Client Acceptance Test

Bernd Bruegge, Christian Sandor

February 7, 2002

Agenda

- Introduction (Bernd Bruegge)
- Project management (Christian Sandor)
  - Context, goals, project organization
- Client acceptance test
  - Presentation of the system (Florian Fuchs, Otmar Hilliges, Andreas Krause)
  - Demonstration of the system
- Discussion (All)

Introduction

- Purpose:
  - Presentation and demonstration of the scenario as specified by the project agreement
- Desired Outcome:
  - Passing the system test
  - Identification of open issues as a basis for the second project phase

TRAMP Participants

Alexander Koch, Alexander Schuster, Alexandra Remptke, Allen Dutoit, Andreas Krause, Andreas Schildbach, Andreas Wundsam, Asa MacWilliams, Astrid Stangler, Baltsar Sahlin, Benjamin Herrmann, Bernd Bruegge, Bernhard Zaun, Bertolt Meier, Christian Fischer, Christian Sandor, Daniel Pustka, Dick Martin, Elena Kolodizki, Fabian Schilcher, Fabian Sturm, Florian Echtler, Florian Fuchs, Florian Kirstein, Florian Sager, Georg Treu, Goetz Bock, Guido Kraus, Guying Hu, Helma Schneider, Horst Mauersberg, Jan Gregor Fischer, Jie Zhang, Jim Beck, Joerg Dolak, Joerg Traub, Johan Ejerhed, Korbinian Abenthum, Lei Chen, Lilith Al-Jadiri, Lothar Richter, Lutz Kuederli, Marco Feuerstein, Markus Strohmeier, Martin Bauer, Martin Groher, Martin Ott, Martin Pittenauer, Martin Wagner, Martin Winter, Michael Ott, Michael Riedel, Ming Ju Lee, Ming Wu, Oliver Creighton, Oliver Strutynski, Otmar Hilliges, Patrice Kwemo, Peter Dill, Peter Keitler, Peter Kronberg, Rafal Kobylinski, Reinhard Stein, Robert Eigner, Roland Zumkeller, Shunwei Shen, Siyuan Liu, Stefan Eckhardt, Stefan Richter, Sven Hennauer, Tao Zhuang, Thomas Knausenberger, Thomas Schiwietz, Tobias Kluepfel, Ulrich Bauer, Vinko Novak, Willy Chen, Wolfgang Hommel, Wolfgang Sprung, Yong Lin

Context: UMTS Consortium

- UMTS consortium
  - Cooperation between Industry, Technische Universität München and Bayerische Staatskanzlei
  - 5 projects with a total budget of 6 Mio €
- UMTS project: Mobile Maintenance
  - Inmedius GmbH Europa
  - Chair for applied software engineering
  - Duration: October 2001 - October 2004
  - 1.2 Mio € budget

TRAMP Project

- Creation of components that lead to an industrial product
- Industry-oriented evolutionary software education
- Leading edge research in mobile software architectures and applications
- Project phases
  - October 2001: TRAMP 1
  - October 2002: TRAMP 2
  - October 2003: TRAMP 3

TRAMP 1 Goals

- Development of a prototype in the first phase in the UMTS project
- Evaluation of new Hardware and Software concepts
- Experience of a real-world project for software engineering students

Project Organization

Challenges of TRAMP

- Time-boxed prototyping: 3 months
- „Part-time“ employees
- Flat staffing
- Incorporation of innovative Hardware/ Software
- Architecture-driven design

Now Showing

Car Breakdown

Find Garage

Client Acceptance Test

Florian Fuchs, Otmar Hilliges, Andreas Krause

February 7, 2002

Outline

- Key Requirements
- System and Object Design
- Demonstration of Core Use Cases
- Future Work
- Discussion and Client Acceptance

Key Requirements

- **T**raveling **R**epair **A**nd **M**aintenance **P**latform
  Mobile support of complex automobile maintenance tasks
- Functional Requirements
  Register customer, navigate customer and mechanic, support repair process, handle payment
- Non-Functional Requirements
  - Mobile, wearable, distributed
  - Context-aware, multi-modal user interfaces

Core Use Cases

- Request Maintenance
- Handover Maintenance Task
- Calibrate System
- Find Customer at the Parking Spot
- Execute Procedure

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Design Goals

- Multi-Modality
- Context Awareness
- Automatic Reconfiguration
- Extensibility
- Reusability

Recap of DWARF

- Peer-to-Peer architecture
- Needs and Abilities

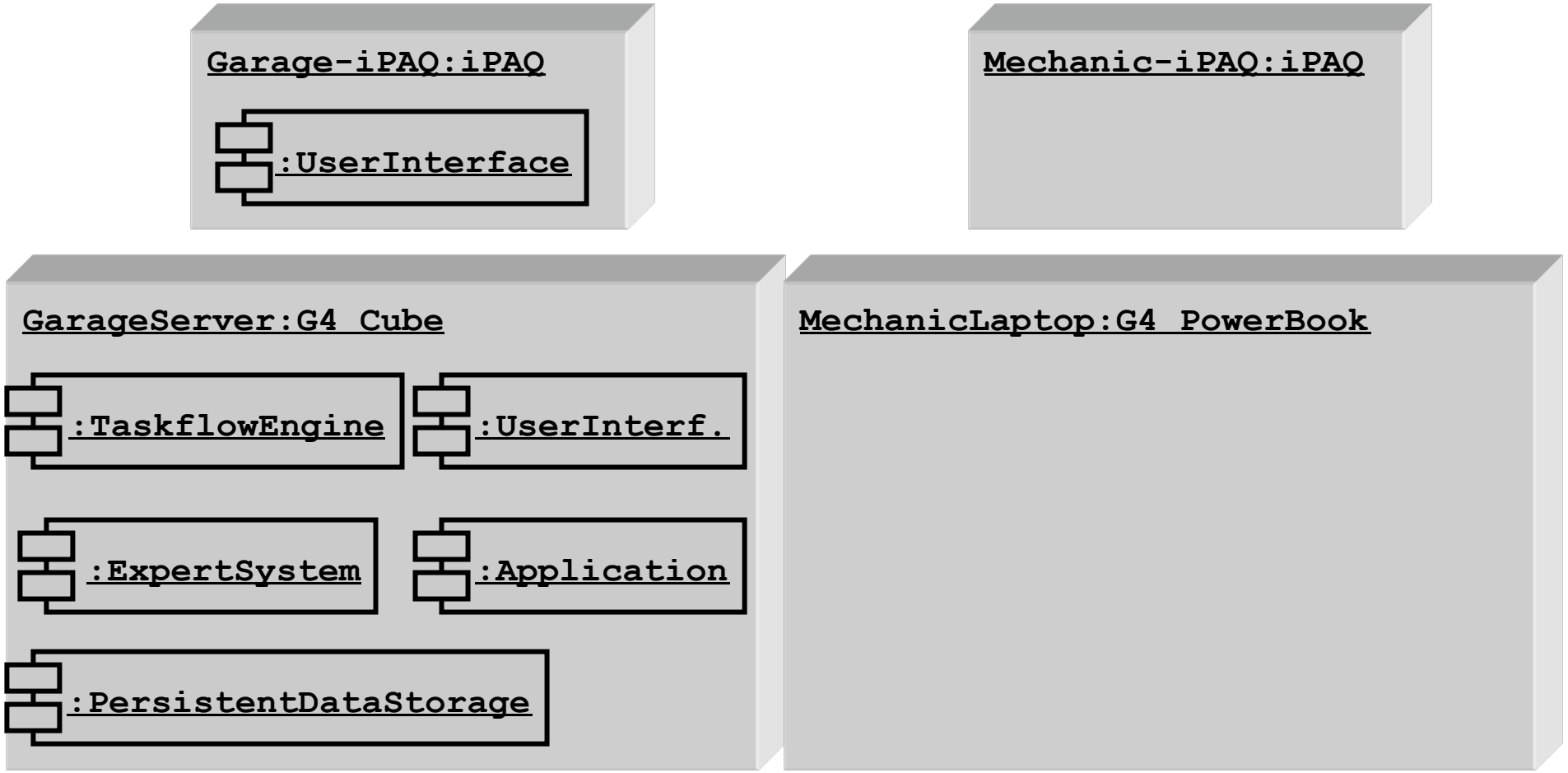
(DWARF Homepage: http://www.augmentedreality.de)

TRAMP Deployment Hardware

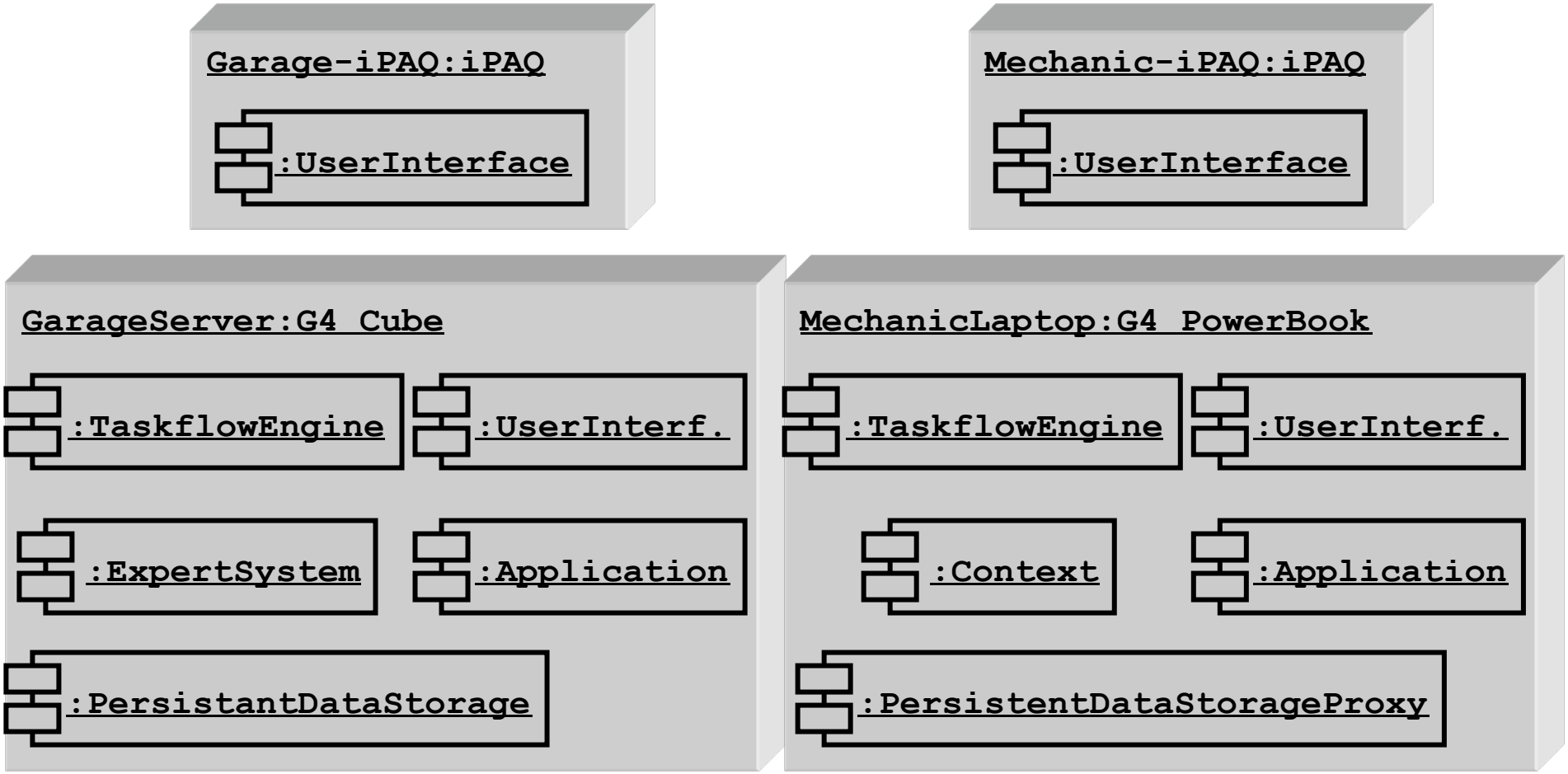
- GarageServer
  - Mac OS X on G4 Cube
- MechanicLaptop
  - Mac OS X on G4 PowerBook
  - InterSense InterTrax^2 Inertial Tracker
  - Sony GlassTron Head Mounted Display
  - Garmin eTrex Summit GPS receiver
  - Orangemicro iBOT FireWire Camera
- iPAQs
  - Linux
  - CompactFlash Memory Extension 128 MB

