Review and Update on **Kieker**

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Reliable Software Systems Group

SSP 2015
05. November 2015 @ Munich
Overview

Monitoring Probe
Software System with Monitoring Instrumentation
Dynamic Analysis with Kieker
[van Hoorn et al. 2012]

Overview

Monitoring Records

Measurement

Monitoring log/stream

Software System with Monitoring Instrumentation
Dynamic Analysis with Kieker
[van Hoorn et al. 2012]

Overview

Analysis Configuration (via API and WebGUI)

Pipes and Filters

Monitoring Records

Measurement

Monitoring log/stream

Analysis

Software System with Monitoring Instrumentation
Dynamic Analysis with Kieker

[van Hoorn et al. 2012]

Overview

Analysis

Analysis Configuration (via API and WebGUI)

Pipes and Filters

Invocations/minute [x 1000]

Calendar time (hh:mm)

Workload Anomaly Detection

0.0

0.5

1.0

1.5

2.0

SRV0::

@3:..Bookstore

SRV0::

@1:..Catalog

SRV0::

@2:..CRM

SRV1::

@1:..Catalog

<<execution container>>

SRV0

<<deployment component>>

@3:..Bookstore

<<deployment component>>

@2:..CRM

<<deployment component>>

@1:..Catalog

<<execution container>>

SRV1

<<deployment component>>

@1:..Catalog

searchBook()

getBook(..)

getOffers()

getBook(..)

1635

getBook(..)

543

getBook(..)

1092

573

1062

$ 1635

Online and Offline Visualization

Software System with Monitoring Instrumentation

Monitoring Records

Measurement

Monitoring log/stream

Analysis

Pipes and Filters

Online and Offline Visualization

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Framework Features & Extension Points

Kieker

- Modular, flexible, and extensible architecture (Probes, records, readers, writers, filters etc.)
- Pipes-and-filters framework for analysis configuration
- Distributed tracing (logging, reconstruction, visualization)
- Low overhead (designed for continuous operation)
- Evaluated in lab and industrial case studies

Kieker is open-source software (Apache License, V. 2.0)

http://kieker-monitoring.net

Recommended Tool of the SPEC Research Group

Kieker is distributed as part of SPEC RG’s repository of peer-reviewed tools for quantitative system evaluation and analysis,

http://research.spec.org/projects/tools.html
Agenda

1 Overview

2 Review

3 Summary and Outlook
Looking back ... 2006–2009

Review
Looking back ... 2006–2009

Review

2006
2007
2008
2009

Trustworthy Software Systems
Component Technology

Performance Monitoring von Middleware-basierten Applikationen

May 2006
May 2007
May 2008
May 2009

EWE
Nokia Siemens Networks
Sourceforge
cewe color

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Looking back ... 2010–2013

Review

2010
May Sept.
2011
May Sept.
2012
May Sept.
2013
May Sept.

JUnit

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Looking back... 2010–2013

Review

- 2010
  - May
  - Sept.

- 2011
  - May
  - Sept.

- 2012
  - May
  - Sept.

- 2013
  - May
  - Sept.

Projects:
- JUnit
- DynaMod
- PubFlow
- Menges
- Kosse
- Dataport
- HSH Nordbank
- XING

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Looking back . . . 2010–2013
Looking back ... 2010–2013

2010

- MENGES
- KoSSE

2011

- DynaMod
- PubFlow

2012

- iObserve
- ESN SL

2013

- Kieker Days '12

Regular meetings:

- JUnit
- FindBugs
- trac
- b+m
- dataport
- HSH Nordbank
- XING

1.1 2010

1.2

1.3 2011

1.4

1.5 2012

1.6

May Sept.

May Sept.

May Sept.

May Sept.
Looking back ... 2010–2013

Review

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Looking back ... 2014–2015

Review

PubFlow

iObserve

FindBugs

trac

SourceForge

regular meetings

SOSP '14

2014

2015

May

Sept.

May

Sept.

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Looking back . . . 2014–2015

1.11 1.12
SSP '15

1.9 1.10
FindBugs

regular meetings
iObserve
SOSP '14

Open-Source Software as Catalyzer for Technology Transfer: Kieker's Development and Lessons Learned

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Abstract: The monitoring framework Kieker commenced as a joint diploma thesis of the University of Oldenburg and a telecommunication provider in 2006, and grew toward a high-quality open-source project during the last years. Meanwhile, Kieker has been and is employed in various projects. Several research groups constitute the open-source community to advance the Kieker framework. In this paper, we review Kieker's history, development, and impact as catalyzer for technology transfer.

1 Introduction
The development of tools is common practice for researchers in order to demonstrate the practicality of developed research approaches and to qualitatively and quantitatively evaluate their research results. During the last years, there is an increasing trend that researchers make their tools publicly available under an open-source license, e.g., allowing a more thorough evaluation of work presented in research papers, as well as easing reproducibility of results and building on the work of others. The state of these tools ranges from proof-of-concept implementations to full-blown products. Popular examples of wide-spread and mature open-source tools originally developed and maintained by researchers include the probabilistic model checker PRISM [KMP11] and the R language and environment for statistical computing [R DI08].

Since 2006, we have been developing the Kieker framework for dynamic analysis of software systems.¹ In this paper, we review Kieker's history, development, and impact as catalyzer for technology transfer. Parts of this paper have been published in a PhD dissertation [vH14, Chapter 15], which also includes a more detailed description of the framework (in addition to [vH08, vHR10, vHR12]) as well as its development process and infrastructure.

2 Kieker's Development and Impact
This section reviews the past years of Kieker development and gives some indication of the impact in terms of where and by whom Kieker has been developed and used.

¹The Kieker framework's web site—including downloads, documentation, publications, and references—is available at http://kieker-monitoring.net.
Evolution of Code Size and Downloads

LOC obtained via `wc -l <file>.java`

Review

![Graph showing the evolution of code size and downloads over time. The x-axis represents the month of the year from August 2008 to June 2015, and the y-axis represents the number of lines of code (KLOC) in thousands. The graph includes two lines: one for LOC (sources + tests) and one for LOC (tests only).]

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Evolution of Code Size and Downloads

LOC obtained via `wc -l <file>.java`

Review

```

<table>
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<tr>
<th>Month of year (from Aug 2008 to Jun 2015)</th>
<th>Release number</th>
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<td>0.5 0.91 1.0 1.1 1.2 1.3 1.4 1.5 1.6 1.7 1.8 1.9 1.10 1.11</td>
</tr>
</tbody>
</table>

KLOC (LOC in thousands)

LOC (sources + tests)

LOC (tests only)

Brought to you by: avanhoorn, janwaller, mat-rohr

Home (Change File)

Date Range: 2007-12-17 to 2015-08-31

DOWNLOADS

5,944

In the selected date range

TOP COUNTRY *

Germany

47% of downloaders

TOP OS *

Windows

60% of downloaders

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Kieker

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1 Overview

2 Review

3 Summary and Outlook
Current Activities (Selection) toward Kieker 2.0

- New high-throughput infrastructure for Kieker Analysis
  - Based on TeeTime [Wulf et al. 2014], http://teetime.sf.net
- Kieker Trace Diagnosis
  - Trace diagnosis tool to identify typical performance problems
- Eclipse plugin for profiling
- Docker-based Kieker example (NetflixOSS RSS reader application)
- Interoperability with other monitoring tools via a common trace API
- Analysis of Kieker development process and infrastructure

Ticket System: Current/Upcoming Issues

http://trac.kieker-monitoring.net
For a comprehensive list of publications, talks, and theses about Kieker, visit: http://kieker-monitoring.net/research/


