Extraction of Operational Workflow-based User Behavior Profiles for Software Modernization

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Motivation

• Priorization of (human) resources for maintaining and modernizing frequently used views
• Identification of unused views to discontinue their development and support
• Adaptation of intended workflows which are actually bypassed by the users

How do users work with a software application‘s graphical user interface (GUI)?

=> Visualization of the operational user behavior
The b+m bAV-manager

- An administration software for customer and calculation data in the field of company pension scheme
- In cooperation with a third-party calculation engine, it creates expert opinions for several valuation and accounting regulations.
Agenda

• Introduction
• Our Approach
• Case Study: b+m bAV-Manager
• Conclusions
Our Approach

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Diagram:

- b+m bAV-Manager
- Spring Interceptor
- Kieker
- ScreenEntryRecord
- SessionExtractor
- Session Log Files
- TeeTime
- BehaviorModelExtractor
- Graphviz (*.gv)
- GraphML (*.graphml)
- XMI (*.xmi)
- Summary (*.csv)
package de.bmiag.gear.util.monitoring.record

entity ScreenEntryRecord {
    string userName
    long loginTime
    string screenName
    string subprocessName
    string processName
    string processExecutionId
    long entryTime
    string eventName
}

Our monitoring record defined with Kieker’s Instrumentation Record Language (IRL)
Session Extractor

TCPRenderStage ➔ IMonitoringRecord ➔ InstanceOfFilter

ScreenEntryRecord ➔ SessionExtractorStage

SessionAnonymizingStage ➔ SessionEntry ➔ AnonymizedSessionEntry ➔ SessionLogWriterStage
Behavior Model Extractor

InitialElementProducer

File

Directory2FileFilter

RecordList

LogFile2RecordListFilter

BehaviorModelExtractorStage

BehaviorModel

BehaviorModelAnalysisStage

ExportCompositeStage
Case Study

• Instrumented bAV-Manager with Spring interceptors and the `ScreenEntryRecords`

• Asked five b+m employees (developers, architects, and project managers)

• Execute 11 common business processes

Goal:

"Identifying abnormal screenflows and workflows by users of the monitored application"
Methodology using GQM

Questions:
1. Which screenflows do significantly differ from the expectations of the professionals?
2. In which workflows does the usage significantly differ from the process definition?

Metrics:
• visits per screen
• think times
• transition probabilities
Results

- Collected 53 session logs with 2381 recorded user activities
- Identified 23 of 109 screens which were not visited at all
- Retrospectively, 8 of them were classified as obsolete by the professionals
- Recognized unusual workflows by a high number of visits on the error screen
- Greatest number of unusual incoming and outgoing transitions (not part of the process definition)
An Example Behavior Model

Excerpt of an example behavior model of the b+m bAV-Manager calculation process (dark grey) including its subprocesses (light grey) and screens (white).
Conclusions

• Approach to extract and visualize workflow-based user behavior profiles
• Feasibility shown by an industrial real-world application

Future work
• Repetition of the experiment on productive systems of the b+m bAV-Manager's customers
• Visualization of process information to improve the screenflow for the users since they often lack orientation.