Config Workshop

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Akademy 2018, TU Wien

13.8.2018
Motivation

1. Motivation
2. Topics
3. Some Research Input
Problems

- configuration settings can be very complex
- not all configuration settings changeable via GUI
- configuration settings not sharable
Misconfiguration

- configuration is a user interface for both developers and system administrators
- *misconfigurations* are a major cause of system failures
- much time needed to fix misconfigurations
Examples

Not every misconfiguration involves big companies, cloud, and huge amounts of money:

- No internet access because resolv.conf symlink broken.
- KDE crash because of ulimit setting.
- Crash if config files are missing. KDE #262307
- Akonadi fails to start after mysql upgrade. Debian #843534
Game

Task

We start by getting to know each other.

- Go to someone you do not know.
- Ask about the person:
  - Name
  - free software activities
  - What is your motivation for coming here?
  - Have you already experienced misconfiguration?
  - Did you read about misconfiguration in the news?
  - ...  
- When all are finished, introduce the person you asked.
Who?

David Faure <faure@kde.org>
Markus Raab <markus.raab@tuwien.ac.at>
Sandro Knauß <sknauss@kde.org>
David Edmundson
Adriaan de Groot
Johannes Zarl-Zierl
Dan
Tobias Fischbach <fit@mailbox.org>
Allan
Sune
Fabian Vogt
Elvis Angelaccio <elvis.angelaccio@kde.org>
Kevin Kofler
Bernhard Schiffner
Helio Chissini de Castro
Organization

Slides available at
http://www.complang.tuwien.ac.at/raab/akademy.pdf


Time Line:

10:30  Slot 1: brainstorm+decide on topics
11:30  Slot 2
12:30  Lunch: Pizza
13:00  Slot 2 ½
14:00  Slot 3
Topics

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Topic: Code generation

- KConfig XT quite enhanced compared to other projects
- improve CMake for users
- GenElektra (not discussed)
- Standard Path for Installing the files?
- Config Options for KConfig XT
- QML
- Wrap with QObject
- Have run-time validation? (not discussed)

Talk: Dan
Topic: *some research input*

- sources of configuration
- trend
- early detection of misconfiguration

Talk: Markus Raab
Topic: *notification*

- out-of-sync problems
- emergent misbehavior
- notification at sync time
- kconfig might return outdated config

In Elektra: `src/libs/notification/example/example_notification_async.c`

Talk: David Edmundson
Topic: *Caching*

- what happened with the caching of configuration files (iirc it was available somewhere in KDE3)
- mmap cache

Talk: David Faure &lt;faure@kde.org&gt;
Topic: *LDAP*

- bring back Backends?
- needs to be async
- needs local cache

**Talk:** Helio Chissini de Castro
Topic: *Interfaces to Config*

- generated interfaces
- custom manually-implemented interfaces
- generic interfaces (key/value)

Talk: Markus Raab
Topic: configuration specification

- make configuration settings safer
- complexity reduction
- configuration-less systems (auto-detection)
- agreement that override is often needed

Talk: Markus Raab
Topics: configuration design

- separate more and less volatile configuration (state) e.g. have screen resolution in the config path
- avoid binary blobs
- see configuration setting as human interface
- guidelines, e.g., avoid complexity: limit number and range of configuration as much as possible

Talk: Sandro Knauß <sknauss@kde.org> (till 14:00)
kconf_update

- who uses it?
- problems: not always performed
- future?
- Waldo?

Talk: David Edmundson
Elektra

- Add as dep in KDE?
- Maybe in KDE Plasma 6 (year 2020)
- Alternative: improvements in Kconfig

Talk: Markus Raab
Topic: *kiosk mode*

- who uses it?
- problems?
- how is it used?

Talk: ?
In which topics are you interested?

Task (1)
Topics to drop?

Task (2)
Further Topics to be discussed?

Task (3)
Scheduling Constraints?
Some Research Input

1 Motivation

2 Topics

3 Some Research Input
Method

\( S \): source code analysis of 16 applications (including akonadi), comprising 50 million lines of code

\( Q \): survey with 672 persons visiting, 162 persons completing the survey

\( R \): runtime logs of applications with Elektra’s getenv
Q: “What is your experience with the following configuration systems/libraries/APIs?” (very) frustrating to work with:

- `getenv` (10 %, \( n = 198 \))
- configuration files (6 %, \( n = 190 \))
- command-line options (4 %, \( n = 210 \))
- X/Q/GSettings (41 %, 14 %, 35 %)
- KConfig (21 %)
- dconf (42 %)
- plist (32 %)
- Windows Registry (69 %)
No-Futz

- futzing is “tinkering or fiddling experimentally with something.”
- With no-futz computing means “futzing should be allowed, but should never be required.”
- currently configuration is error-prone and under-specified, futzing is often required

Counter measurements:
- no configuration
- specified, introspectable configuration
Number of `getenv` Firefox

![Graph showing the number of `getenv` Firefox occurrences over time. The x-axis represents the date from 2008 to 2016, and the y-axis represents the occurrences. There is a steady increase in occurrences from 2008 to 2016.](image-url)
Number of Getenv Chromium
Number of Getenv Akonadi

![Graph showing occurrences over dates]

Occurrences

Date

$R$: Akonadi had the largest number of `getenv` invocations at run-time. The environment variable `LANGUAGE` alone was requested 5126 times. KDE startup: 27\% of all `getenv` invocations used the parameter `LANGUAGE`. requested/unique parameters: median is 14\% but for Akonadi it is only $\sim 1\%$. 
Early detection

- 12% – 39% configuration settings are not used at all during initialization.
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- Applications often have latent misconfigurations (14% – 93%)

- Latent misconfigurations are particularly severe (75% of high-severity misconfigurations)

- Latent misconfiguration needs longer to diagnose