

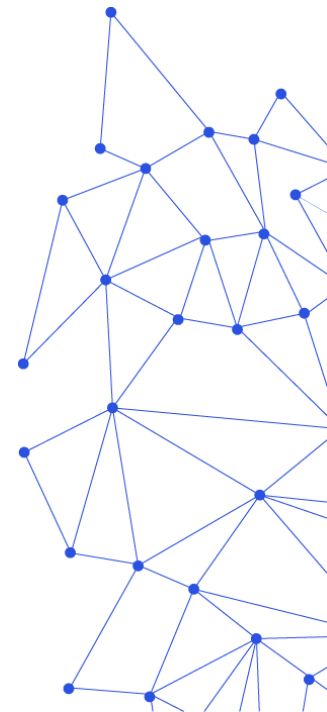
Applying the Palladio tool in a SOA Project

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Agenda

- Introduction
- Project Context
- PCM Use Cases
- Conclusion
- Outlook

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Introduction

fortiss

- An-Institut Technische Universität München
- Application-oriented research institute
- Industry collaboration to improve the applicability of research results in practice



- Performance analysis and prediction
- Performance Management Work
- Focus on complex enterprise applications

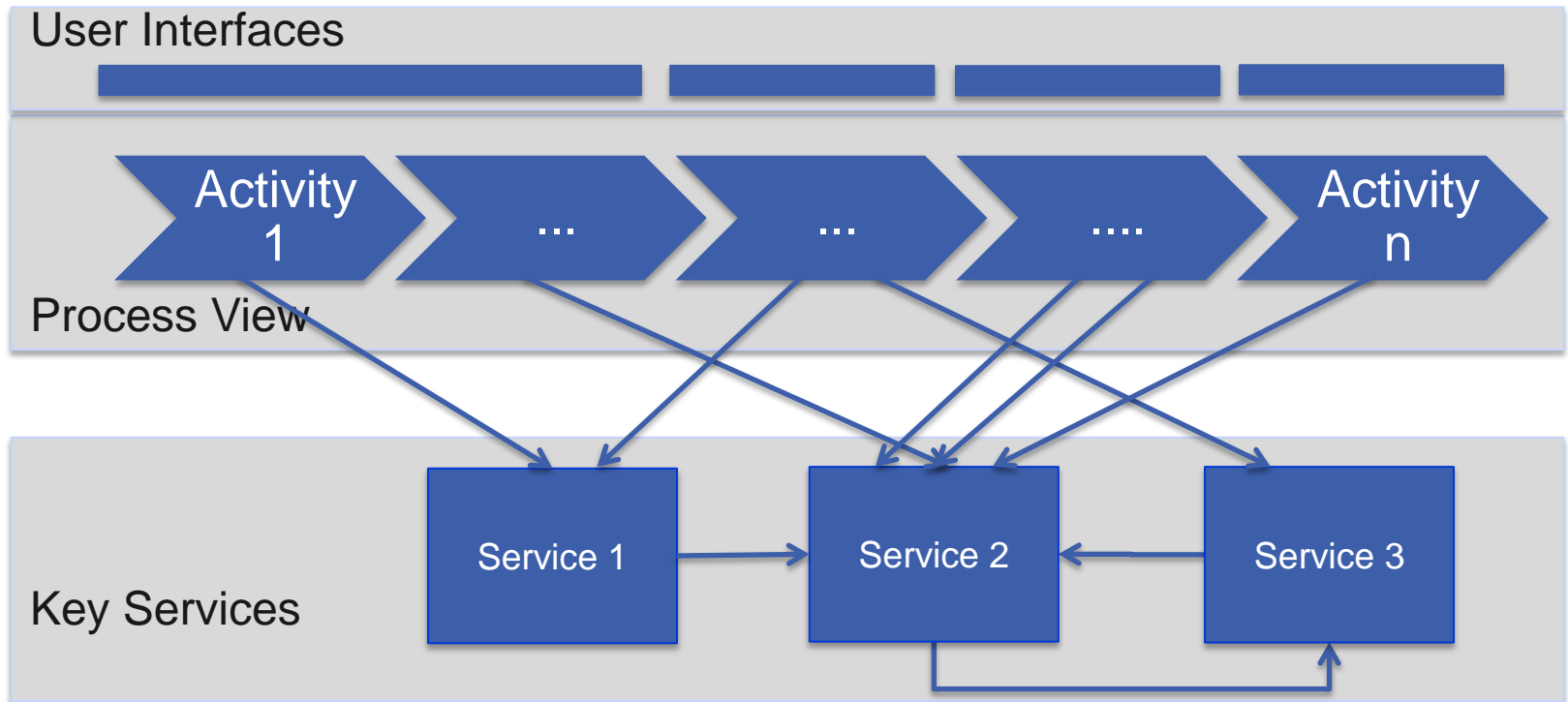
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- Introduction
- **Project Context**
 - Goals
 - Technology
 - Performance Challenges
 - Performance Evaluation Approaches
 - Model Driven Development Process
- PCM Use Cases
- Conclusion
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Project Context

