

A Short Story of (Mis)Configuration

Introducing Validation with Elektra

Fosdem 2018

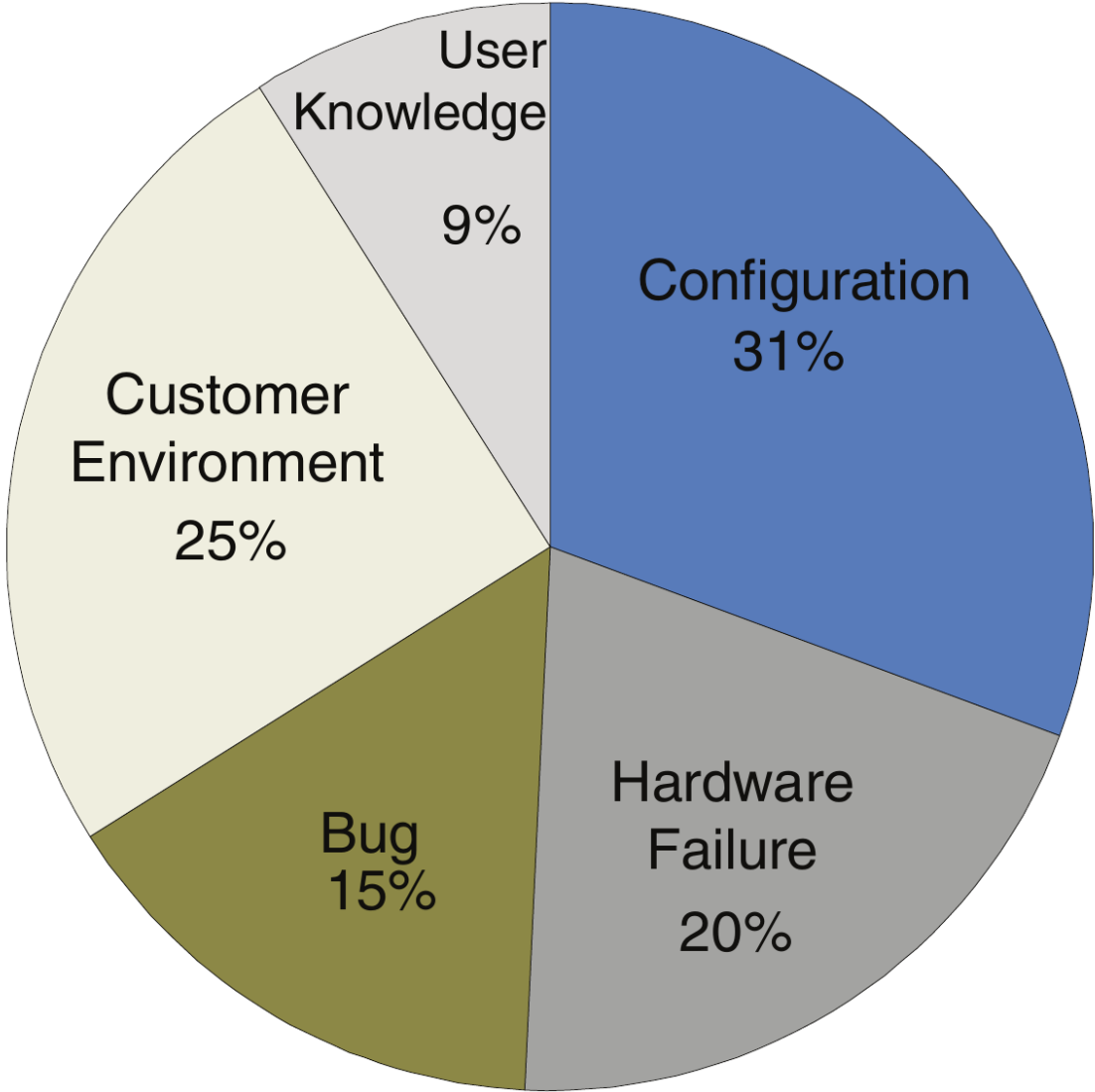
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<http://www.libelektra.org>



Misconfiguration



Yin 2011



Major Findings on Prevalence and Severity of Configuration Issues (Section 3)

Similar to results from previous studies [11, 29, 30], data from COMP-A shows that a significant portion (27%) of customer cases are related to configuration issues.

