

Code Mobility

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Outline

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Motivation

- Design code mobility system on ESE Board
- Hardware drivers & mobile agents & communication
- Master project management skills

Code mobility overview

Concept of code mobility

Concept of code mobility

Mobile agent

Strong and *weak* code mobility

Layered architecture

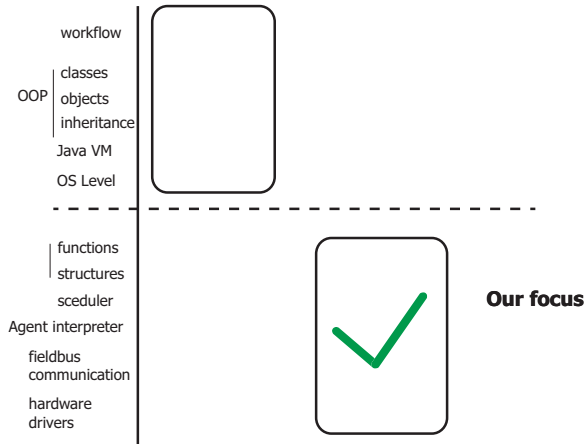
Advantages of code mobility

Move code close to resources

Enable client customization of remote resources

Performance gains

Level of abstraction



Design challenges for the project

Processing gap

Performance

Memory management

Communication design

Requirements

- Agents:
 - simple language
 - support mobility and message exchange
- Platform:
 - execute agents concurrently
 - provide hardware services to agents
- Communication:
 - transfer agents & state *strong mobility*
 - transfer messages between platforms
 - cross board communication via Zigbee

General overview

3 layered architecture:

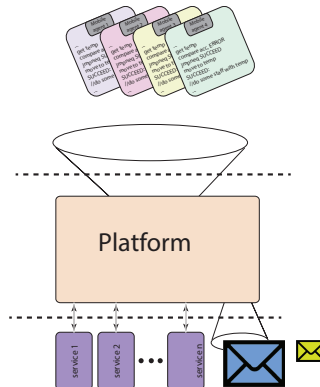
- Agent level
- Platform level
- communication & drivers



General overview

3 layered architecture:

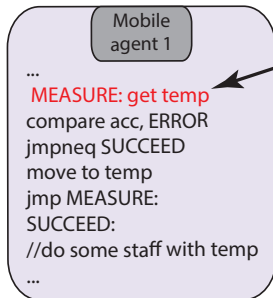
- Agent level
- Platform level
- communication & drivers



Agent language that support:

- Arithmetical operations, branching and looping
- Message exchange
- Replication and code mobility

Agents



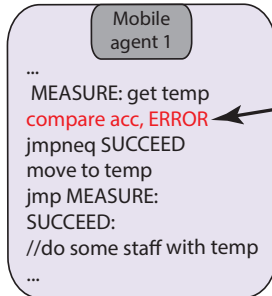
Get temperature value

Platform can provide this service?

yes: do staff

no: move agent to another platform

Agents



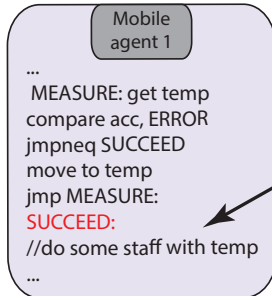
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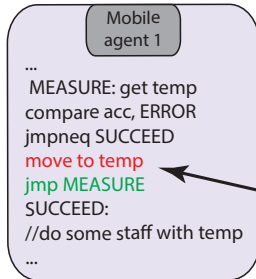
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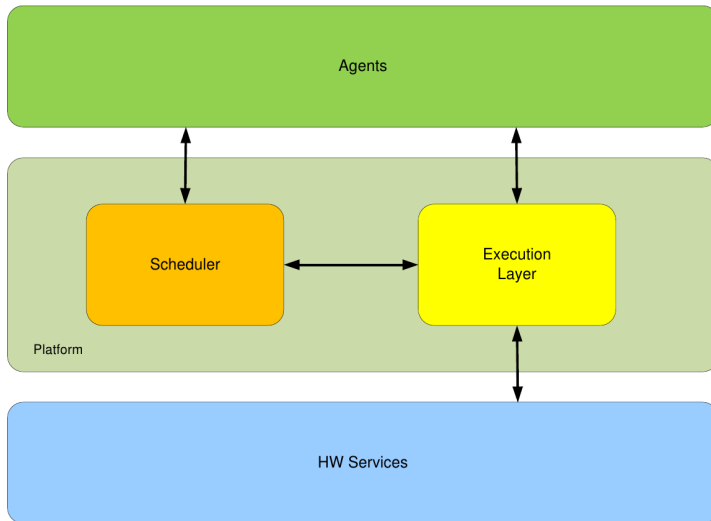
Get temperature value

Platform can provide this service?

