Distributed Programming with Space Based Computing Middleware

Drone Factory

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Overview

- Technologies used
- Coordination Model (Coordination of Actors, Architecture)
- Cost Estimation (LOC, Workload)

Technologies

- **Non-space based solution : RMI**
  - Tightly coupled mechanism
  - Peer must be online to receive a message
  - Previous experience
- Non-space based solution : JMS
  - Loosely coupled mechanism
  - Guaranteed delivery, but not really needed in our case
- Sockets
  - Low level
  - Time consuming and complicated to implement

- **Space based solution : MozartSpaces 2.3**
  - Was handled more during lecture -> convinced
- Space based solution : JavaSpaces
  - No aspects, complicated to implement

Technologies

XVSM vs. RMI

XVSM

- neatly implementation
  - container independence
  - without significant data-exchange
- removes huge burden through integrated coordinators
- containers can be accessed easily from everywhere
- easy to listen for changes in containers
- transaction model
- selecting data easy through selectors

RMI

- no coordinators, but streams (java 8) can be used
- no transaction model
- synchronization has to be handled explicitly
- thread safe constructs are needed
- an explicit method is needed to access the data

Coordination Model XVSM

Four Containers

- Parts
- Modules
- Drones
- Tested Drones

Four Notification Containers

- Painted
- Assembled
- Calibrated
- Tested

Two Coordinators

- QueryCoordinator
- FIFOCoordinator

Coordination Model RMI

- Part
- Module
- Drone
- Order

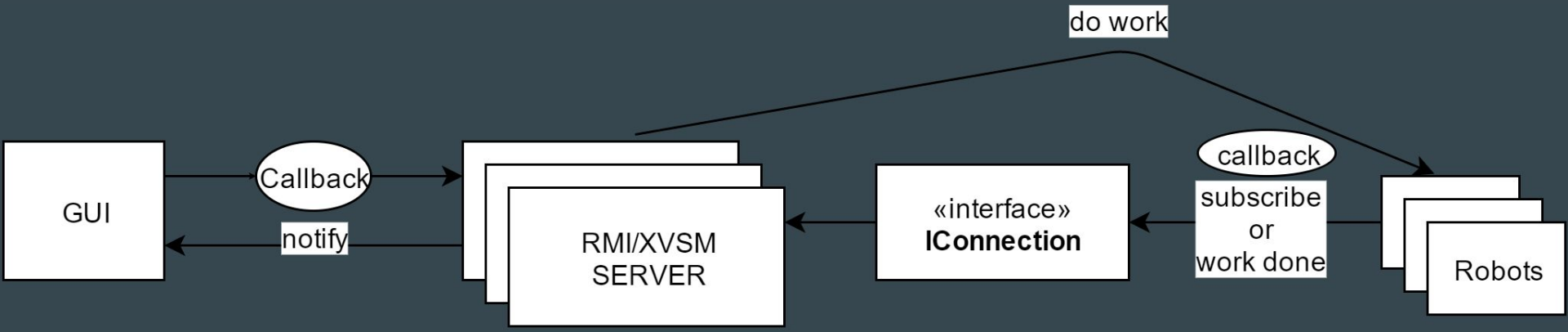
CopyOnWriteArrayList

- [Robots]

Queue

Coordination Model Architecture

- Implicit Invocation Architectural Style (mostly)
- Asynchronous communication (notifications)
- Time decoupling
- Transactions
  - RMI: implementing our own transaction model was necessary



Cost Estimation

Lines of Code (LOC)

Common Code

GUI	1073	+ 650 *.fxml
*.connection	134	
*.entity	434	
*.notification	456	
*.robot	318	
*.server	36	
utils	103	
SUM	**2452**	

XVSM

xvsm	1028

RMI

rmi	1104

TOTAL	**4764**

Cost Estimation Workload

	Part 1	Part 2	Total
Task *.1 : (GUI)	40 Hours	16 Hours	56 Hours
Task *.2 : (Space Based Solution)	60 Hours	8 Hours	68 Hours
Task *.3 : (Alternative Solution)	50 Hours	11 Hours	61 Hours
Scripts +Documentation	10 Hours	15 Hours	25 Hours
		SUM	**210 Hours**

THANK YOU FOR YOUR ATTENTION

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