/ld-linux.so.2
```



- ✓ *small, fast library*
- ✓ *access to global configuration*
- ✓ *portable, no deps required (ANSI C)*
- ✓ *no daemon: security by OS*

<https://www.libelektra.org>



Abstraction: Key/Value



➤ INI



➤ XML Tool

➤ Augeas:

[env]

ls = ls -FH

vnc = vncserver

```
<?xml version="1.0"  
encoding="UTF-8"?>  
  
<keyset xmlns=""  
xsi:schemaLocation=""  
  
parent="user/env/alias">  
<key basename="ls"  
type="string"  
value="ls -FH"  
  
    <comment></comment>  
</key>  
  
<key basename="vnc"  
type="string">  
<value>vncserver  
</value>  
    <comment></comment>  
</key>  
</keyset>
```

➤ Hosts

➤ Fstab

➤ XML

➤ JSON

➤ YAML

➤ Line

➤ CSV

➤ Hosts

➤ ...



Bindings

➤ Available

- ✓ C/C++
- ✓ Shell
- ✓ Lua
- ✓ Python
- ✓ Java
- ✓ Haskell
- ✓ Ruby

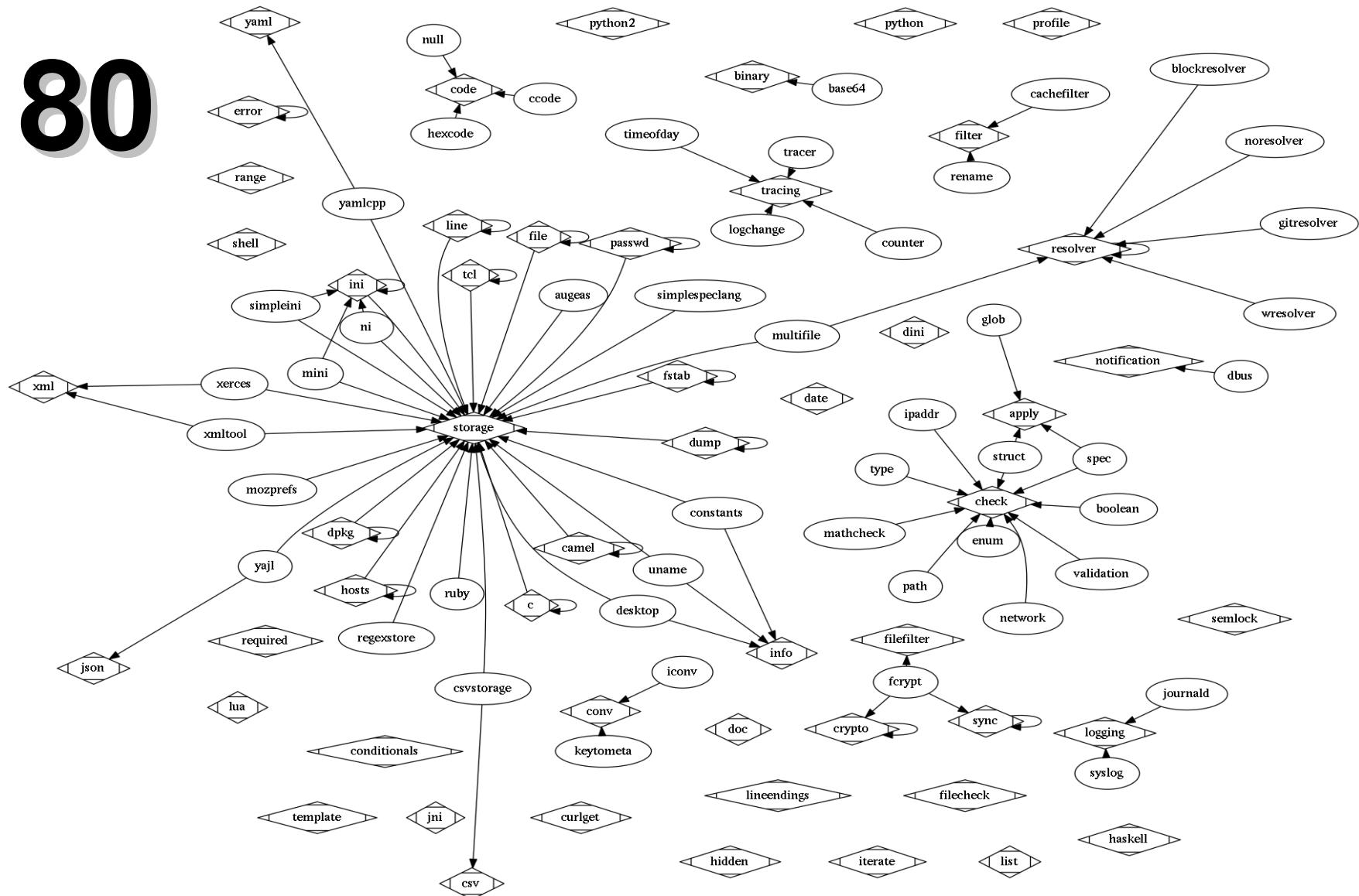
➤ Interception

- ✓ Getenv
- ✓ GSettings
- ✓ Filesystem



Available Plugins

> 80



Available Packages

OpenWrt
Wireless Freedom



➤ *Thanks to the
maintainers!*

<https://www.libelektra.org>