Goals

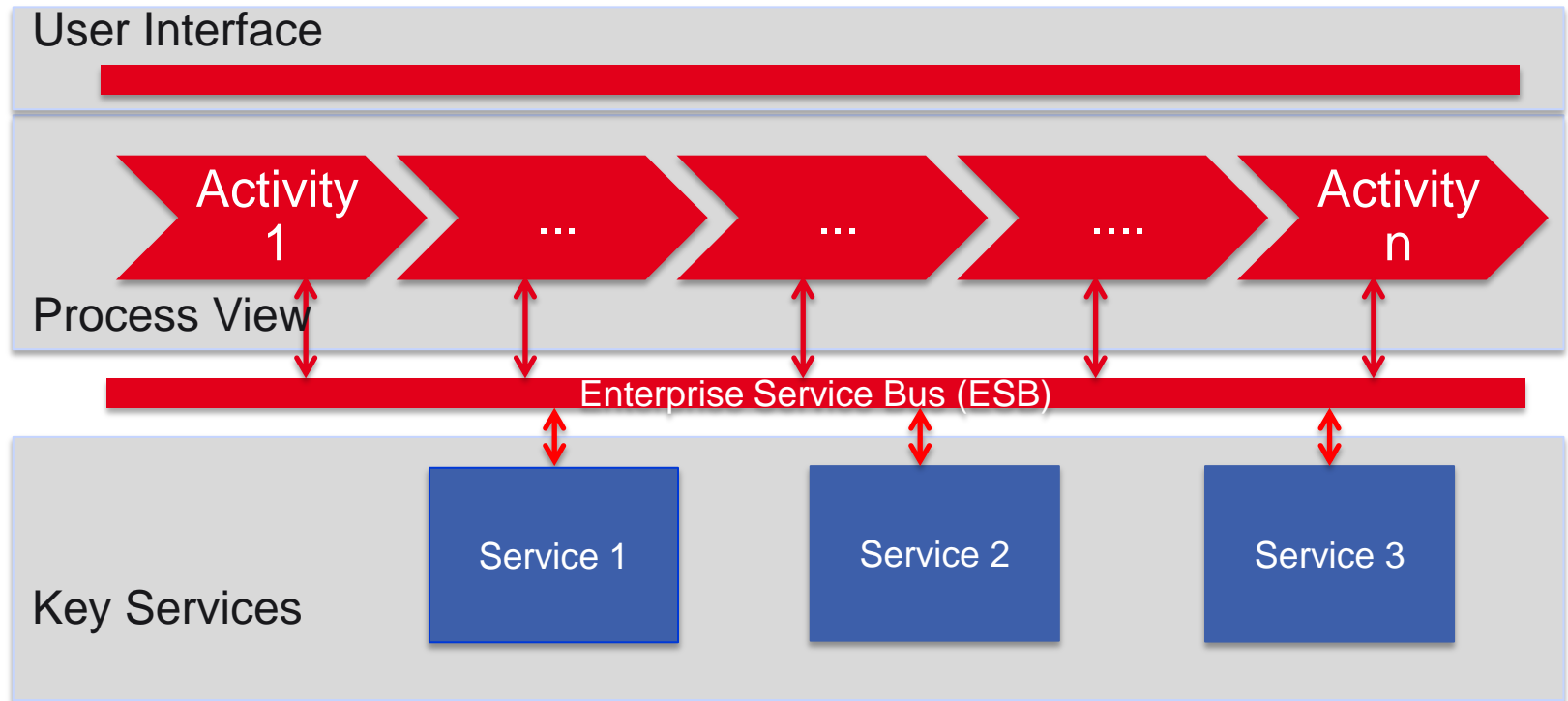
- Current IT landscape



Project Context

Goals

- Target IT landscape



Project Context

Technology

- Oracle WebLogic Application Server 11g
- Oracle Application Development Framework (ADF)
 - JavaServer Faces (JSF) based web-applications using Enterprise Java Beans (EJB)
- Oracle Service-oriented Architecture (SOA) Suite
 - Service Component Architecture (SCA)-based web-service components
 - Sometimes plain web-service implementations
 - Facades in front of legacy systems
- Oracle Service Bus (OSB)
 - Enterprise Service Bus

