Kieker: Overview, Review, and Outlook

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Software Engineering Group

Kieker Days 2012
November 29, 2012 @ Kiel
Dynamic Analysis with Kieker

Overview

Software system with monitoring instrumentation

Monitoring probe

Software system with monitoring instrumentation
Dynamic Analysis with Kieker

Overview

Measurement

Monitoring records

Monitoring log/stream

Monitoring probe

Software system with monitoring instrumentation
Dynamic Analysis with Kieker

Overview

Monitoring records

Analysis configuration (Web GUI)

Analysis

Plugins

Visualizations

Monitoring log/stream

Software system with monitoring instrumentation

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Overview

1. **Architecture Discovery**: Model Extraction and Visualization

2. **Application Performance Management**: Anomaly Detection + Diagnosis
Overview

Architecture Discovery: Model Extraction + Visualization

[van Hoorn et al. 2009]
Architecture Discovery: Model Extraction + Visualization (cont’d)
Architecture Discovery: Model Extraction + Visualization (cont’d)
Overview

Architecture Discovery: Model Extraction + Visualization (cont’d)
Architecture Discovery: Model Extraction + Visualization (cont’d)

[Döhring 2012] (based on [Wulf 2010])
APM: Anomaly Detection + Diagnosis

[Image of a screen showing a graph with anomaly detection and diagnosis features]

[Bielefeld 2012]
APM: Anomaly Detection + Diagnosis (cont’d)

[Marwede et al. 2009]
Agenda

1 Overview

2 Review

3 Outlook
Looking back ... 2006–2008

Review
Looking back ... 2006–2008

Review

versions 0.5/0.6

- 1st Sourceforge releases
- Monitoring Component - \textit{Tpmon}
- DB and FS Writer (sync&async)
- 12 Java classes
- 2 AspectJ probes
- (Analysis component - \textit{Tpan} - not part of the releases)
Looking back ... 2009–2012

Review

version 0.91
- Distributed monitoring
- Servlet, CXF, and Spring probes
- 36 Java classes

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Nov. 29, 2012 @ Kiel
Looking back . . . **2009–2012**

**Review**

- **2009**
  - May Sept.

- **2010**
  - May Sept.

- **2011**
  - May Sept.

- **2012**
  - May Sept.

**versions 0.95a/1.0**

- Major architectural changes (2009 TR)
- Generalized/extensible monitoring record model
- Generalized/extensible writer/reader model
- First release containing parts of the analysis component
- Micro-benchmark
- Version 1.0: 81 Java class files + 28 Java test files
Looking back . . . 2009–2012

Review

version 1.1
- TraceAnalysis tool
- System meta-model
- On-the-fly trace reconstruction
- 141 Java classes

version 1.2
- User Guide
Looking back ... 2009–2012

Review

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Looking back... 2009–2012

**Review**

- **2009**
  - May to Sept.

- **2010**
  - May to Sept.

- **2011**
  - May to Sept.

- **2012**
  - May to Sept.

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**version 1.3**

- Various new features
- Improved configuration management
- Initial version submitted to SPEC RG
- 205 Java classes + 42 test classes

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**2009**

- May
- Sept.

**2010**

- May
- Sept.

**2011**

- May
- Sept.

**2012**

- May
- Sept.

---

**Regular meetings**

**FindBugs**

- Various new features
- Improved configuration management
- Initial version submitted to SPEC RG
- 205 Java classes + 42 test classes
Looking back . . . 2009–2012

Review

- Various new features
- Improved configuration management
- Initial version submitted to SPEC RG
- 205 Java classes + 42 test classes

version 1.3

- Major improvements to code quality
- Revised version for SPEC RG

version 1.4

regular meetings
Looking back ... 2009–2012

Review

- Completely reworked pipes-and-filters framework
- Event-based tracing
- 284 Java classes + 92 test classes

version 1.5
Looking back... 2009–2012

**Review**

- **2009**
  - May Sept.
  - Completely reworked pipes-and-filters framework
  - Event-based tracing
  - 284 Java classes + 92 test classes

- **2010**
  - May Sept.
  - Adaptive Monitoring
  - WebGUI (beta)
  - 375 Java classes + 147 test classes

- **2011**
  - May Sept.

- **2012**
  - May Sept.

**Version 1.5**
- Completely reworked pipes-and-filters framework
- Event-based tracing
- 284 Java classes + 92 test classes

**Version 1.6**
- Adaptive Monitoring
- WebGUI (beta)
- 375 Java classes + 147 test classes
Evolution of Kieker's Code Size ('master')

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

Review

<table>
<thead>
<tr>
<th>Year</th>
<th>Month</th>
<th>LOC (sources + tests)</th>
<th>LOC (tests only)</th>
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<td>10</td>
<td>5</td>
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Evolution of Kieker’s Code Size (’master’) LOC obtained via `wc -l <file>.java`

Review

- LOC (sources + tests)
- LOC (tests only)

Version 1.0

- LOC(s) 100%
- LOC(t) 100%
- LOC(s+t) 100%

- 12/’10
  - 277%
  - 272%
  - 276%

- 12/’11
  - 332%
  - 301%
  - 327%

- 11/’12
  - 483%
  - 999%
  - 561%
Evolution of Kieker’s Code Size (‘master’) LOC obtained via `wc -l <file>.java`

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  - 561%

Number of Java files:
- 100% source
- 100% tests
- 100% total

- 244%
- 160%
- 225%
- 298%
- 200%
- 275%
- 463%
- 588%
- 493%
Issue Tracking Activity

Ticket Creations

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<th>Month of year (from Mar 2011 to Nov 2012)</th>
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A. van Hoorn (CAU)
Thanks to All Contributors!
1. Overview
2. Review
3. Outlook
Outlook

Current Activities (Selection)

- **WebGUI**: Auto-layout, finalize dashboard and display concept
- Release $\theta$PAD anomaly detection filters and time-series library
- New web site

Future Topics

- Integrated support for **CEP-based analysis**
- Importer for common log formats
- Additional (interactive) visualizations
- Integrate with (EMF-based) model repository
- Composite filters
- Support for distributed execution of plugins

Ticket System: Current/Upcoming Issues

http://trac.kieker-monitoring.net
Kieker: APM and Dynamic Analysis

Outlook

- 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

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


Kieker Project. Kieker web site, 2012b. [URL](http://kieker-monitoring.net/).