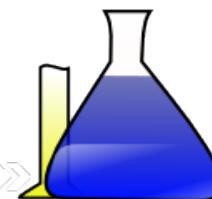
Users and Targets

✓ *Embedded Systems*



cameras

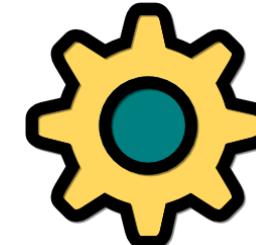
TOSHIBA
Leading Innovation >>



universities weighting scales



✓ *shared configuration in FLOSS (Desktop)*



(in progress)



➤ Your
CM?

✓ *Administrators (Servers)*



libelektra.org, universities, insurances, ...

<https://www.libelektra.org>



11



puppet



II. Puppet-Elektra

<https://www.libelektra.org>



Architecture

- ✓ libelektra Puppet integration with two resource types:
- ✓ kdbkey
- ✓ kdbmount

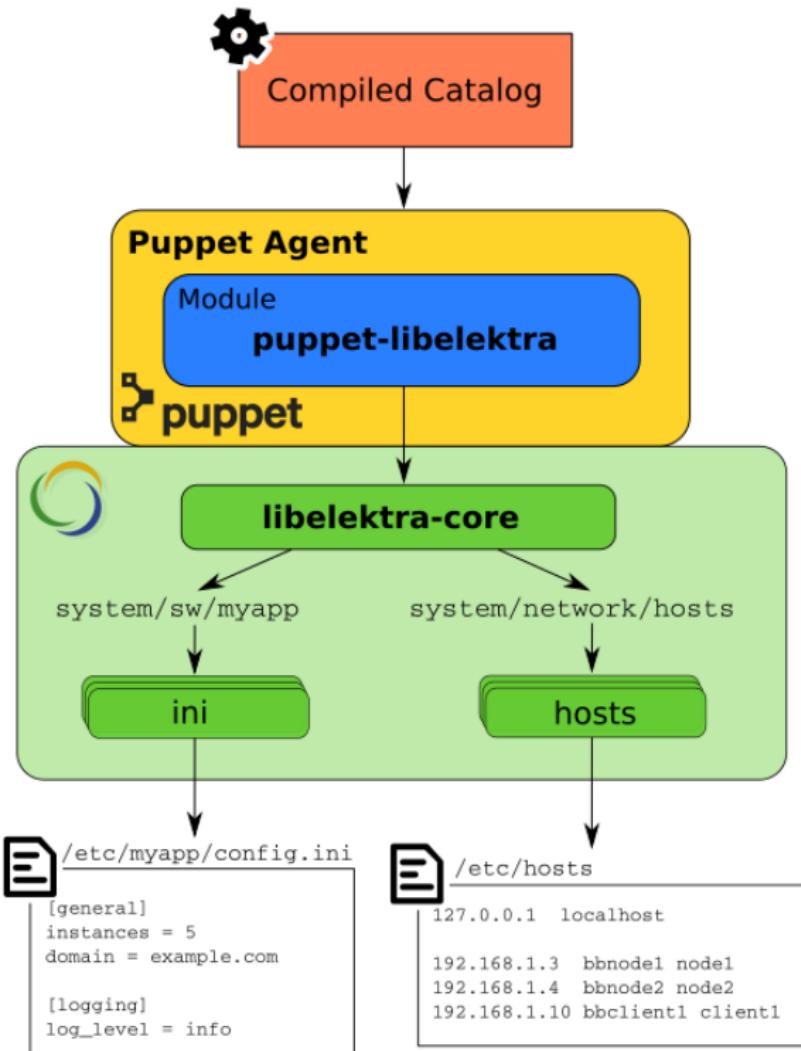


Figure 3.1: `puppet-libelektra` system overview

<https://www.libelektra.org>



Puppet-Extension: Puppet-Elektra

- ✓ treat configuration settings as **first-class citizen**
- ✓ brings all features of Libelektra to Puppet
 - ✓ many generic parsers
 - ✓ good error messages
 - ✓ ...

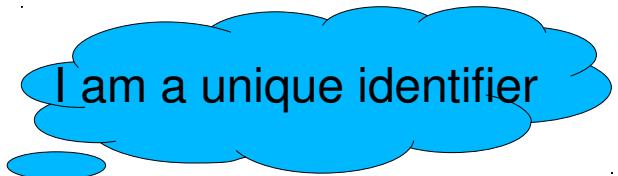


<https://www.libelektra.org>



Manage Keys

✓ as Puppet users would expect:



```
kdbkey { 'system/sw/samba/global/workgroup':  
    ensure => 'present',  
    value   => 'MY_WORKGROUP'  
}
```

```
# ensure desired configuration setting is missing  
kdbkey { 'system/sw/samba/global/debug level':  
    ensure => 'absent'  
}
```

Mounting

- ✓ ... is the mapping between file system and Elektra
- ✓ ideally applications already specify their configuration
- ✓ otherwise, we do it in Puppet:

```
# mount the file /etc/samba/smb.conf at system/sw/samba
kdbmount { 'system/sw/samba':
  ensure  => 'present',
  file    => '/etc/samba/smb.conf',
  plugins => 'ini'
}
```

Specifications

- ✓ *add validation code:*

```
kdbkey { 'system/sw/myapp/priority':  
    ...  
    check => {  
        'type'  => 'short',  
        'range' => '0-9'  
    }  
}
```

- ✓ *is checked on the target with plugins*
- ✓ *can refer to information only available locally*

A close-up photograph of two monkeys, likely rhesus macaques, grooming each other. One monkey's head is buried in the fur of the other, and they appear to be engaged in a social bonding activity.

Is more comfort possible?

<https://www.libelektra.org>



18

Implicit Checks

- ✓ *some plugins already know their data:*

```
kdbmount {'system/hosts':  
  ensure => 'present',  
  file => '/etc/hosts_bs',  
  plugins => ['hosts', 'glob', 'network']  
}  
  
