Live Database Trace Visualization in Large Software Landscapes

ICSA 2017 Tutorial
Runtime Modeling and Visualization

Software Engineering Group, Kiel University
Christian Zirkelbach — April 04, 2017
<table>
<thead>
<tr>
<th>Time</th>
<th>Event</th>
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<tbody>
<tr>
<td>09:00 – 09:10</td>
<td>Welcome and General Introduction</td>
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<tr>
<td>09:10 – 09:40</td>
<td>Study Foundations</td>
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<tr>
<td>09:40 – 10:00</td>
<td>Model-based Software Application Monitoring</td>
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<tr>
<td>10:00 – 10:30</td>
<td>Runtime Architecture Modeling and Visualization</td>
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<td>10:30 – 11:00</td>
<td>Coffee Break</td>
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<td>11:00 – 12:15</td>
<td>Introduction to the ExplorViz, Palladio, and iObserve Approaches with following Tool / Visualization Demos</td>
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<td>12:15 – 12:30</td>
<td>Study Setup</td>
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<td>12:30 – 14:00</td>
<td>Lunch</td>
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<td>14:00 – 15:30</td>
<td>Comprehensibility Study</td>
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<td>15:30 – 16:00</td>
<td>Coffee Break</td>
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<td>16:00 – 16:30</td>
<td><strong>Live Database Trace Visualization in Large Software Landscapes</strong></td>
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<td>16:30 – 17:00</td>
<td>Feedback and Open Discussion</td>
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Example Software Landscape (Banking Industry)

*Systems, Applications, and Databases*
Challenges

• Handling large-scale, enormous-in-size data repositories

[ Cuzzocrea et. al ]

• Changing requirements or increasing workload

• Performance issues or customer requests

→ inevitable software updates or refactoring

[Zirkelbach et. al]

• Legacy systems: often based on outdated technologies and poorly documented

[ Godfrey and German ]

• Insufficient knowledge of the (actual) systems hamper the process

[ LaToza et. al ]
Where to start?

1. Gathering information
2. Evaluation

Extended system development life cycle (SDLC) based on [Avison and Fitzgerald]
Envisioned Approach
Envisioned Approach

Legend

A1: Monitoring
A2: Analysis
A3: Transformation
A4: Navigation

Existing Application
Existing Database

Monitoring Data
132743373;createStatement;SELECT..
132743373;createStatement;SELECT..
132743377;createStatement;INSERT..
132743377;createStatement;INSERT..
132743380;databaseQuery;showTab...

Traces

Data Model

Visualization

Landscape-Level Perspective
Systems, Applications, and Databases

Architecture-Level Perspective
Entity Types and Relationships

Usage-Level Perspective
Entities, Relationships, and Joins
Related Work
ExplorViz

Related Work
Related Work

ExplorViz

https://www.explorviz.net
Related Work

InspectIT

[Image of software interface]

Database URL
Statement
in Invocations  Count  Avg (ms)  Min (ms)  Max (ms)  Duration (ms)

select product0_PROD_ID as PROD1_S, product0_ASIN as ASINS, product0_DESCRIPTION as DESCRIPTION1 100% (in 20 inv) 20 61.6 47.7 81.3 1323 1m 1l
select product0_PROD_ID as PROD1_S, product0_ASIN as ASINS, product0_DESCRIPTION as DESCRIPTION1 100% (in 105 inv) 105 0.0 0.0 0.2 2.5 1m 1l
select product0_PROD_ID as PROD1_S, product0_ASIN as ASINS, product0_DESCRIPTION as DESCRIPTION1 100% (in 109 inv) 109 0.1 0.0 0.6 13.1 1m 1l
select product0_PROD_ID as PROD1_S, product0_ASIN as ASINS, product0_DESCRIPTION as DESCRIPTION1 100% (in 4 inv) 4 94.1 70.8 124.3 376.4 1m 1l
select user0_USERID as USERID, user0_FIRSTNAME as FIRSTNAME, user0_LASTNAME as LASTNAME 100% (in 30 inv) 30 0.1 0.0 0.1 1.8 1m 1l
select Inventory0_INVID as INVID, Inventory0_PROD_ID as PROD_ID, Inventory0_QUAN_IN_STOCK 100% (in 200 inv) 800 0.0 0.0 0.1 23.3 1m 1l
select product0_PROD_ID as PROD1_S, product0_ASIN as ASINS, product0_DESCRIPTION as DESCRIPTION1 100% (in 16 inv) 32 74.3 63.2 90.4 445.6 1m 1l
select product0_PROD_ID as PROD1_S, product0_ASIN as ASINS, product0_DESCRIPTION as DESCRIPTION1 100% (in 6 inv) 6 4.6 0.0 13.9 148.1 1m 1l
select sum(orderline0_QUANTITY*product0_PRICE) as col_0_0_ from ORDERLINES orderline0_PRODUCTS 100% (in 16 inv) 32

Parameters

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Related URL: https://www.inspectit.rocks
Related Work

InspectIT
Related Work

DAHLIA 2.0

https://staff.info.unamur.be/lme/DAHLIA
Conclusions & Open Questions
Conclusions

• Lack on database monitoring in long-living systems
  • Based on...
    • obsolete technologies and platforms
    • poor documentation
    • insufficient knowledge

• Presented an approach as a solution
  • Live database trace visualization for large software landscapes
  • Addresses developers and operators
  • Early work in progress – open for feedback and suggestions