Configuration issues cause the largest percentage (31%) of high-severity support requests.

Major Findings on Misconfiguration Types (Section 4)

Configuration-parameter mistakes account for the majority (70.0%~85.5%) of the examined misconfigurations.

However, a significant portion (14.5%~30.0%) of the examined misconfigurations are caused by software compatibility issues and component configuration, which are not well addressed in literature.

38.1%~53.7% of parameter misconfigurations are caused by illegal parameters that violate formats or semantic rules defined by the system, and can be potentially detected by checkers that inspect against these rules.

A significant portion (12.2%~29.7%) of parameter mistakes are due to value-based inconsistency, calling for an inconsistency checker or a better configuration design that does not require users to worry about such error-prone consistency constraints.

Although most misconfigurations are located within each examined system, still a significant portion (21.7%~57.3%) involve configurations beyond the system itself or span over multiple hosts.

Major Findings on System Reactions to Misconfigurations (Section 5)

Only 7.2%~15.5% of the studied misconfiguration problems provide explicit messages that pinpoint the configuration error.

Some misconfigurations have caused the systems to crash, hang or have severe performance degradation, making failure diagnosis a challenging task.

Messages that pinpoint configuration errors can shorten the diagnosis time by 3 to 13 times as compared to the cases with ambiguous messages or by 1.2 to 14.5 times as compared to cases with no messages.

Major Findings on Causes of Misconfigurations (Section 6)

The majority of misconfigurations are related to first-time use of desired functionality. For more complex systems, a significant percentage (16.7%~32.4%) of misconfigurations were introduced into systems that used to work.

By looking into the 100 used-to-work cases (32.4% of the total) at COMP-A, 46% of them are attributed to configuration parameter changes due to routine maintenance, configuring for new functionality, system outages, etc, and can benefit from tracking configuration changes. The remainder are caused by non-parameter related issues such as hardware changes (18%), external environmental changes (8%), resource exhaustion (14%), and software upgrades(14%).

Major Findings on Impact of Misconfigurations (Section 7)

Although most studied misconfiguration cases only lead to partial unavailability of the system, 16.1%~47.3% of them make the systems to be fully unavailable or cause severe performance degradation.

Table 1: Major findings on misconfiguration characteristics. Please take our methodology into consideration when you interpret and draw any conclusions.

Yin 2011



Mistakes?