System Design and Deployment

System Design and Deployment

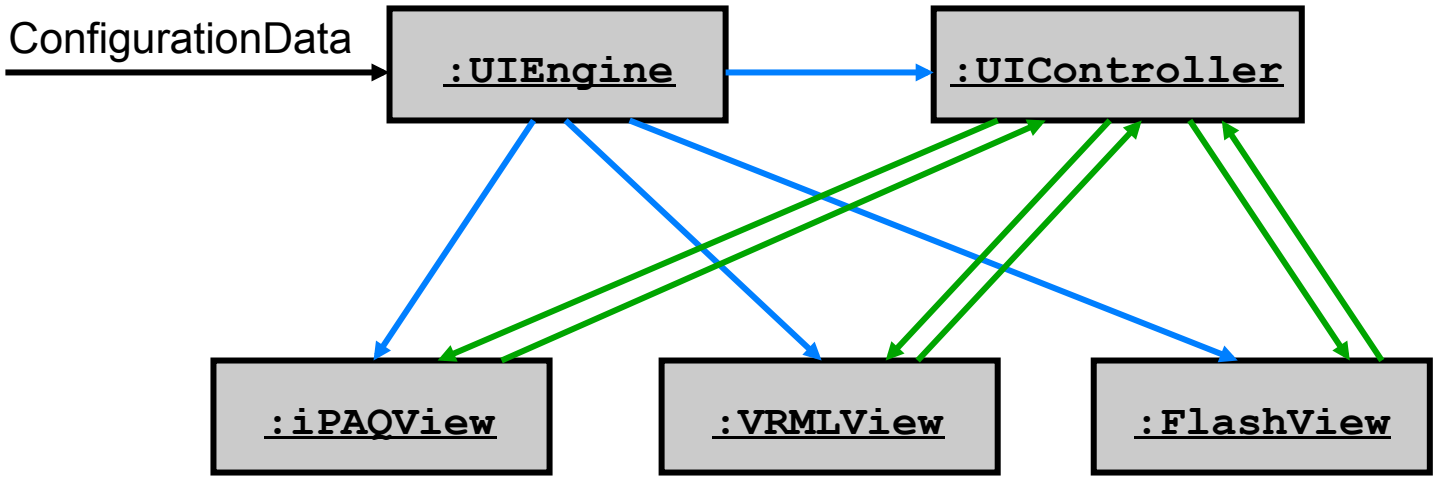


System Design and Deployment



Object Design: Design Patterns

One Example: User Interface Subsystem



Combination: Compiler + Observer

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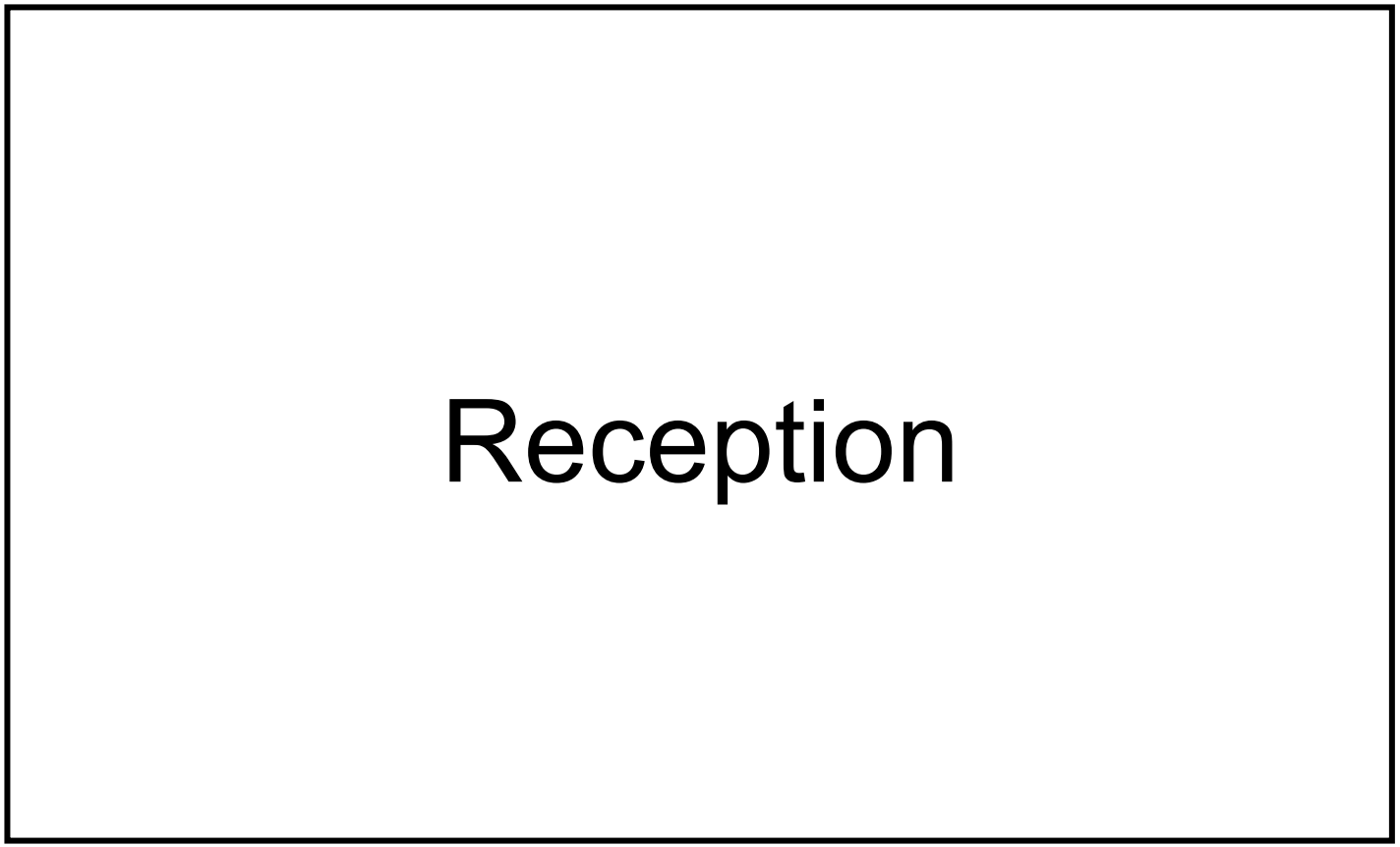
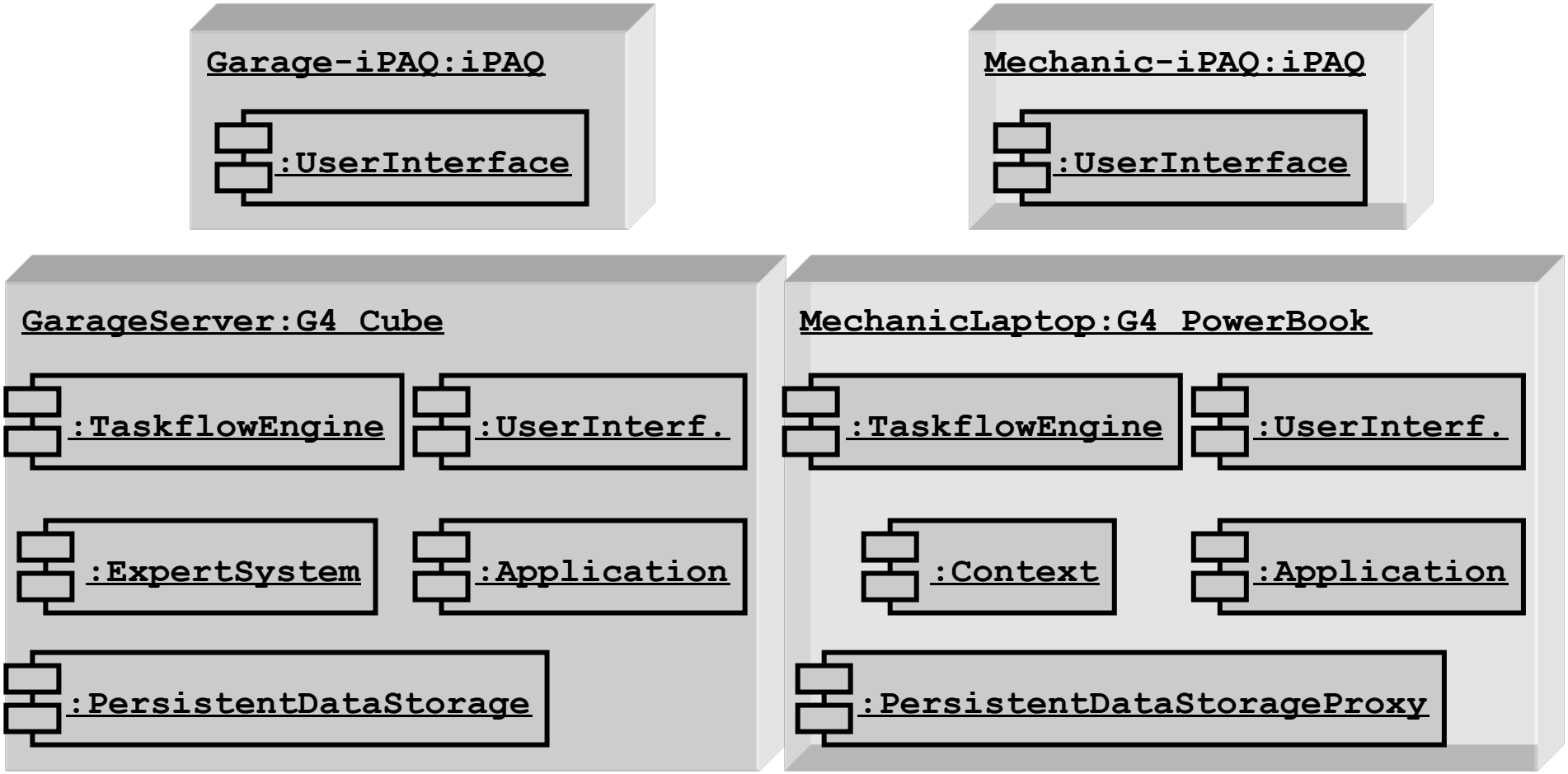
Scenario

- Charles the Customer wants to get his Headturnlight fixed at the TRAMP Garage.
- Mike the Mechanic finds and repairs the Car using the TRAMP System.
- Charles pays the bill and drives away happily.

