

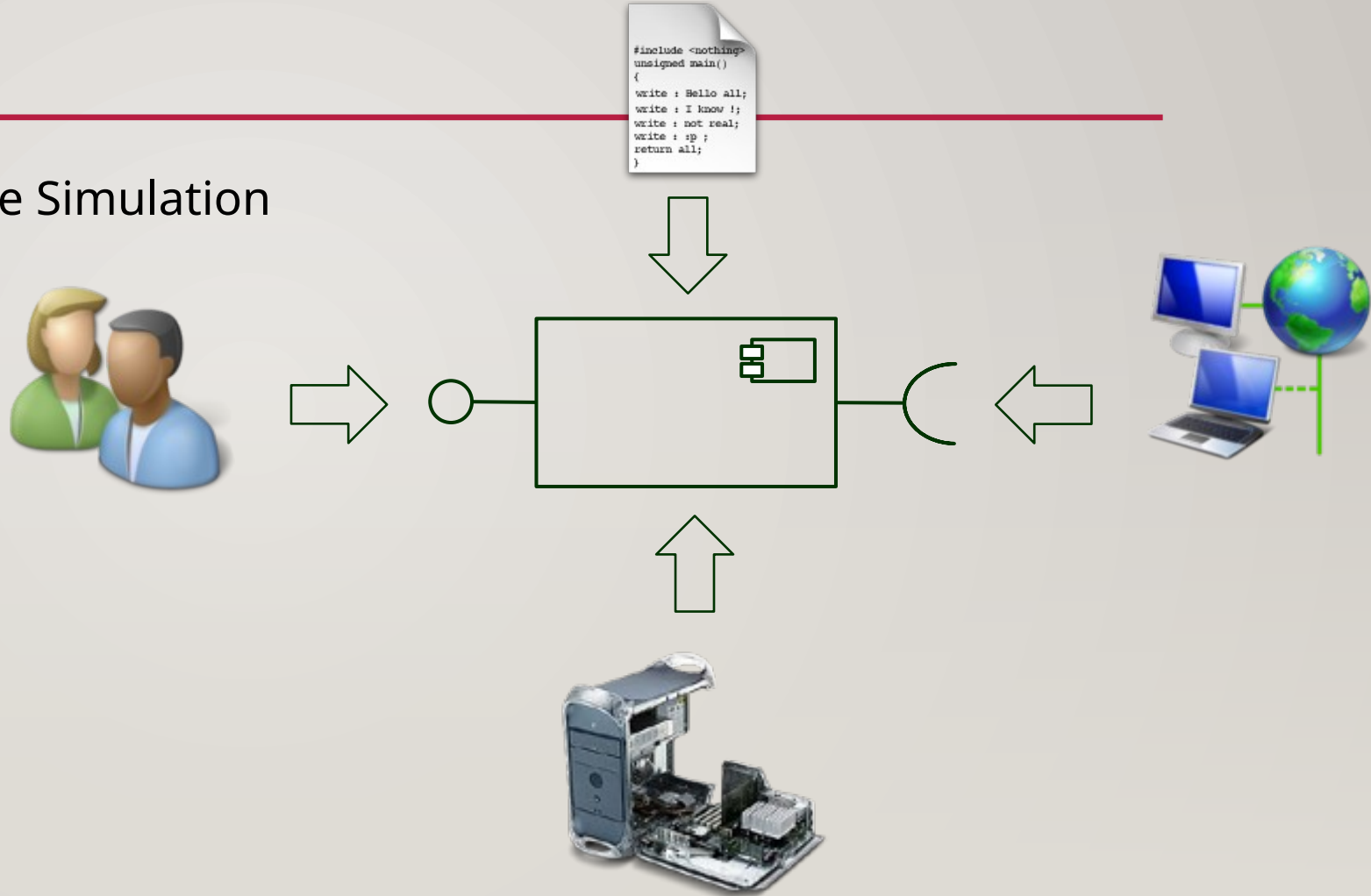
PALLADIO UPDATE

SSP 2025 STATUS REPORT

STEFFEN BECKER (U STUTTGART), ROBERT HEINRICH (U ULM),
ANNE KOZIOLEK (KIT), RALF REUSSNER (KIT / FZI)