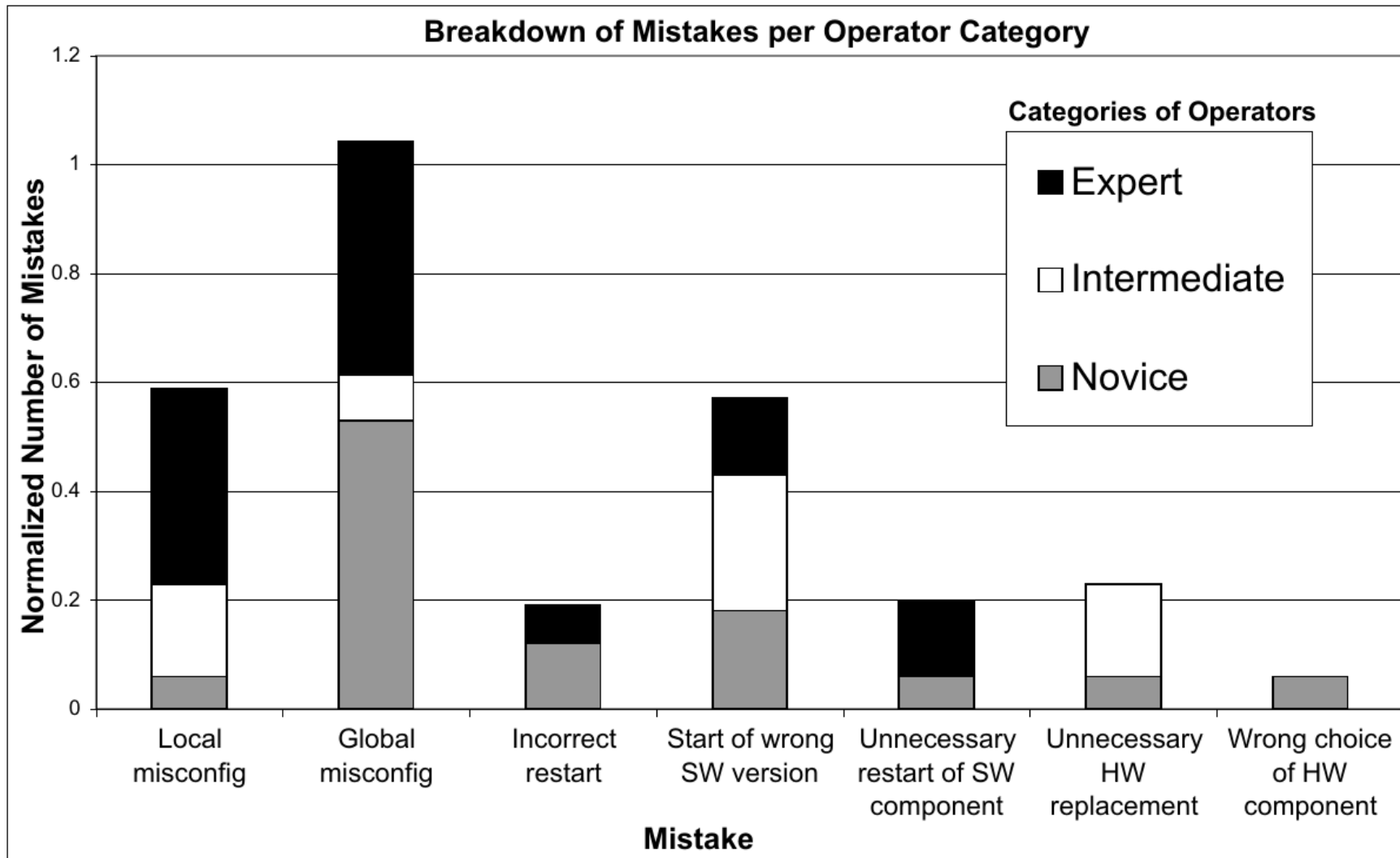


Figure 2: *Operator mistakes per operator category.*

Nagaraja 2004



Education?

And now all together: The problem is known, we are working on it, the problem is known, we are working on it,...



- *You cannot learn to make no mistakes*
- *Many similar formats*
- *Weak tooling*
- *Little documentation*
- *Not transparent*
- *System admins have no easy life*

Seminar for System Administrators

<http://www.libelektra.org>





Local
Validation

Validate Local Configuration

✓ Regex Validation (could be in Puppet)

```
# kdb set system/sw/xorg/Screen/Display/Modes 12y80x1024  
Could not validate "12y80x1024", needed [0-9]+x[0-9]+
```