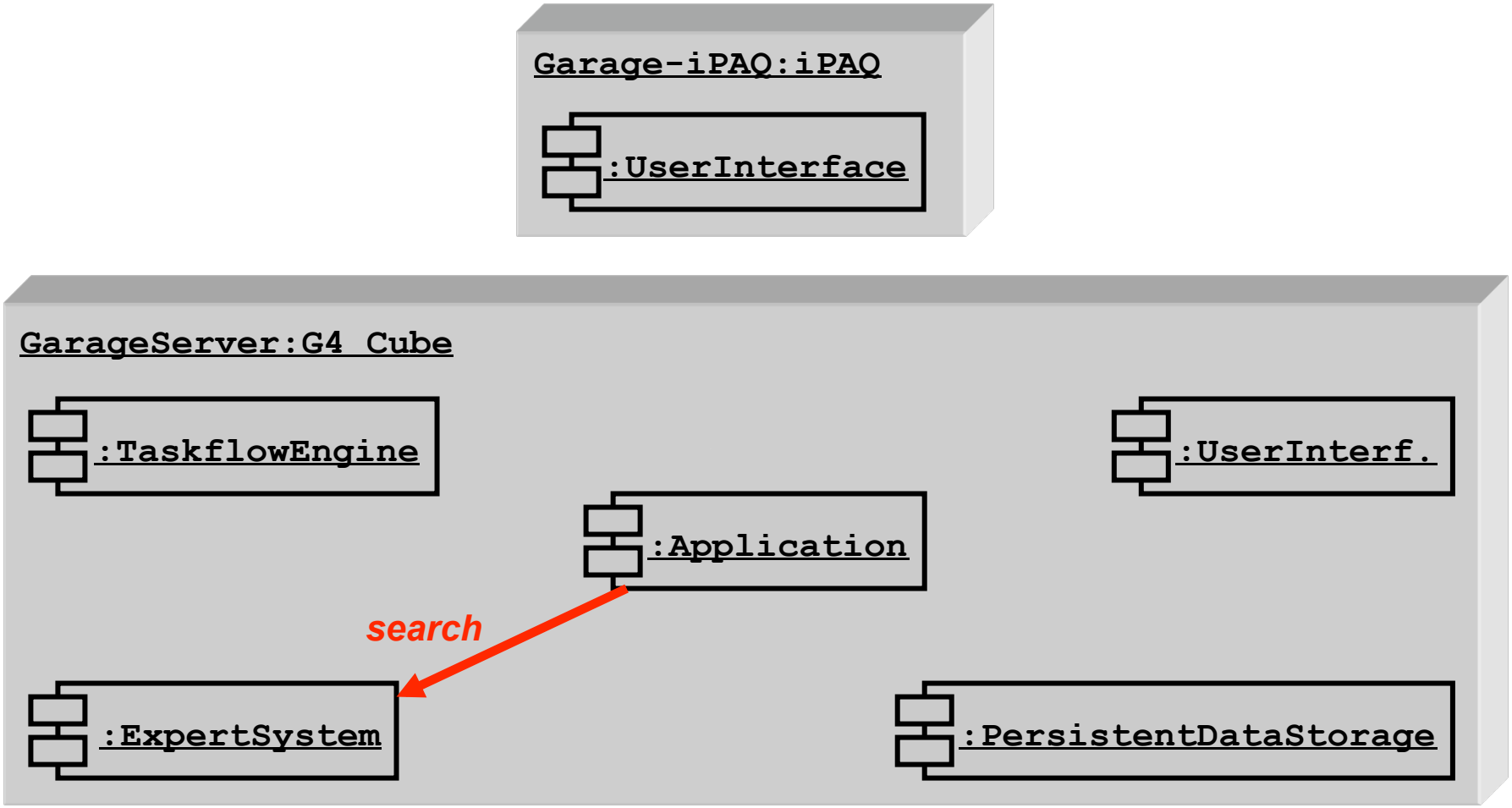
Now Showing



Reception


Garage-iPAQ:iPAQ
:UserInterface
Mechanic-iPAQ:iPAQ
:UserInterface
GarageServer:G4 Cube
:TaskflowEngine
:UserInterf.
:ExpertSystem
:Application
:PersistentDataStorage
MechanicLaptop:G4 PowerBook
:TaskflowEngine
:UserInterf.
:Context
:Application
:PersistentDataStorageProxy

Register a Customer



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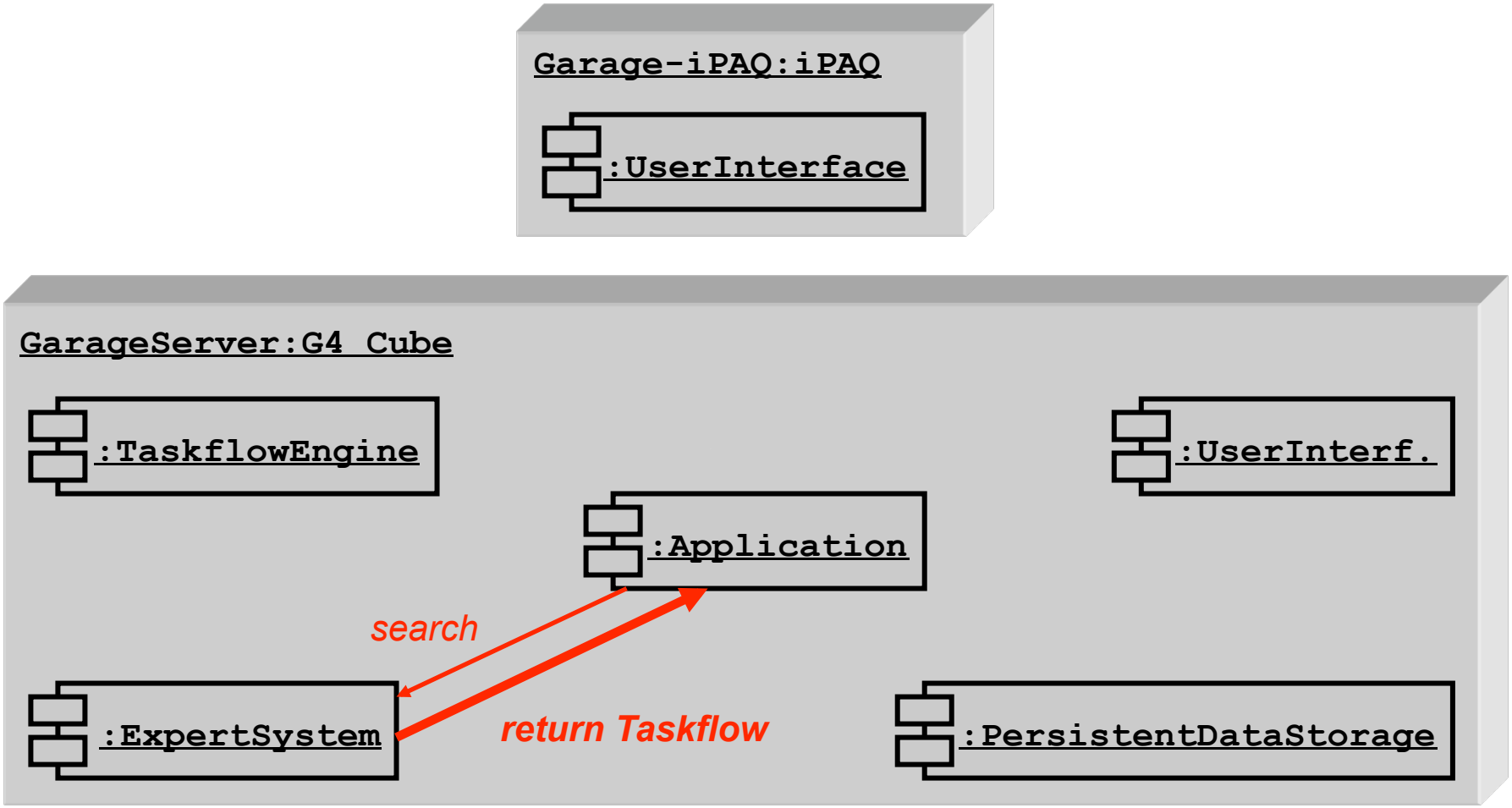

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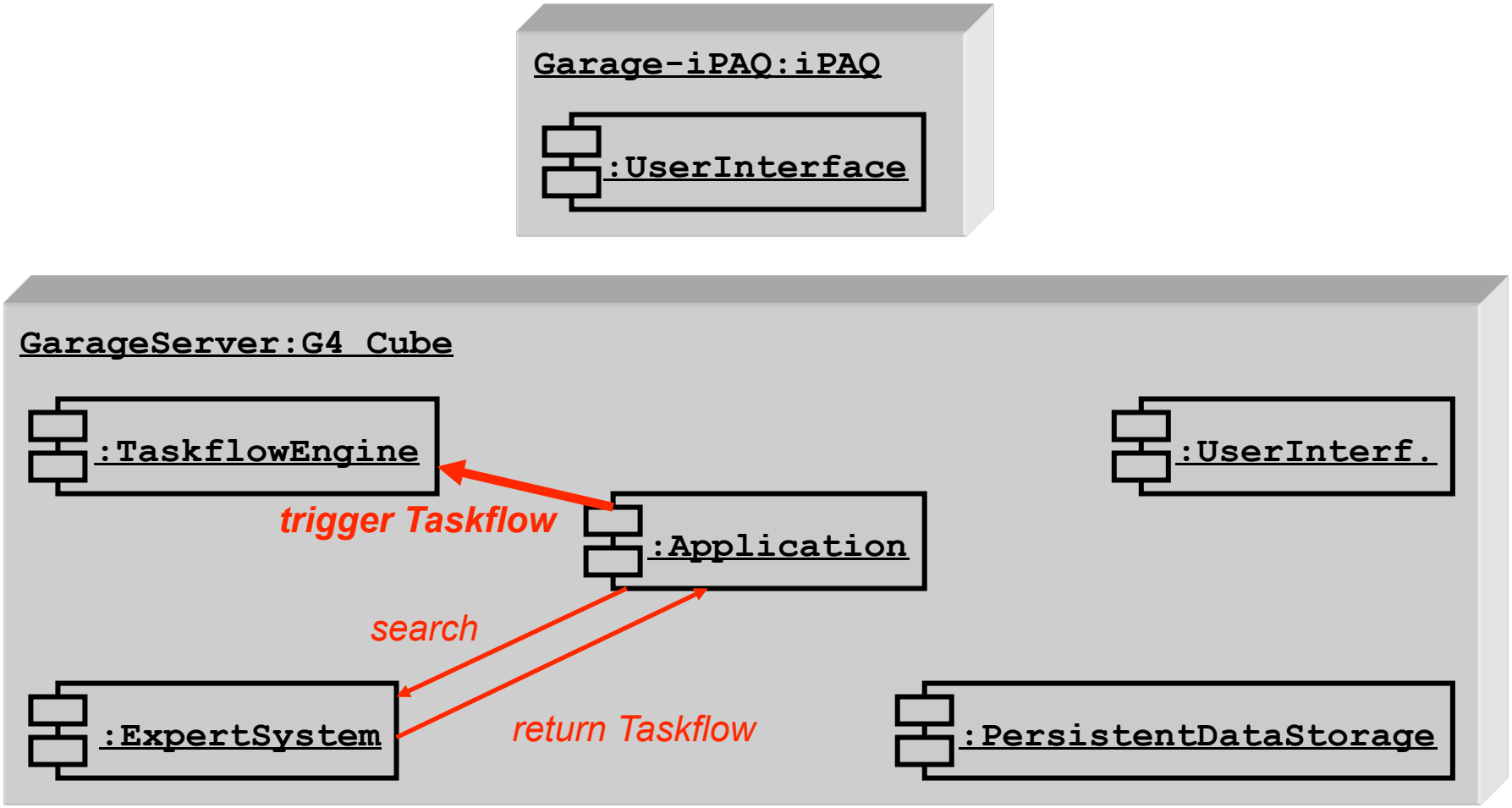