kdbkey{  
  prefix => 'system/hosts/ipv4'  
}  
  
kdbkey {"$master_hostname":  
  ensure => 'present',  
  value => "$master_ip"  
}
```

- ✓ *hostnames are checked locally using getaddrinfo*
- ✓ *applications should deliver their specification*

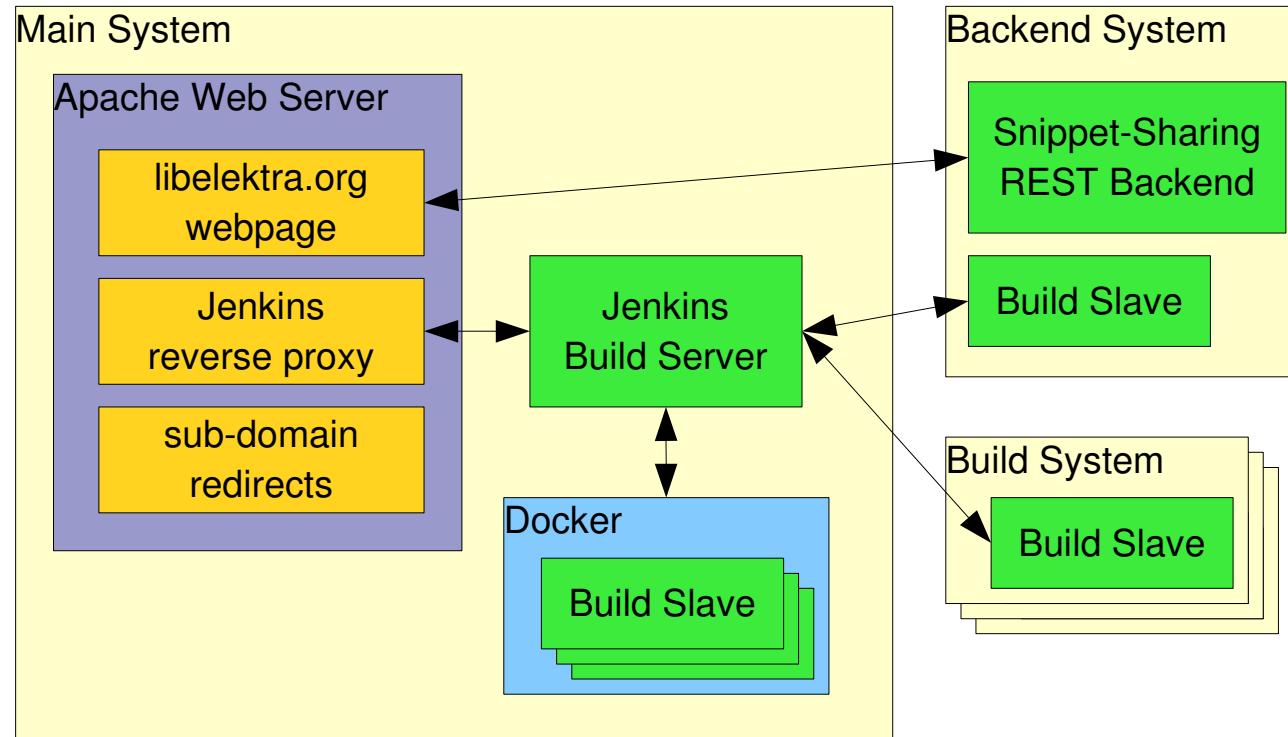


III. Case & User Study

<https://www.libelektra.org>



Case Study



<https://www.libelektra.org>



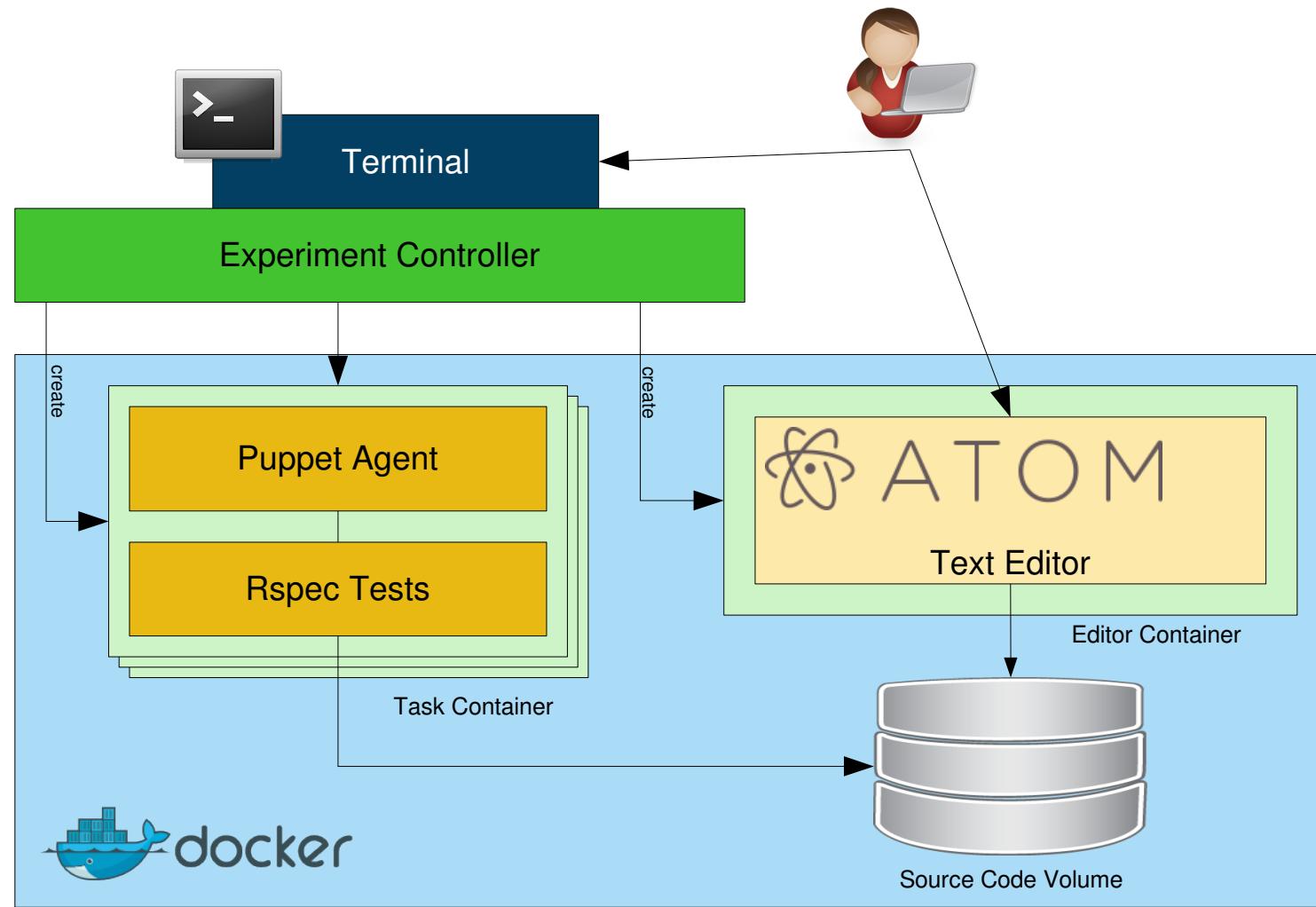
User Study Overview

- *4 Puppet tasks in up to 3 variants*
- *14 subjects*
- *focus on configuration file editing*
- *compare usability*
 - kdbkey, augeas, ini_settings, host
- *time measurement*

<https://www.libelektra.org>



Setup

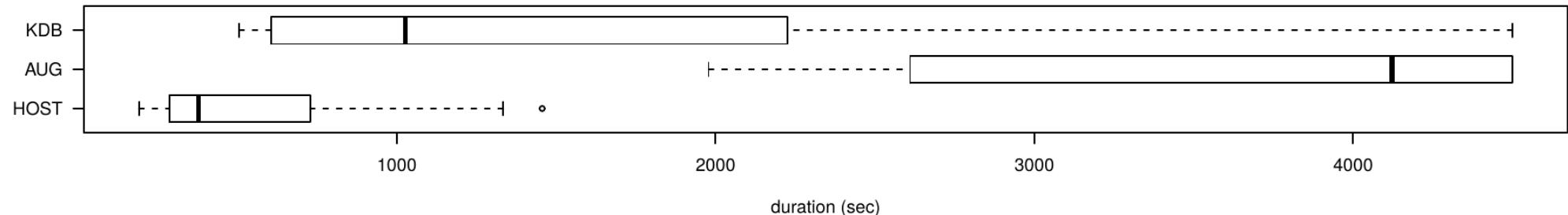


<https://www.libelektra.org>

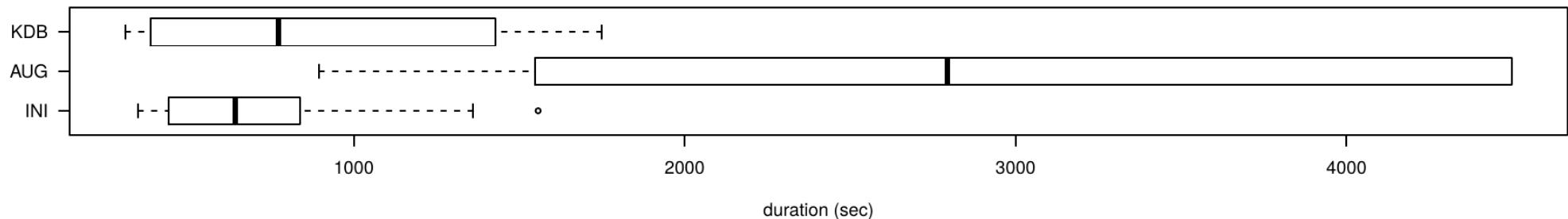


Working Duration

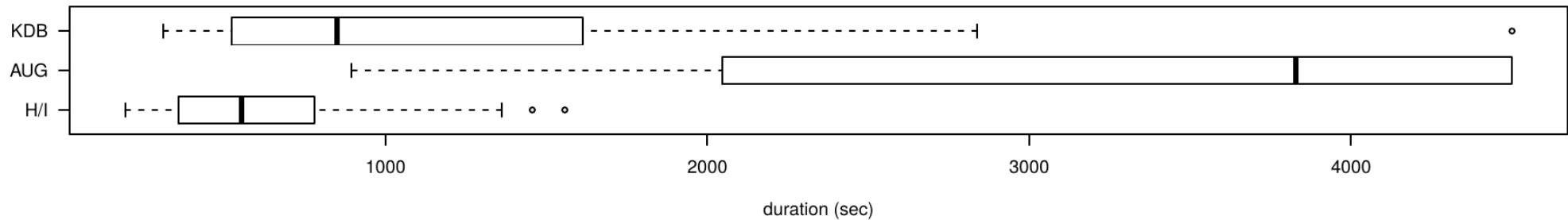
Task 2.1 = host file editing



Task 2.2 = samba config editing



Task 2.1 + 2.2



Significant?

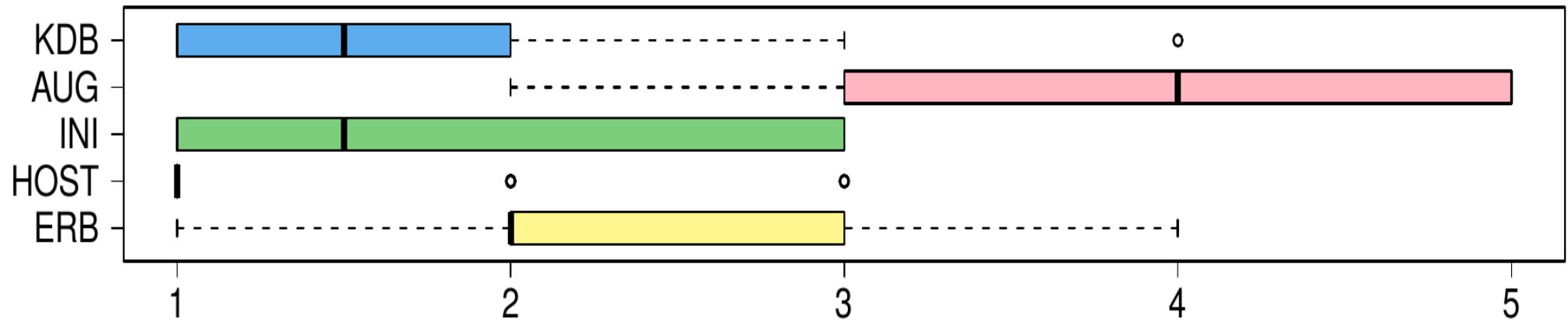
- *Puppet-Elektra significantly faster to use, except:*