✓ Network

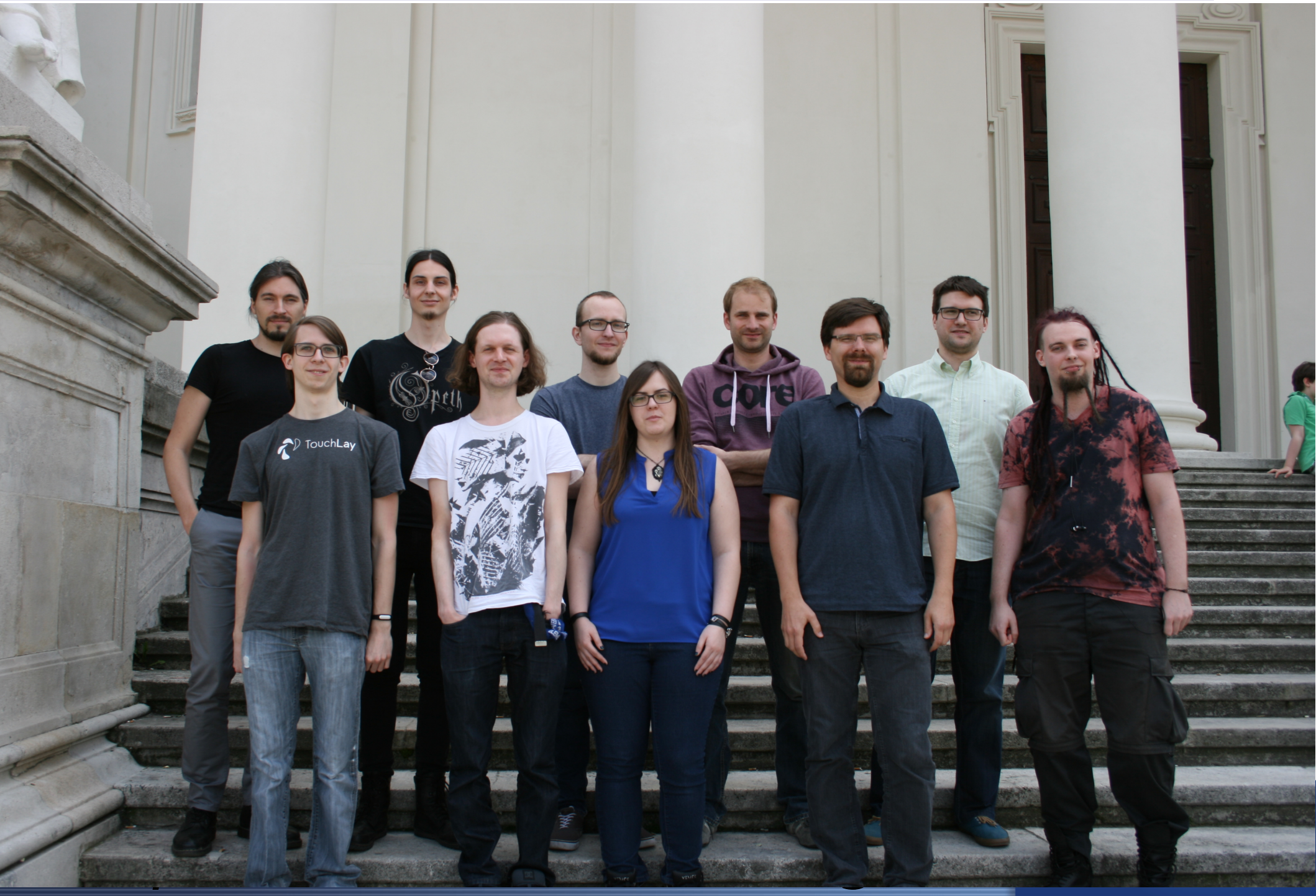
```
$ kdb set user/hosts/hostname 192.168.0.x  
Cannot reach IP Address:  
Name or service not known
```

✓ File System

```
$ kdb set user/idea/local/cache /mnt/nfs  
Cache is not suitable to be on an NFS device  
/mnt/nfs is currently mounted on NFS
```



Who is working on Elektra?



Who uses Elektra? What are the targets?

✓ *Embedded Systems*



cameras



universities



weighing scales

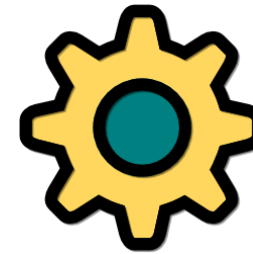
✓ *shared configuration in FLOSS (Desktop)*



oupanos



(in progress)



➤ Your project?

✓ *Administrators (Servers)*



<http://www.libelektra.org>



Resources

Thank you for your attention!

Drop us an email or open a issue!

Questions?

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- *Open Data: <https://rawdata.libelektra.org>*
- *Build Server: <https://build.libelektra.org/>*

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