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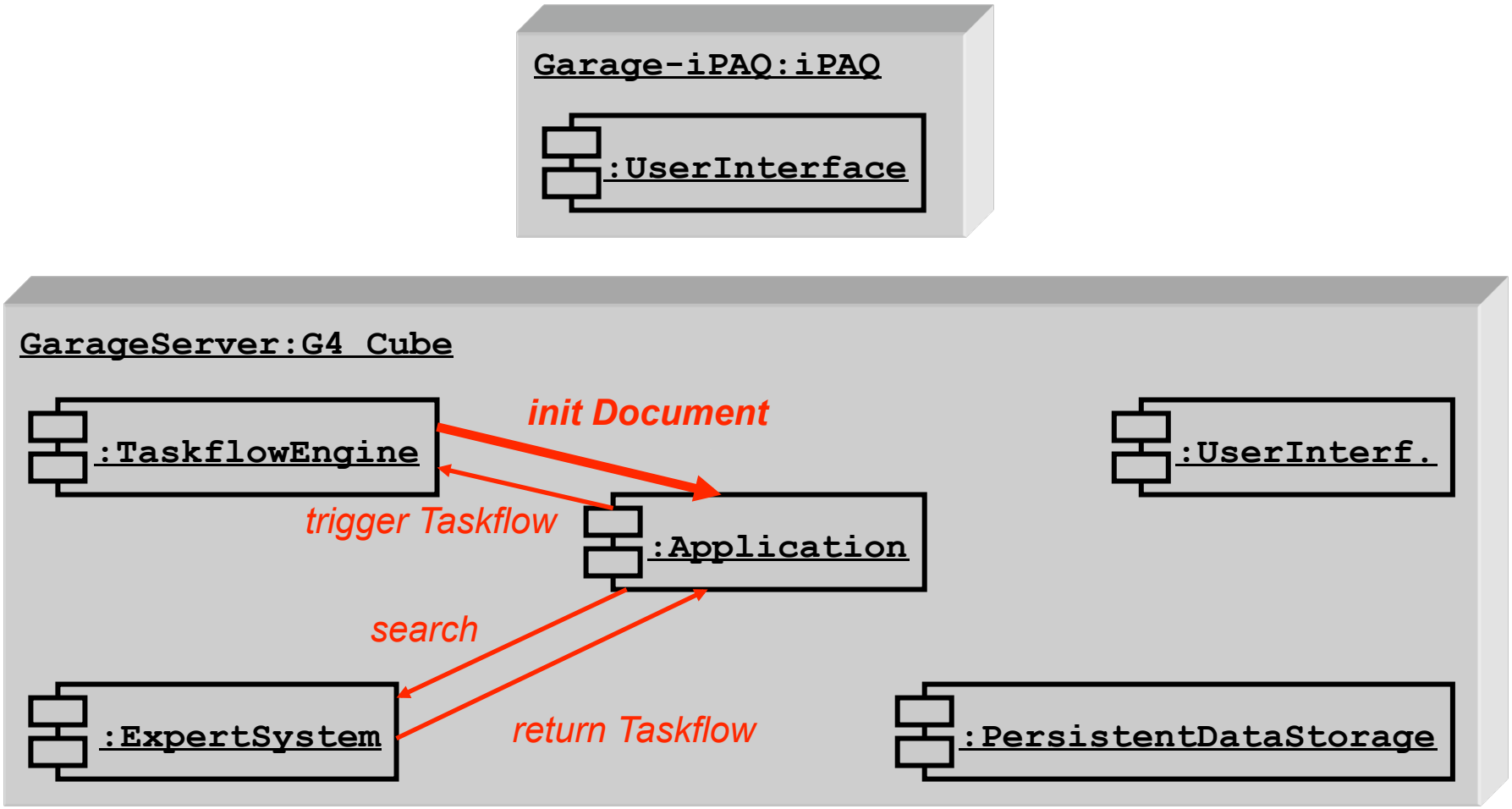

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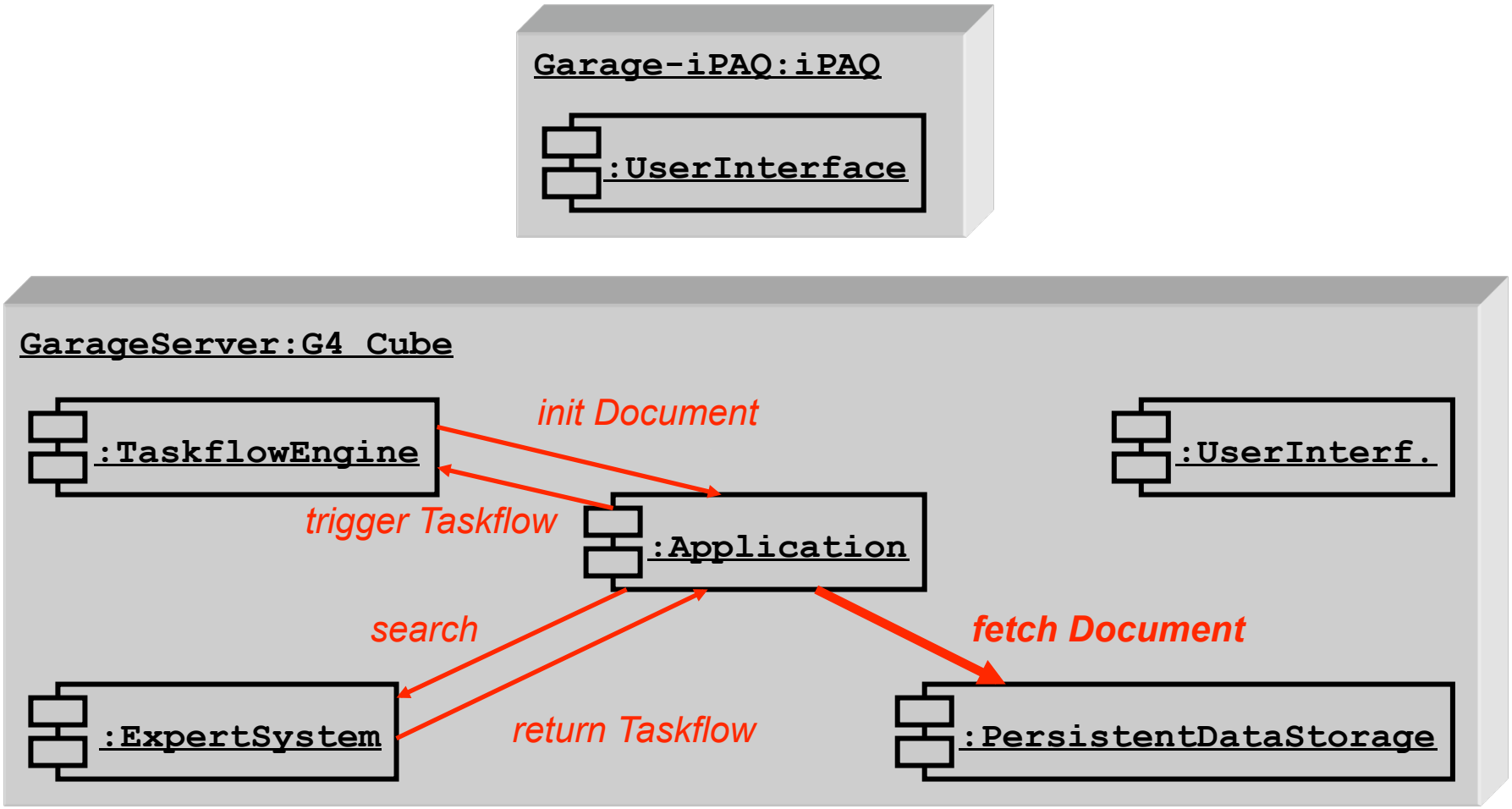

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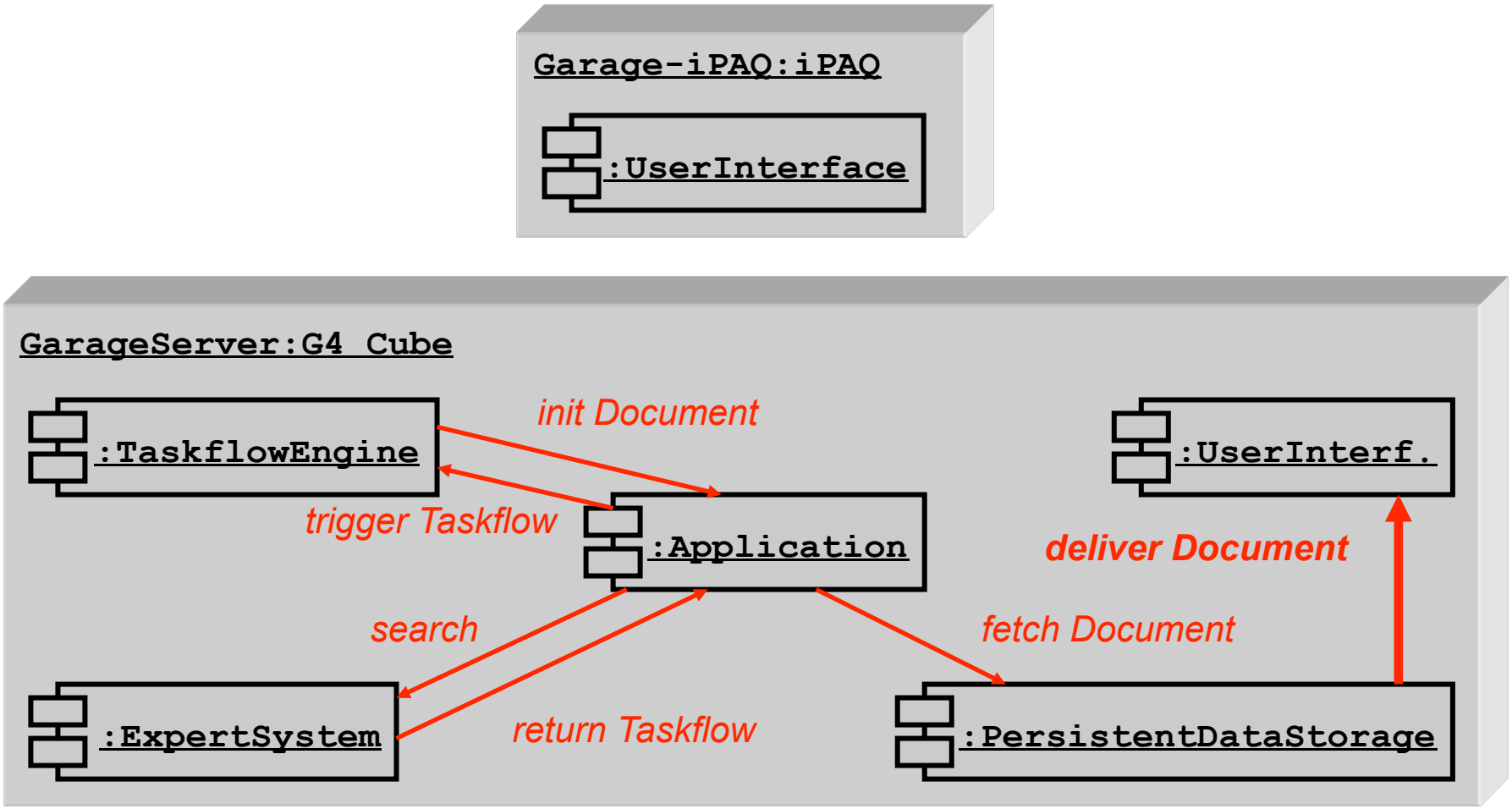