Project Context

Performance Challenges

- Estimating resource requirements and response times for:
 - User interfaces
 - Enterprise Service Bus (ESB)
 - Web services
- How to handle the dynamic workload?
 - ~13'400 concurrent users of the system between 9 and 12 am during weekdays – otherwise much lower load
- Further challenges:
 - Maximum CPU utilization in production 40%
 - SAML authentication performance
 - Web service operation granularity (ESB roundtrip overhead)

Project Context

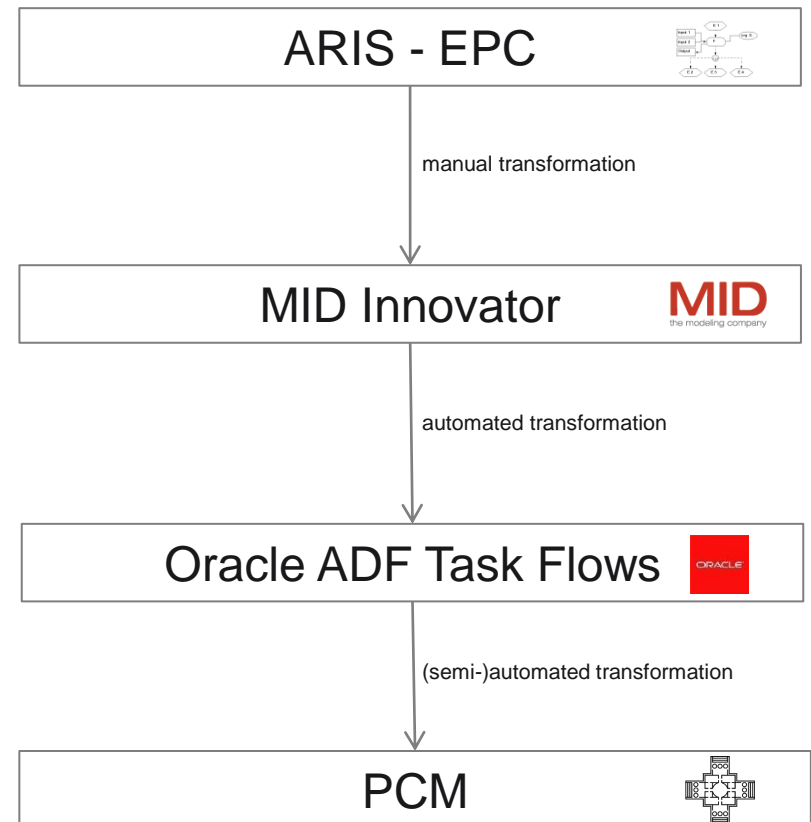
Performance Evaluation Approaches

- Load Tests:
 - Evaluate response times and resource utilization for running components
- Performance models:
 - Evaluate the expected response times for the new applications based on monitoring data for existing web services
 - Evaluate architectural changes (e.g. with or without ESB)
 - Capture data about workloads, resource demands and response times
 - Support the sizing process for the new infrastructure-components (especially in the UI-Layer and for the web services)

Project Context

Model Driven Development Process

- Process Representations by the field specialists
- Combining Process and IT Views (e.g. dependency from processes to services)
- Navigation Rules for the UI
- Performance Models



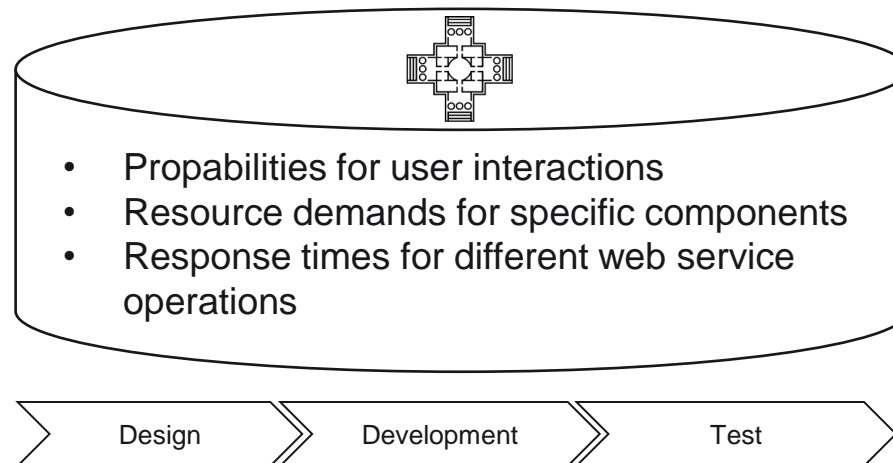
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- **PCM Use Cases**
 - Data Store
 - Use Case Modeling
 - Software Performance Curves
 - Resource Estimation
- Conclusion
- Outlook

