Reliability Support for the Model Driven Architecture

Genaína Rodrigues, Graham Roberts, Wolfgang Emmerich, James Skene

{G.Rodrigues|G.Roberts|W.Emmerich|J.Skene}@cs.ucl.ac.uk

Department of Computer Science

University College London, UK

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Motivation

◆ No standard approach for reliability in the architectural level.

◆ Extend MDA to provide reliability support

◆ Abstract away complexity of reliability support

◆ Achieve a platform-independent reliability model

◆ Integrate formal analysis and design of reliability in a unified semantic framework

The Model Driven Architecture (MDA)

◆ What is MDA?

◆ Model, Abstraction and Refinement

◆ Profiles: The lightweight extension mechanism
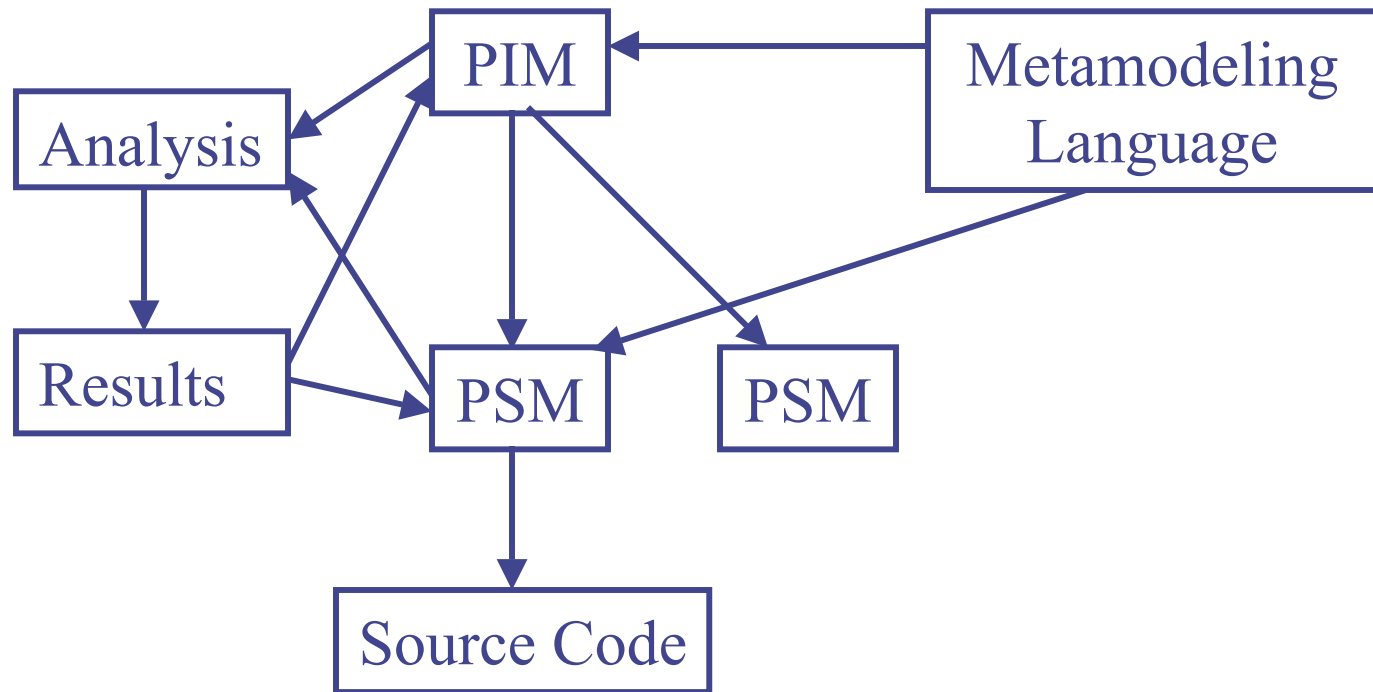
- Stereotypes
- Tagged Values
- OCL

PIMs and PSMs

◆ Problem: Technical infrastructure changes independently of business rules, but these are strongly coupled in designs.