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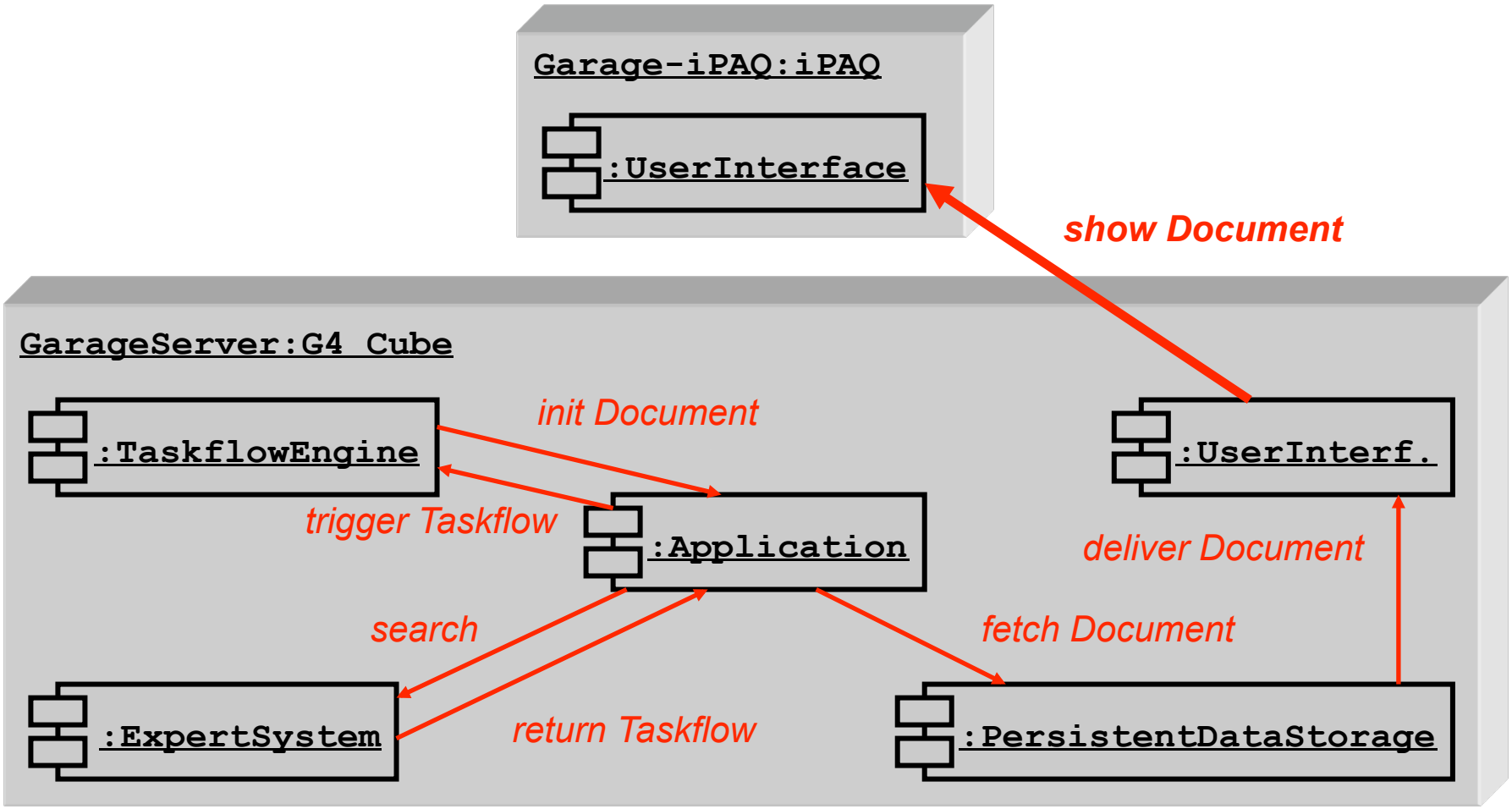
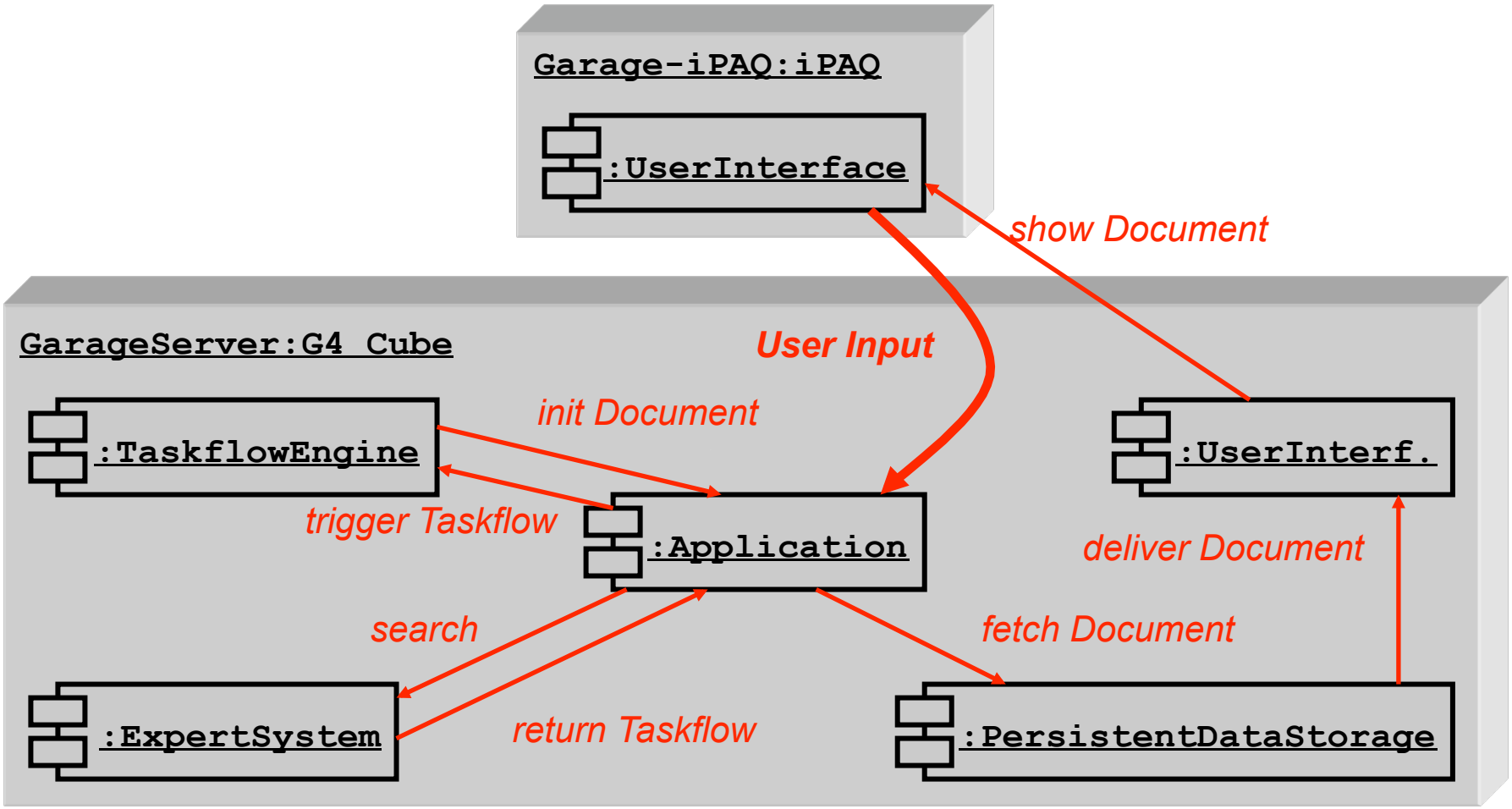


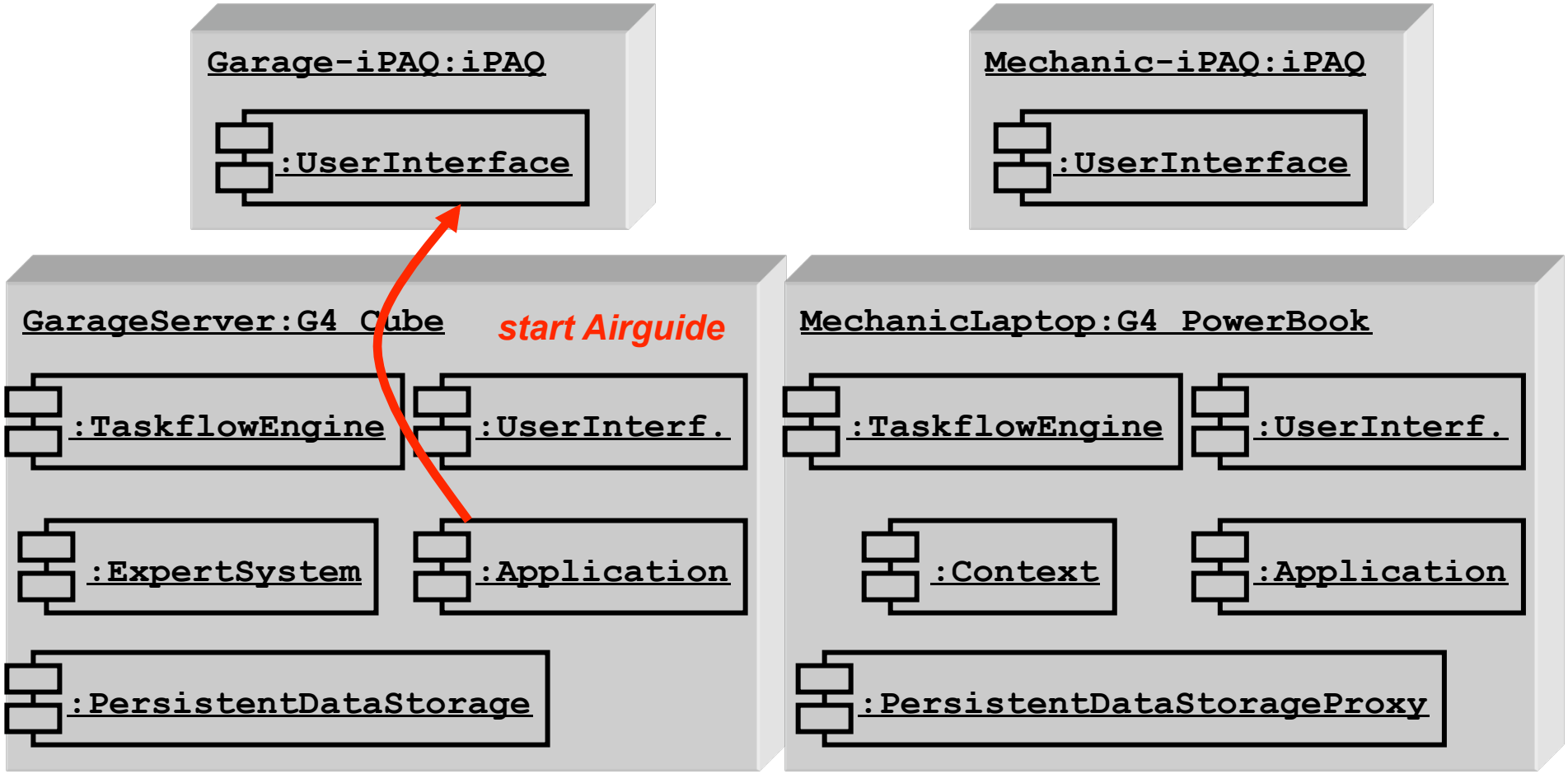
Register a Customer



Core Use Cases

- Request Maintenance **OK**
- Handover Maintenance Task
- Calibrate System
- Find Customer at the Parking Spot
- Execute Procedure