 - host is faster (Task 2.1)
 - ini_setting is on-par but not generic (Task 2.2)
 - unclear for maintenance tasks (Task 3)

Task	Methods	Shapiro-Wilk	paired T-test	Wilcoxon test	H_0 rejected
Task 1	ERB - KDB	0.4	0.06	0.02	yes [†]
Task 2.1	HOST - AUG	0.08	8×10^{-8}	6×10^{-6}	yes
Task 2.1	HOST - KDB	0.5	0.004	0.005	yes
Task 2.1	AUG - KDB	0.6	5×10^{-6}	4×10^{-4}	yes
Task 2.2	INI - AUG	0.1	3×10^{-5}	3×10^{-5}	yes
Task 2.2	INI - KDB	0.4	0.1	0.7	no
Task 2.2	AUG - KDB	0.3	7×10^{-5}	3×10^{-4}	yes
Task 3	ERB - KDB	1	0.3	0.2	no

[†] result of Wilcoxon test used, since test for normality was rejected. However, the result of the paired T-test is very close to your chosen significance level

Usability?

- *from questionnaire during user study*
- rate usability: 1 (best), 5 (worst)
- *people liked host best (specialized)*
- *ini_settings and Puppet-Elektra are second best*



Contributions Welcomed!

support for Puppet 4+

Ruby gem for Elektra

multikey support



Who is working on Elektra?



Who is working on Elektra?

- Armin Wurzinger: type system
- Bernhard Denner: Puppet
- Daniel Bugl: WebUI
- Dominik Hofer: high-level API
- Kurt Micheli: order preserving minimal perfect hash map
- Marvin Mall: website
- Mihael Pranjić: mmap plugin
- Peter Nirschl: fcrypt+crypto plugin
- Raffael Pancheri: Qt GUI
- René Schwaiger: parsing techniques
- Thomas Wahringer: notification
- Thomas Waser: validation and transformations of configuration
- Ulrike Schaefer: shell completion
- Vanessa Kos: misconfiguration bug database



active community



➤ You: New CMs?



configuration

<https://www.libelektra.org>



Resources

Thank you for your attention!

Drop us an email or open a issue!

Questions?



- Homepage: <https://www.libelektra.org/>
- Data: <http://puppet-userstudy-results.libelektra.org/>
- Build Server: <https://build.libelektra.org/>
- Puppet-Elektra: <https://puppet.libelektra.org/>



Bernhard Denner (Author of Study)

<bernhard.denner@gmail.com>

Markus Raab <markus@libelektra.org>

<https://www.libelektra.org>