PCM Use Cases

Data Store

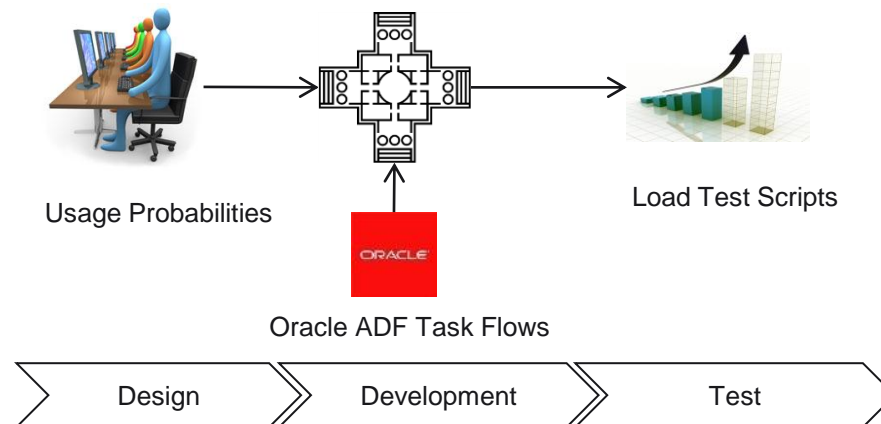
- PCM models offer a good way to store performance data in a structured form
 - reuse performance data gathered during the software engineering process
 - The ability to make use of this data by simulating the environment motivates people to invest time in it



PCM Use Cases

Use Case Modeling

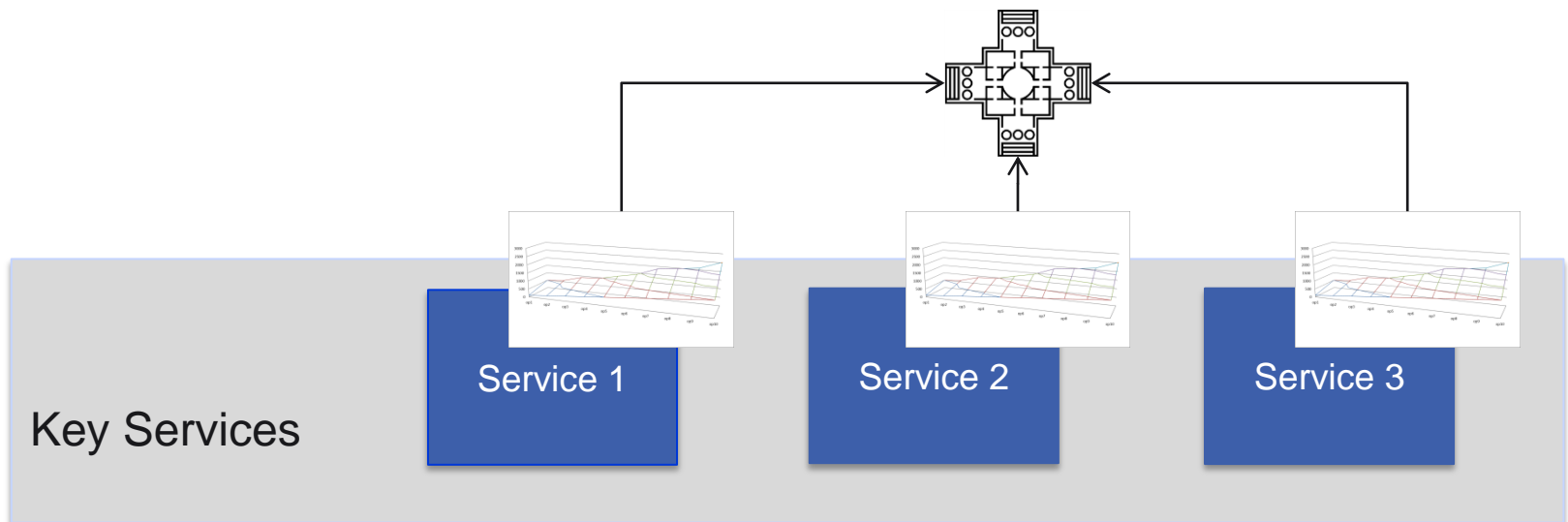
- PCM usage models are used to discuss probabilities for using certain functionalities with the users of the system
 - PCM repository models are generated based on ADF Task Flows
 - Probabilities represented in these usage models are used to support the creation of load test scripts as well