Navigation of Customer



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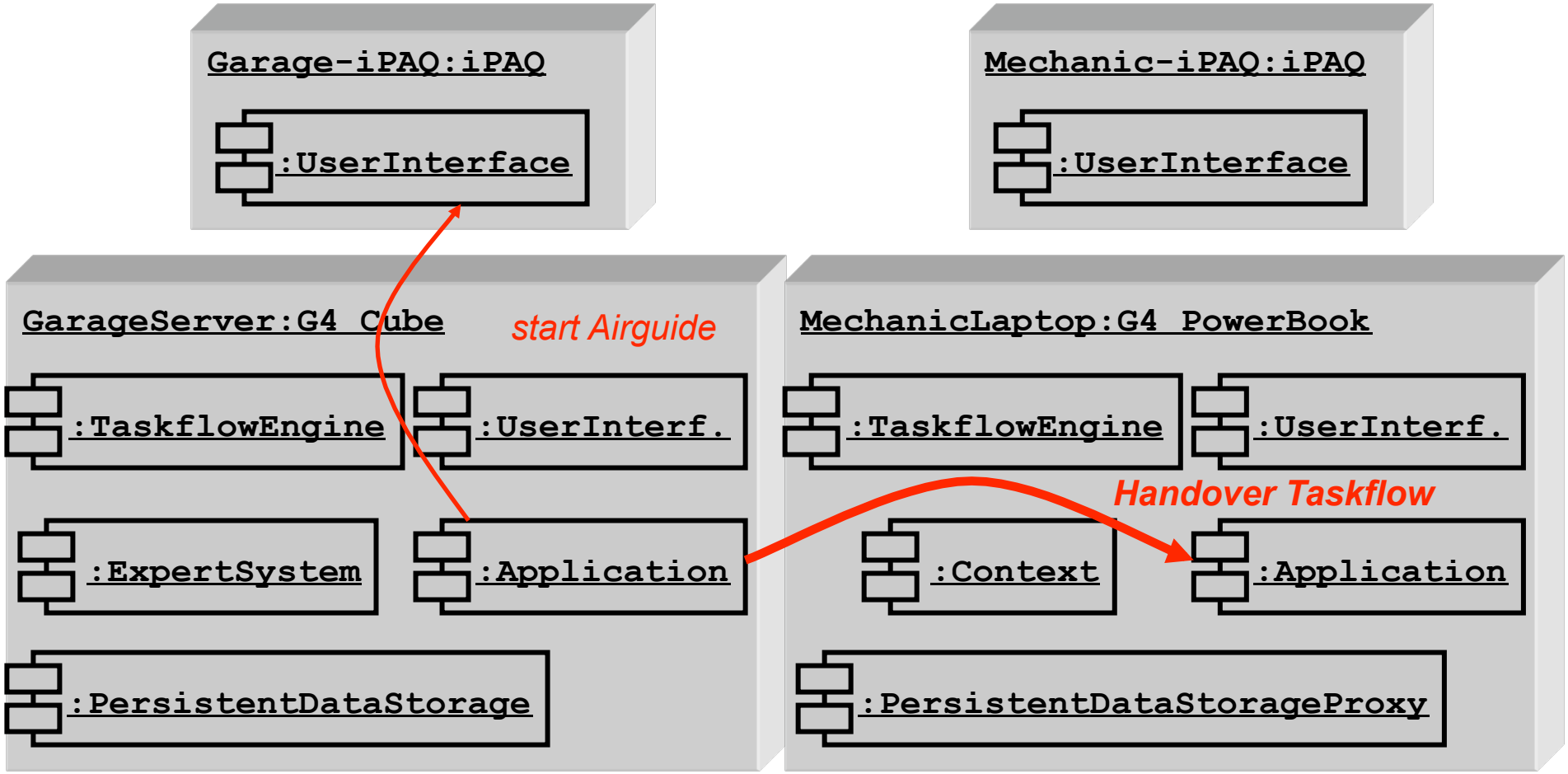

Core Use Cases

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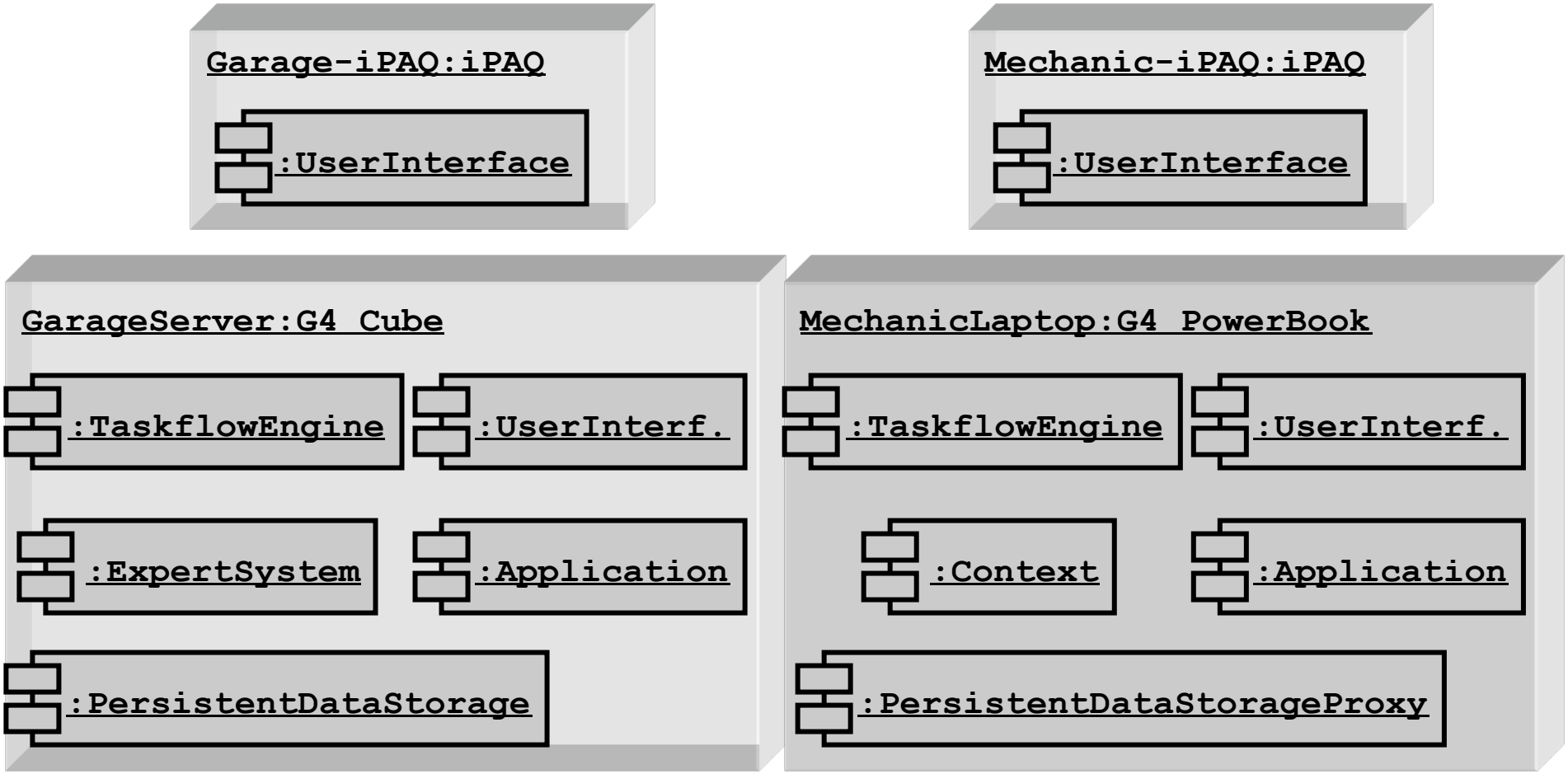
Now Showing

Navigation (Mechanic)

Subsystems for Navigation



Navigation / Tracking Subsystem

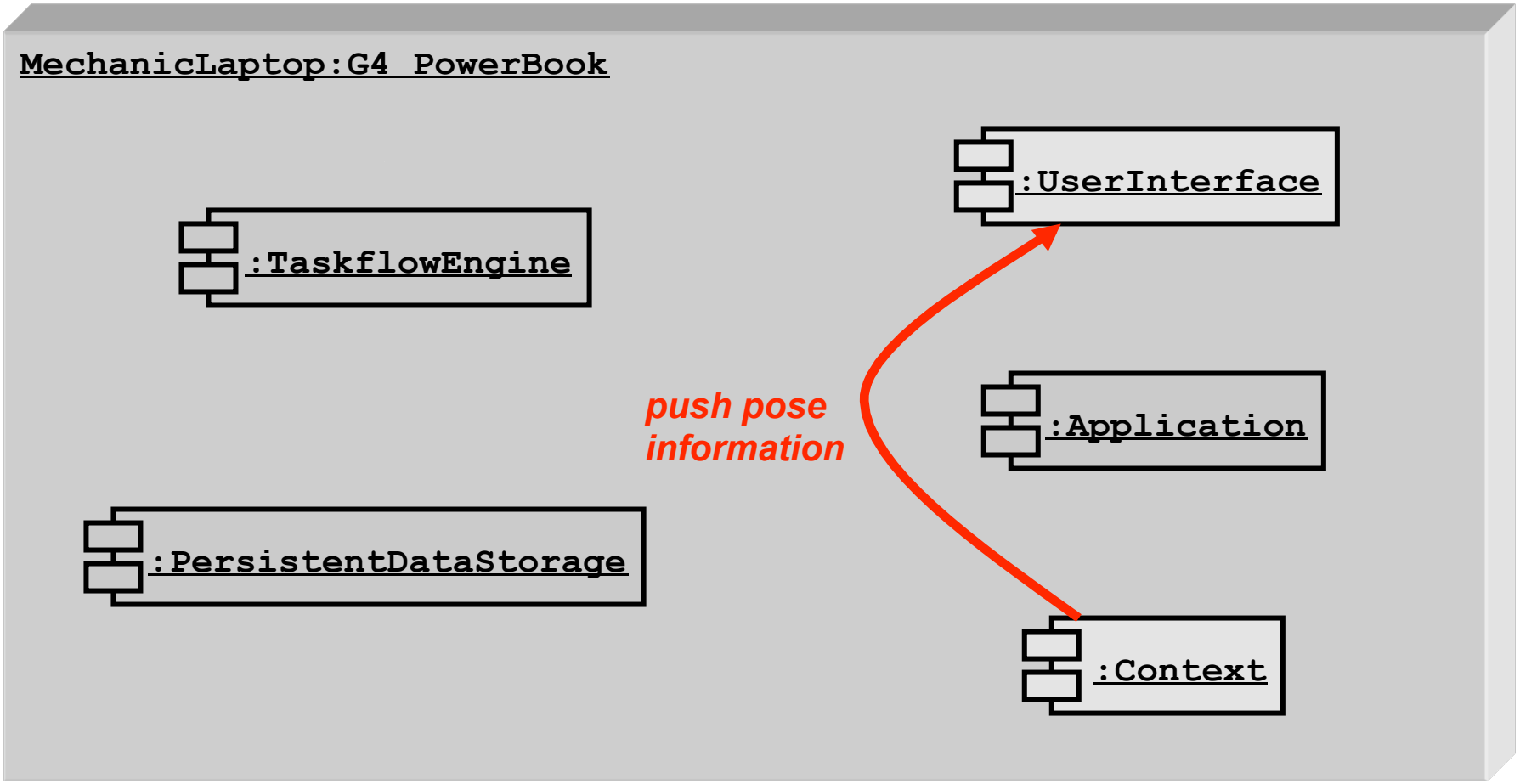
- Multiple sources of pose information
  - GPS-, Inertial-, Marker-Tracker