0 WWW.PALLADIO-SIMULATOR.COM

- Design-Time Performance Simulation



PCMBench - qosa.system_diagram - Eclipse SDK

File Edit Navigate Search Project Diagram PCM Bench Run FieldAssist Window Help

Tahoma 9 B I A 100%

PCMBench Java

*PCM Project View

PCMInstance

- steffen [Palladio Modelling Project]
- Linked Repositories
 - QoSA Repository <Repository> [ID: _WSASwHwAEduH1Ym]
 - Components
 - AudioStore <BasicComponent> [ID: _fmGMoHIEEdu]
 - EncodingAdapter <BasicComponent> [ID: _VgKpAH]
 - OggEncoder <BasicComponent> [ID: _FzO2EHIFEd]
 - WebUI <BasicComponent> [ID: _LulPoHIEEdujPfhns]
 - Interfaces
 - IAudioDB <Interface> [ID: _kmoHQHIEEdujPfhnsGb]
 - IAudioStore <Interface> [ID: _PGWcsHIEEdujPfhns]
 - IEncoder <Interface> [ID: _XgBA4HIFEdujPfhnsGb]
 - IHTTP <Interface> [ID: _SztAHIDEdujPfhnsGb-iA]

diagram.my_seff_diagram

*diagram.my_seff_diagram

```
sequenceDiagram
    participant Start(( ))
    participant InsertAudioFile as <<component_extens>>
    participant InsertAudioFileInfo as <<component_extens>>
    participant FinalizeUpload as <<component_extens>>
    participant End((( )))

    Start->>InsertAudioFile
    InsertAudioFile->>InsertAudioFileInfo
    InsertAudioFileInfo->>FinalizeUpload
    FinalizeUpload->>End
```

*qosa.system_diagram

```
classDiagram
    class WebUI
    class OggEncoder
    class EncodingAdapter
    class AudioStore
    class IHTTP
    class IAudioStore
    class IAudioDB
    class IEncoder

    WebUI --> IAudioStore
    WebUI --> IAudioDB
    OggEncoder --> IEncoder
    EncodingAdapter --> IEncoder
    EncodingAdapter --> IAudioDB
    AudioStore --> IAudioDB
    IHTTP --> WebUI
    IHTTP --> OggEncoder
```