PCM Use Cases

Software Performance Curves

- The web services are facades in front of existing legacy systems:
 - No access to the backend (legacy) systems
 - No possibility to install monitoring functionalities
- Introduced in PCM by Alexander Wert, Jens Happe, Dennis Westermann

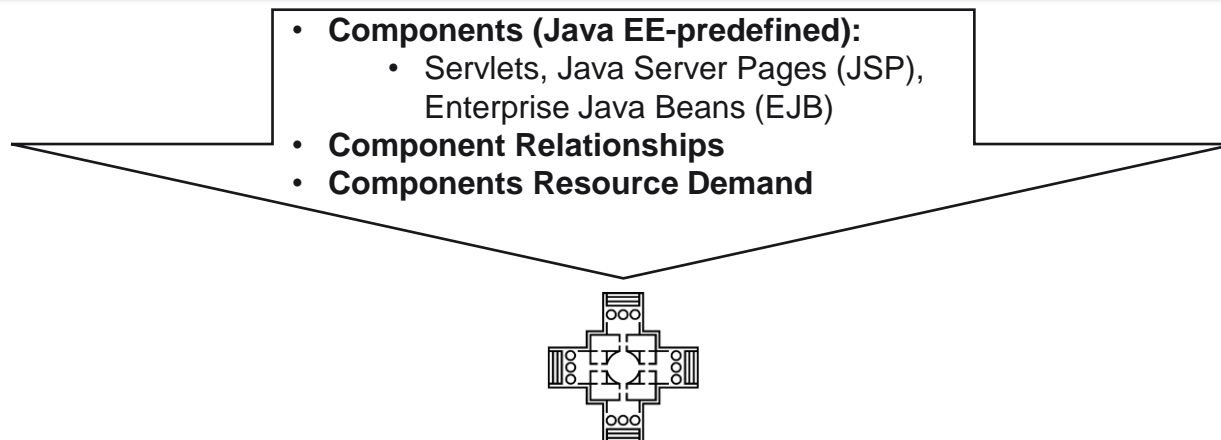


PCM Use Cases

Resource Estimation

- UI layer is is a Java EE web application based on the Oracle Application Development Framework (ADF)
 - JSF, Servlets, JSPs, EJBs, Web services
 - Extract components, component relationships and resource demands from a running Java EE application (different approach than Brosig et al. 2009, 2011)

User Interface (Oracle ADF web applications)



Agenda

- Introduction
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- **Conclusion**
 - What works?
 - What does not work?
 - What can be improved? aka feature wishlist ;-)
- Outlook

Conclusion

What works?

- PCM allows to create performance models that are easily comprehensible by technical staff in an organisation
 - Thanks to the UML alignment and the different views on the system
- PCM models allow to store performance related information that often will not be documented otherwise
- User behaviour modeling in usage models
- SimuCom works reliable once the model has been established
- Evaluating design alternatives



Conclusion

What does not work?

- Creating repository models and their associated RDSEFFS requires a lot of effort
 - Hard to capture the resource demands for the different components
 - ... it is mostly a technical and an organizational challenge to get the required data
 - ... sometimes the effort to get the data for PCM is higher than the benefit
- Representing memory would be beneficial especially for sizing Java EE environments
- Some workflow cases can not be properly represented in PCM usage models
- Simulation result visualizations are difficult to use for discussions with non-PCM experts



Conclusion

What can be improved? aka feature wishlist ;-)

- RDSEFF and Usage Model Editors need some enhancements in terms of:
 - Representing branches within branches within branches...
 - Integrating capabilities to stop complete flows on certain conditions (like return to caller)
 - Referencing usage models from usage models (as of today we're using SEFFs)
- Often the PCM results do not contain data for all sensors
 - specific RDSEFF results are missing
- It would be great to have a downloadable Windows 64bit version
 - The tool seems to be much more stable and faster on MacOS
- Better migration support for existing models
 - Apart from Anne Koziolk's migration script (e.g. for diagrams as well)



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Outlook

What are we working on?

- Better visualization of the simulation results, e.g.:
 - Generate graphs that are easily comprehensible by non-palladio specialists
 - Instead of exporting results into CSV files and doing it in Excel...
 - Remove ramp up times
- Automated PCM-model creation:
 - From ADF Task Flows for early design cycle discussions
 - Capturing user behaviour
 - From running Java EE applications for resource estimation in later cycles
 - Representing application components and their resource demands

Thanks for your attention!

Questions?

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