➔Sensor Fusion

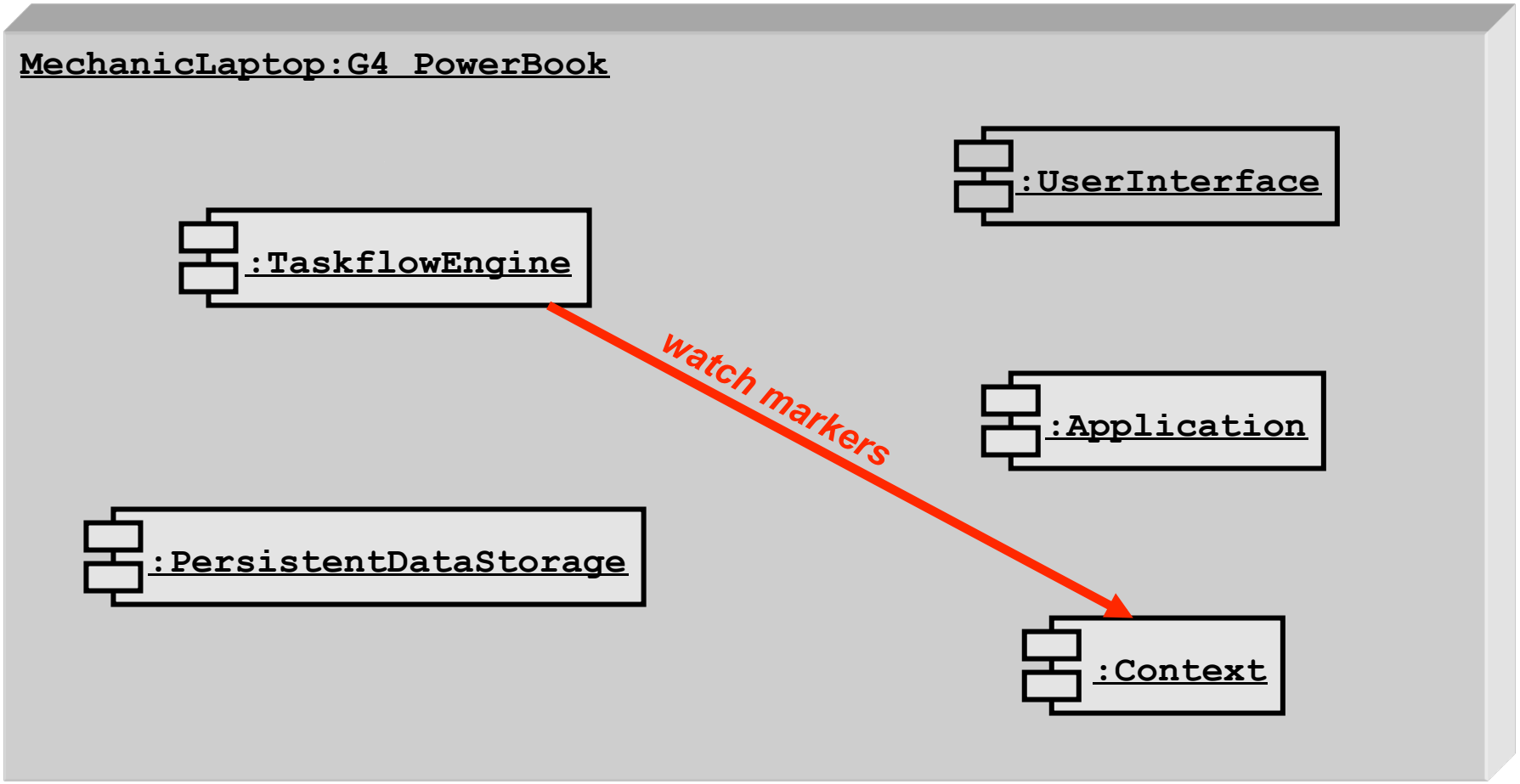
➔Calibration

➔Connected to VRML View (user interface)

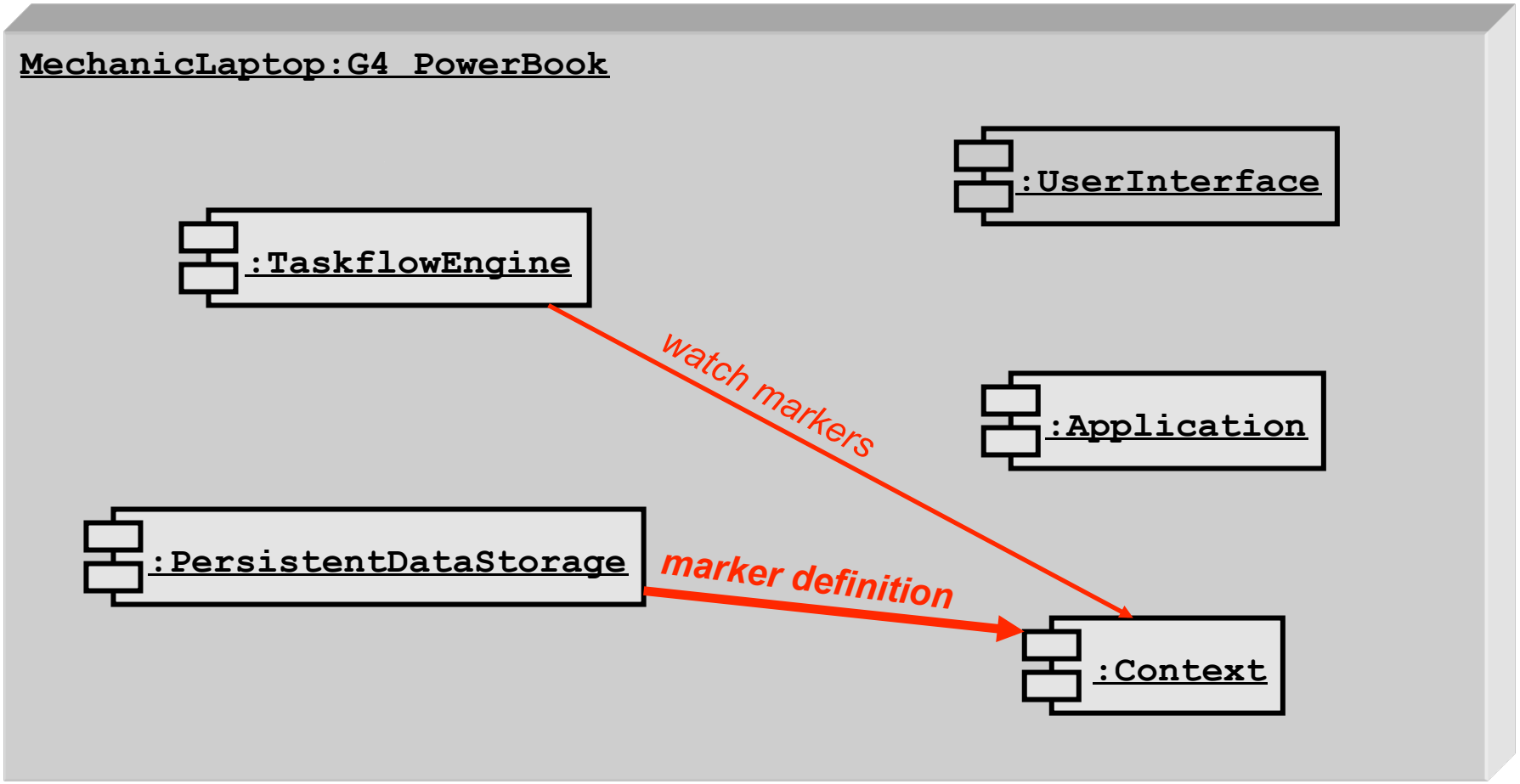
Navigation


MechanicLaptop:G4 PowerBook
:UserInterface
:TaskflowEngine
push pose information
:Application
:PersistentDataStorage
:Context