Resource View

Outline

Properties

Interface

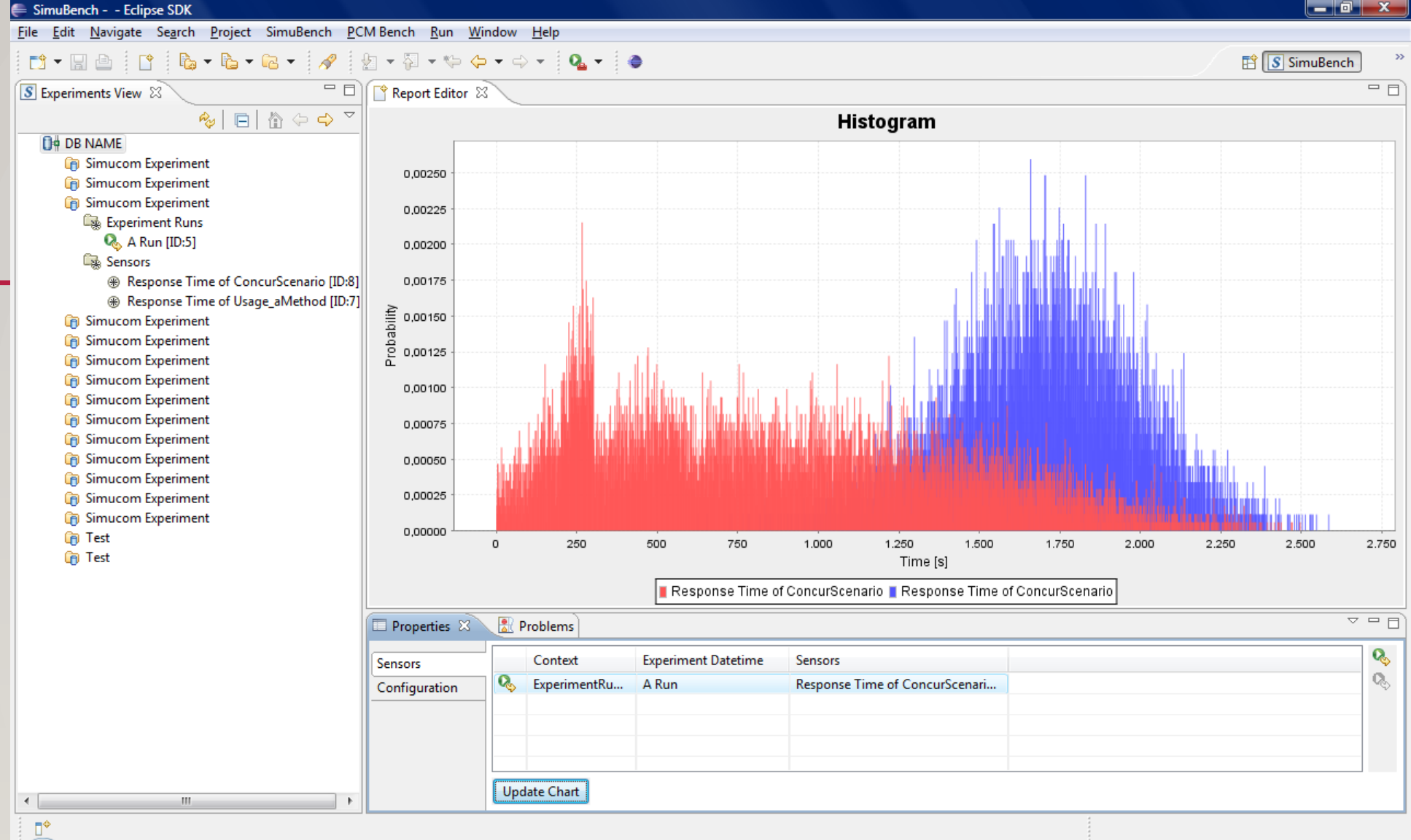
Operations

Advanced

IAudioDB [ID: _kmoHQHIEEdujPfhnsGb-iA]

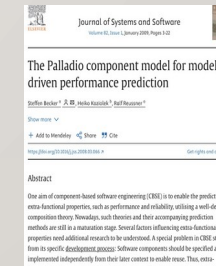
ReturnType	ServiceName	OwnedParameters	ExceptionType
	InsertAudioFile	file	
	InsertAudioFileInfo		
	FinalizeUpload		

Read Me Trim (Bottom) 1 items selected



1 (NOT SO) RECENT NEWS

- Palladio-Paper in JSS (2009), JSS MIP Award 2020 has 999 citations (google scholar last accessed some seconds ago ;-)
- Appointment as W3-Professor of Robert Heinrich at U Ulm, since April 2025
- Defended Dissertation by Floriment Klinaku (U Stuttgart)
- "A Dedicated Architectural View for Simulation-Based Design of Elasticity Policies - The Slingshot Approach" (Defended 30.10.2024)
- Defended Dissertation by Larissa Schmidt (KIT):
"Automatic Performance Modeling and Analysis of Configurable Scientific Software and Workflows"
(Defended with distinction 5.12.2024)
- Defended Dissertation by Sebastian Hahner (KIT):
"Architecture-Based and Uncertainty-Aware Confidentiality Analysis"
(Defended with distinction 9.12.2024)
- Defended Dissertation by Yves Kirchner (KIT):
"Model-driven Reverse Engineering of Technology Induced Architecture for Quality Prediction" (Defended 30.1.2025)