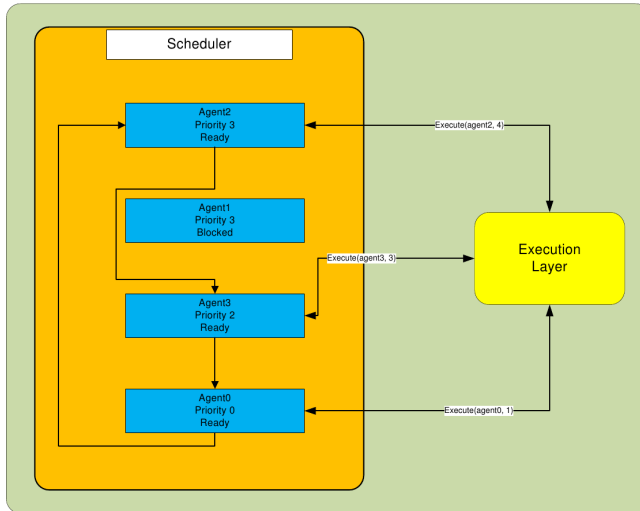
yes: do staff

no: move agent to another platform

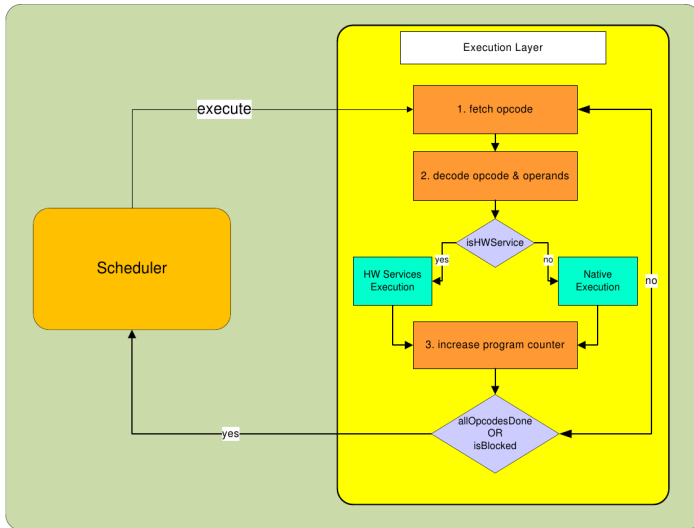
Platform



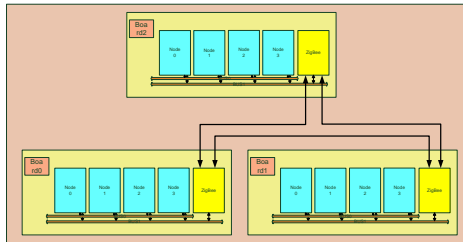
Scheduler



Execution Layer



Communication Requirements



- Inter-node and Inter-board communication
- Correct sending of large amounts of agent code
- Timely delivery of control messages
- Bridging between local and wireless network

Transmission Layers

Byte	MSB	LSB
0	destination node	payload length
1	data	
1	data	
1	...	
14	data	
15	crc	

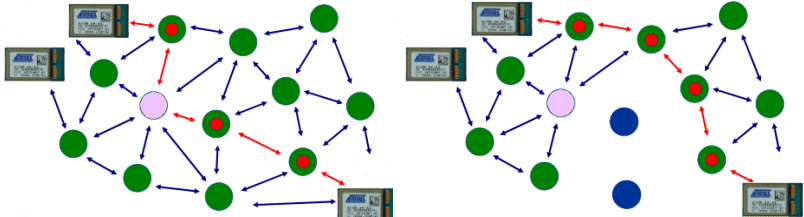
Byte	MSB	LSB
0	destination node	payload length
1	source node	destination board
2	source board	packet type
3	frame id	
4	packet id high	
5	packet id low	
6	empty	
7	data	
1	...	
14	data	
15	crc	

Figure: Lower-and Upper Level Datagram

- Lower level: priority based CSMA/CA protocol
- Upper level: routing and frame composition
- Network bridge: Zigbee access on application layer

Network Topology

Fault Tolerant Routing



- Zigbee Network Coordinator
- Zigbee Network Router
- Disabled Node

Milestones



Phase 1. Product outline and information gathering



Phase 2. Application requirements and specification



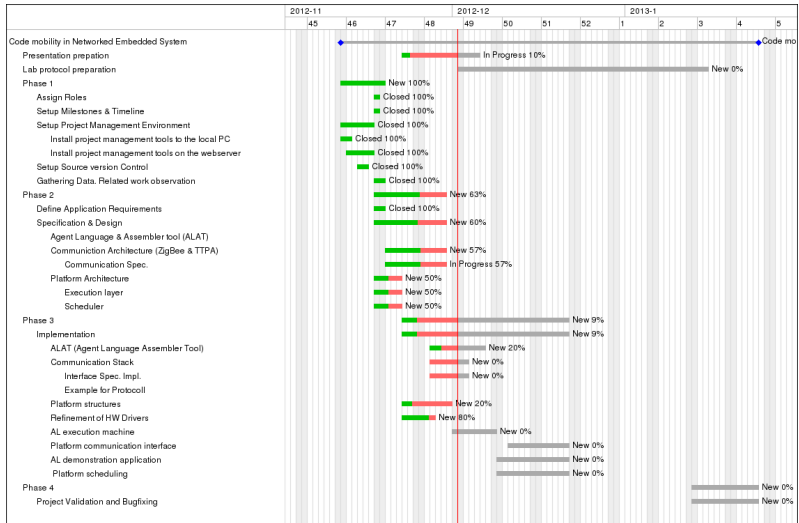
Phase 3. Implementation



Phase 4. Validation and analysis

Workpackages

Gantt diagram



Tools

Version control



git

Documentation & code repository



github

File sharing



amazon s3

Project management



redmine

<http://nes2012group4.herokuapp.com/>

Code generation



SCADE

Editors



Emacs

gedit