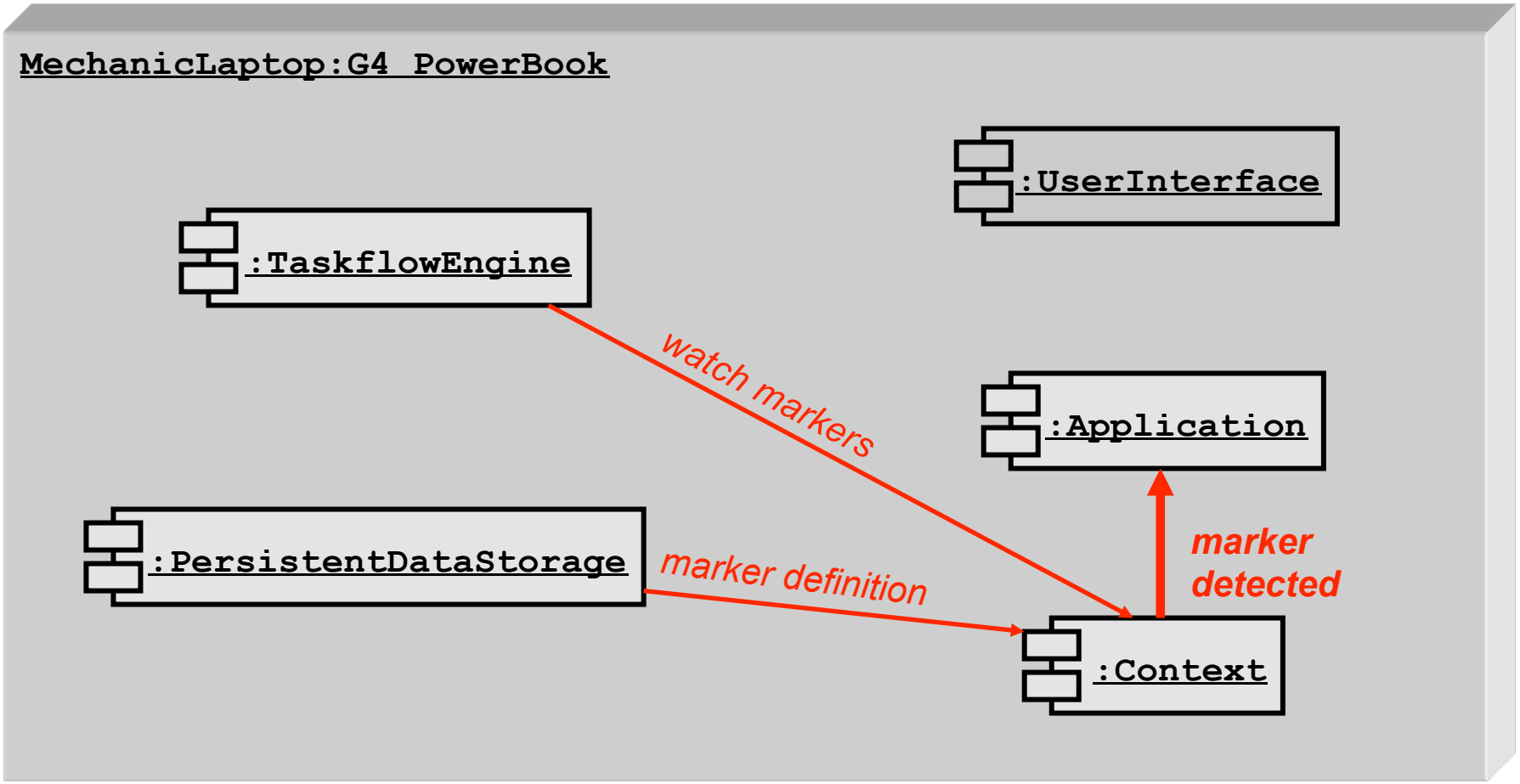
Marker detection



Marker detection



Marker detection



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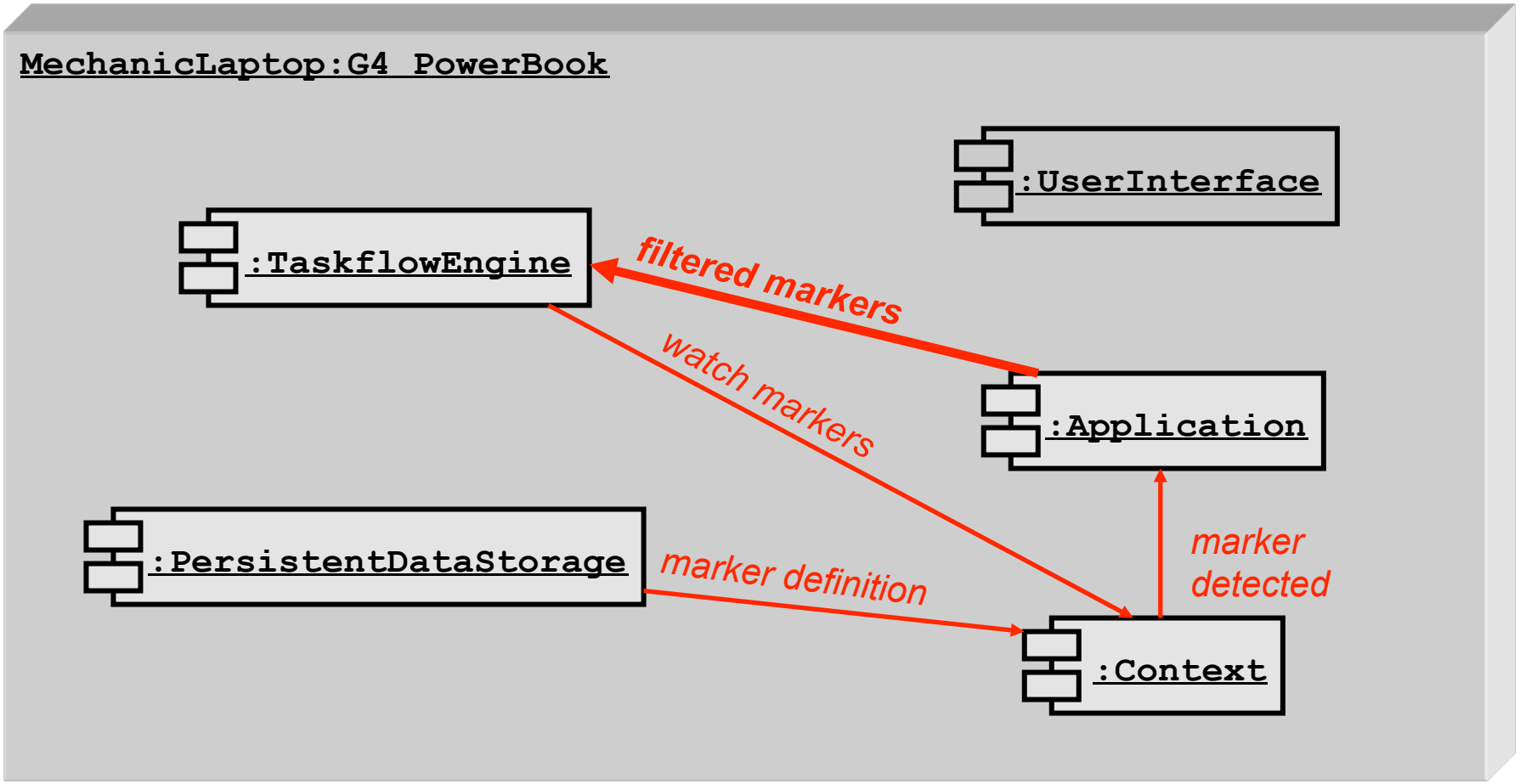
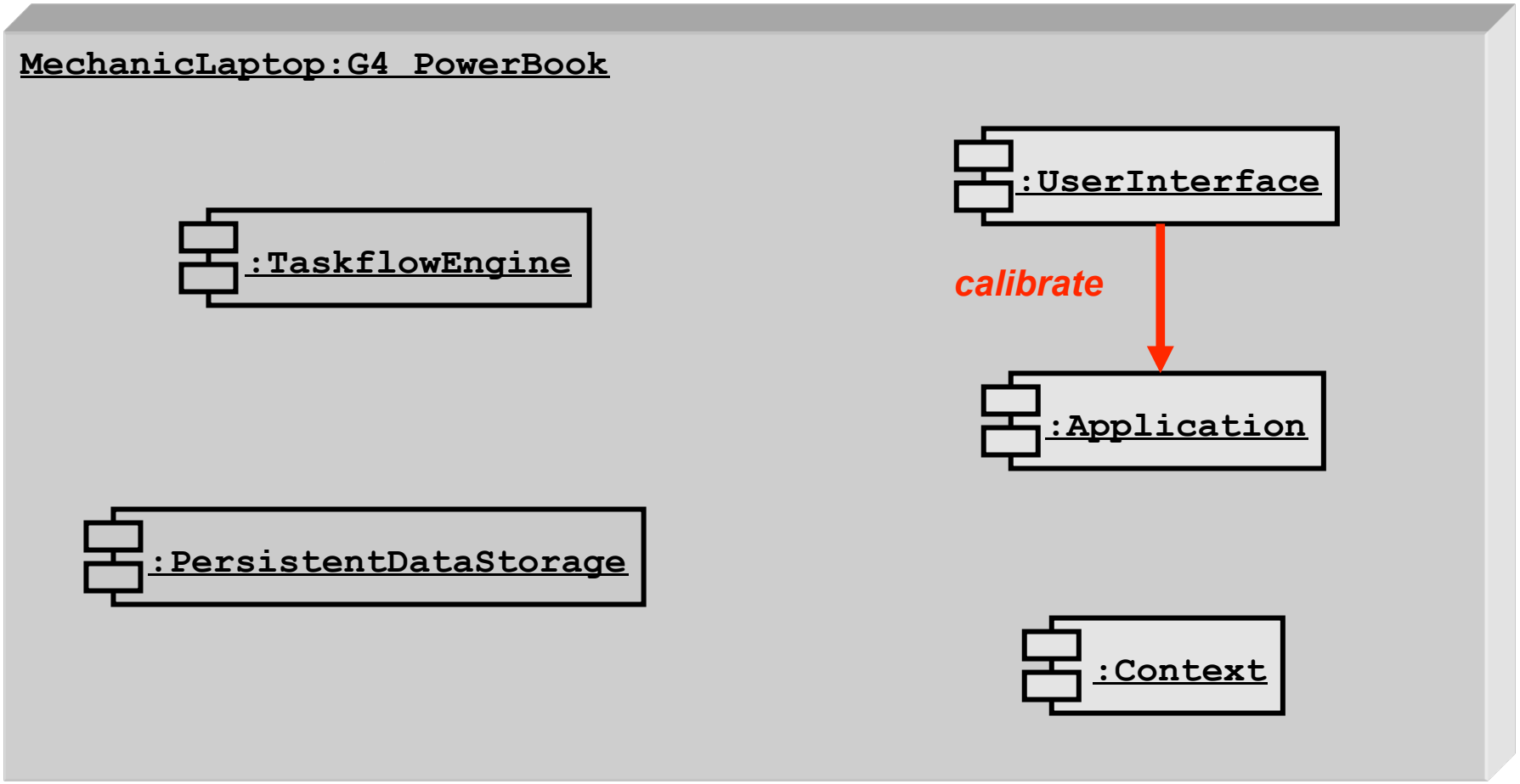


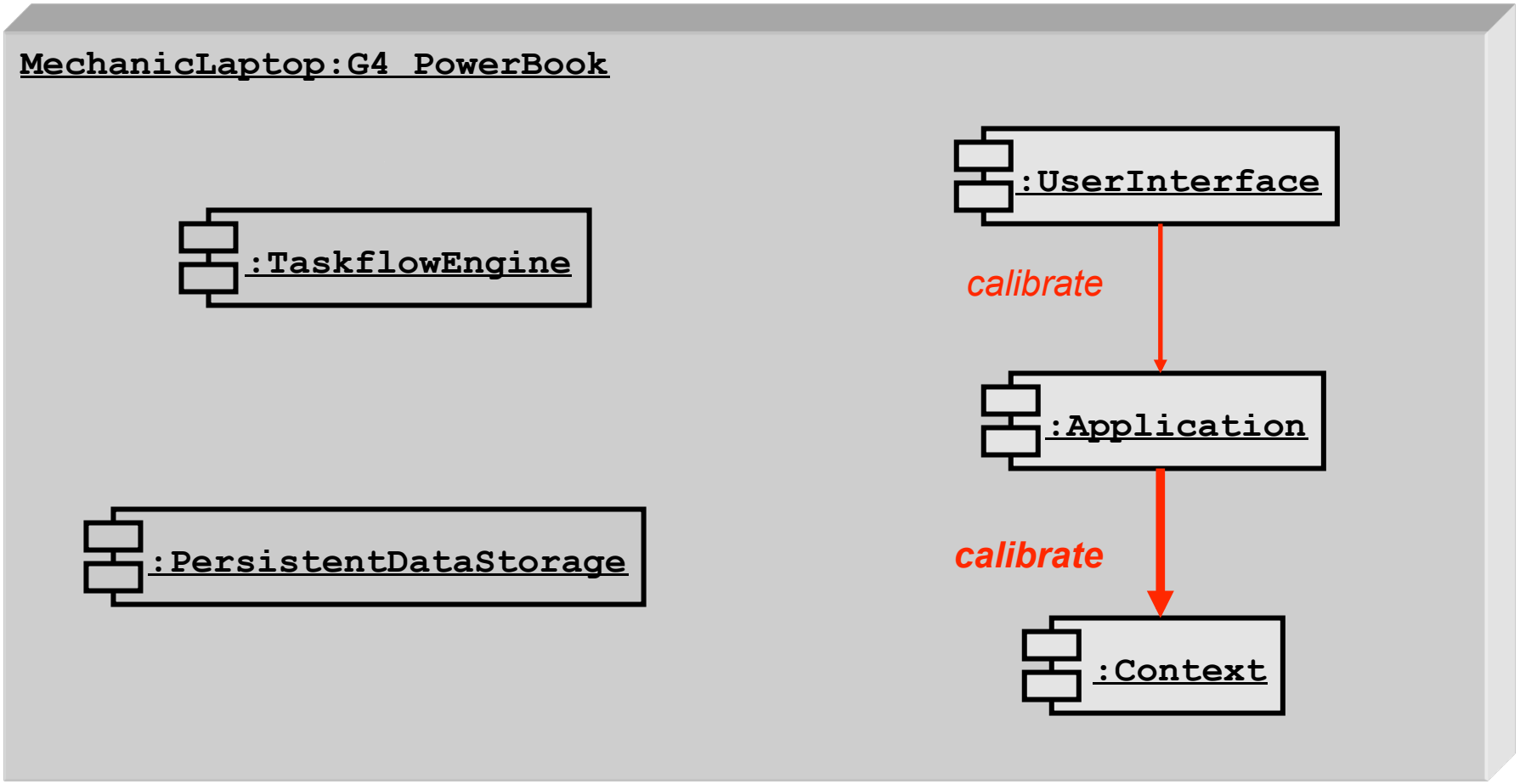
Now Showing

Marker Detection

Calibration



Calibration



Core Use Cases

- Request Maintenance OK
- Handover Maintenance Task OK
- Calibrate System **OK**
- Find Customer at the Parking Spot **OK**
- Execute Procedure

Repair – Execute Procedure

- Multi-modal input
  - Gesture recognition
  - Marker detection
  - Tracker data
  - iPAQ touchscreen
- Multi-modal output
  - iPAQ screen
  - Head Mounted Display (Flash, VRML)
- Context-aware taskflow progress

Now Showing

Repair

Payment

- Credit card number used for billing
- Use of the mechanic's iPAQ for the payment form
- Customer signs the bill
- Payment is cached and sent to the garage server on reconnect
- Completes taskflow

Now Showing

Core Use Cases

- Request Maintenance OK
- Handover Maintenance Task OK
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- Execute Procedure **OK**

Outline

- Key Requirements
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Future Work

- Deployment on SPOT
- Multi-User Management
- Expert System and Remote Experts
- Route Planner

Outline

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Project Handover

- Requirements Analysis Document
- System Design Document
- Object Design Document
- Testing Manual
- Master DVD: Sourcecode
- Video DVD: CAT Presentation

Discussion

- Technical questions?
- Design questions?
- Organisational questions?

- Hands-on demo in 3175 (Aquarium)

Thank you.

Discussion

- Technical questions?
- Design questions?
- Organisational questions?

- Hands-on demo in 3175 (Aquarium)