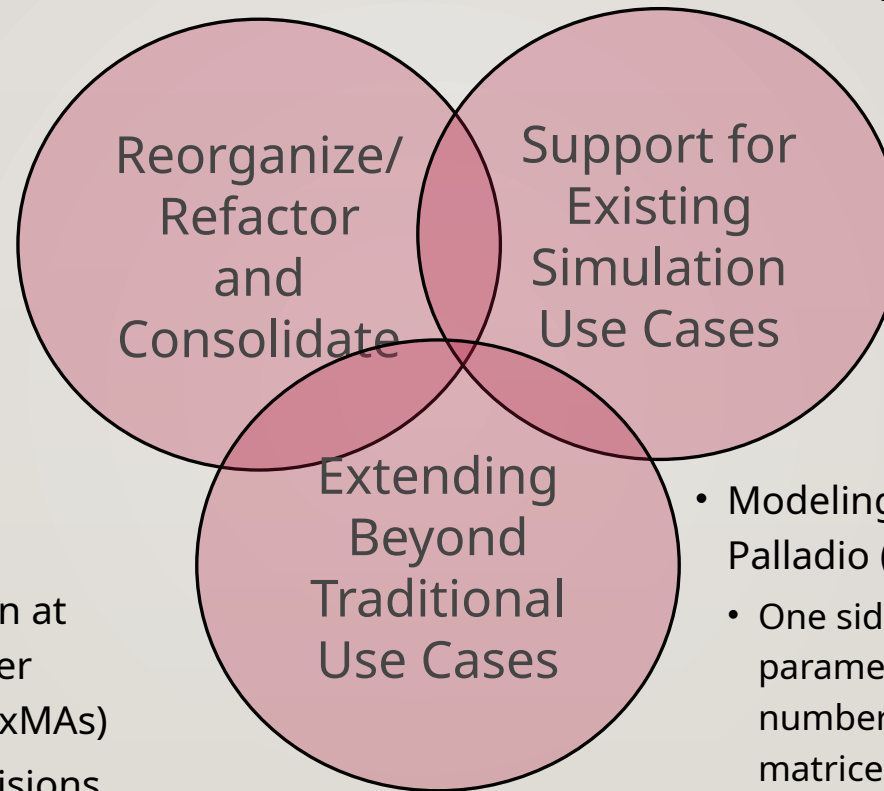
2 ON-GOING WORK I (KIT / FZI / U ULM)

- Security Modelling and Analysis
 - Nicolas Boltz (KIT / U Ulm): Aligning Software-Architecture Development and Data Protection Legal Assessment Processes
 - Nils Niehues (KIT / U Ulm): Automated Repair of Confidentiality Violations in Architectural Models
 - Mahdi Jafari (KIT): Architecture-based Pen-Testcase Generation and Attack Surface Evaluation
- Continuous Modelling and Reverse Engineering
 - Martin Armbruster (KIT): Software Architecture Extraction for Heterogeneous Systems
 - Manar Mazkatli (KIT): Continuous Integration of Parameterized Architectural Performance Models
 - Snigdha Singh (KIT): Software Architecture Extraction for Asynchronous Systems
- Performance Modelling and Analyses
 - Martina Rapp-Sieger (FZI): Performability-oriented Optimization of Runtime Adaptation Strategies
 - Ralf Sieger (FZI): Architecture-based Sustainability Analysis
 - Bahareh Taghavi (KIT / U Ulm): General Analysis of Composition Operators
 - Sebastian Weber (FZI / U Ulm): Multi-level Model-based Simulation Coupling Approach for Software-Hardware Co-simulation
 - **Maximilian Hummel (KIT / ABB): Palladio for Cloud-Native Automation Systems with AI support (newly started)**

2 ON-GOING WORK II (U STUTT GART)

- Slingshot Simulator in one project repository instead many
- Metamodel refactorings for the Elasticity Viewtype (FK Diss)

- Elasticity Optimization at Design Time and other paradigms e.g., RL (2xMAs)
- Planning Scaling Decisions (MENTOR)



- Integrating PerOptryx and Slingshot (MA)

- Modeling AI Use Cases in Palladio (MA, running)
- One side: Relevant work parameters relevant e.g., number of layers, size of matrices, ...
- On the other side: GPU <-> RAM <-> CPU interaction and influencing factors

3 STRATEGIC OUTLOOK

- Palladio as a Simulation Platform for Different Quality Analyses (KIT / FZI / U Ulm)
 - Split meta-model in core and extensions
 - Reference Architecture for flexible creation of meta-model
 - Compositional Analyses
- Software Sustainability (FZI / U Stuttgart)
 - Supporting architectural decisions regarding their impact on Energy Consumption (ò Diss Ralf Sieger)
 - Explaining proactive reconfigurations with Palladio (ò DFG MENTOR /w U Ulm)
- Architecture-based Attack Surface Prediction(beyond confidentiality analysis)
 - Using the set of architecture-based generated Pen-Testcases as a metric for the attack surface of the architecture (ò Diss Mahdi Jafari)
- Palladio4HPC
 - HPC Hardware Performance Modelling and Prediction (in particular Memory and Communication Hierarchy)
 - SEFF-Extension for better Algorithm Modelling
 - Perhaps Specialization for Programming interfaces (MPI most likely)