◆ Solution: Decouple them

Platform Independent Model (PIM)	→ Refinement →	Platform Specific Model (PSM)

MDA Mapping

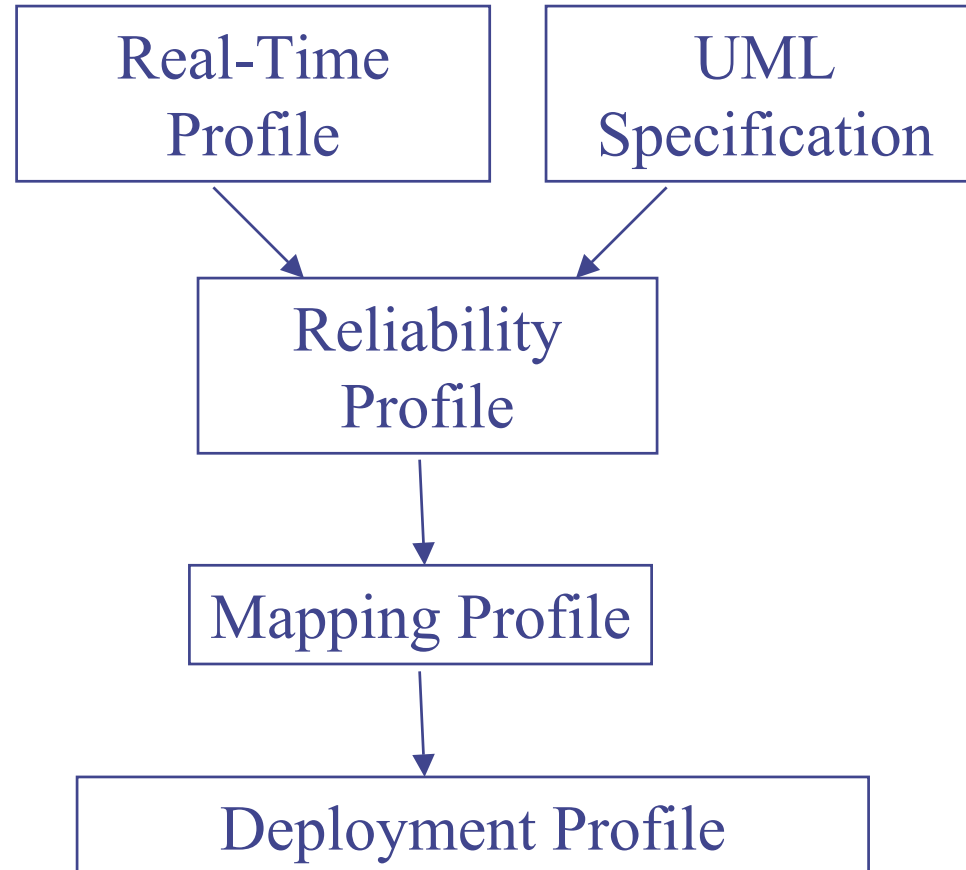# Our Approach

- Define a UML Profile for Reliability
- Implement the mapping from PIM to PSM for EJB
- Extend UML Profile for EJB
- Unified Framework

Our Approach

A Profile for Reliability

- A subset of UML meta-model: stereotypes, tagged values and OCL constraints
- Describe semantics of reliability mechanisms
- Reliability mechanisms
    - Clustering
    - Persistency
    - Message delivery assurance
    - Atomic Transaction

A Scenario

◈ Reliability Assurance of the System:

$$1-(1-c)^n > a$$

c = reliability of each component

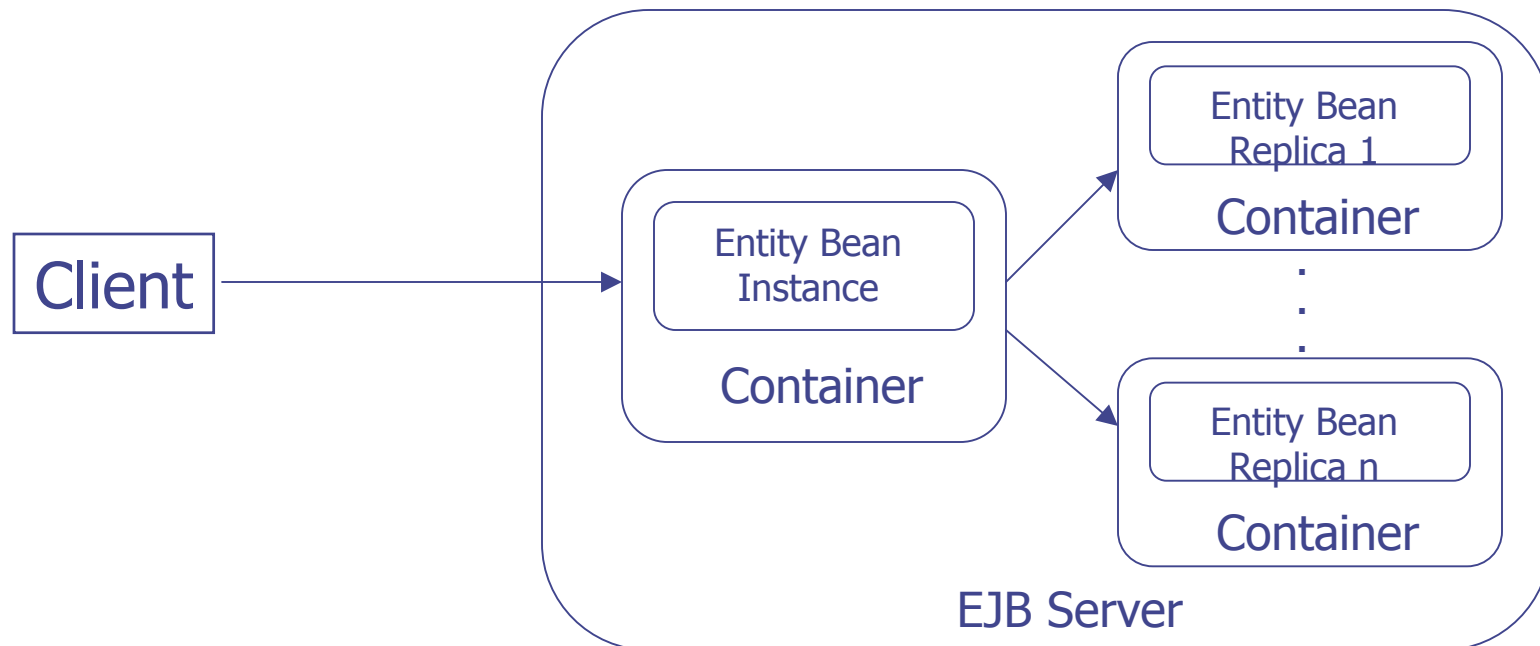a = required reliability of the system

n = replicated components to assure a

◈ If c is 75%, a is 95% then n should be at least 3

A Scenario

◆ EJB Fail-Over Mechanism

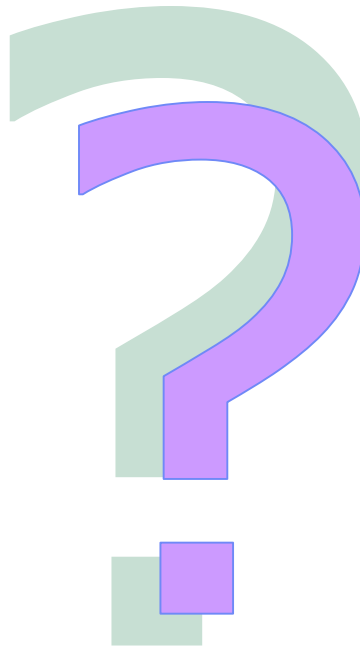# Conclusion And Future Work

Conclusion

◈ Highlighted the need to address reliability during design.

◈ Outlined an approach to integrating reliability specification into MDA

Future Work

◈ Accomplishment of the Reliability Profile

◈ Map the J2EE reliability mechanisms in the UML/EJB profile (PSM)

◈ Automation for mappings

Questions

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G.Rodrigues@cs.ucl.ac.uk

http://www.cs.ucl.ac.uk/staff/g.nunesrodrigues