Code Mobility

Konstantin Selyunin
e1228206@student.tuwien.ac.at
Miljenko Jakovljević
e1228206@student.tuwien.ac.at
Igor Pelesić
e0006828@student.tuwien.ac.at

December 4, 2012

Outline

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   - Code mobility overview
   - Level of abstraction
   - Design challenges for the project
   - Requirements
2. System architecture
   - General overview
   - Agents
   - Platform
     - Scheduler
     - Execution Layer
   - Communication
3. Project management
4. Tools

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

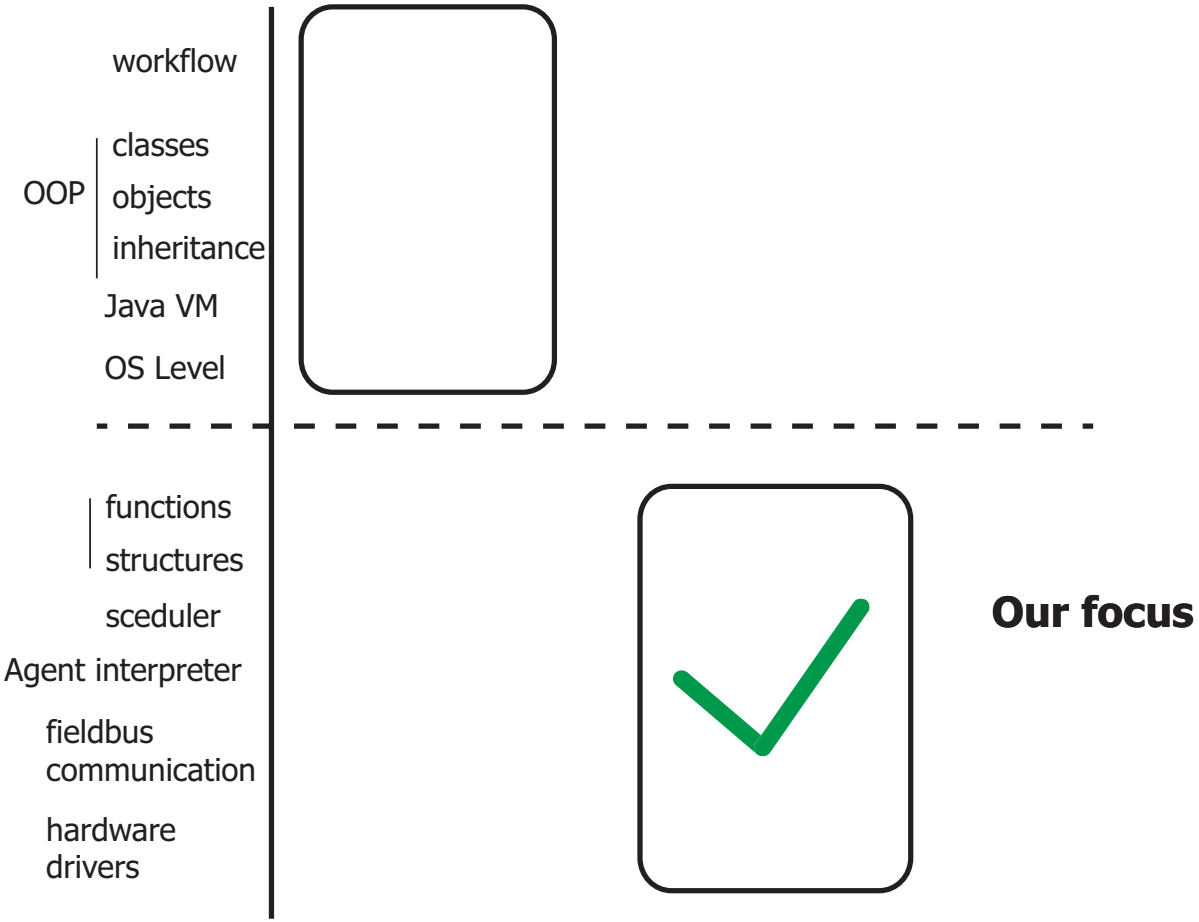
Advantages of code mobility

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

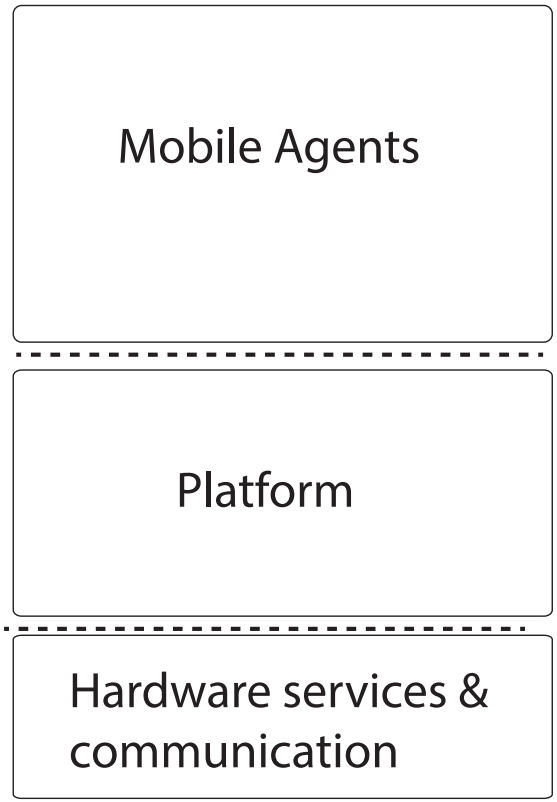
Requirements

- 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:

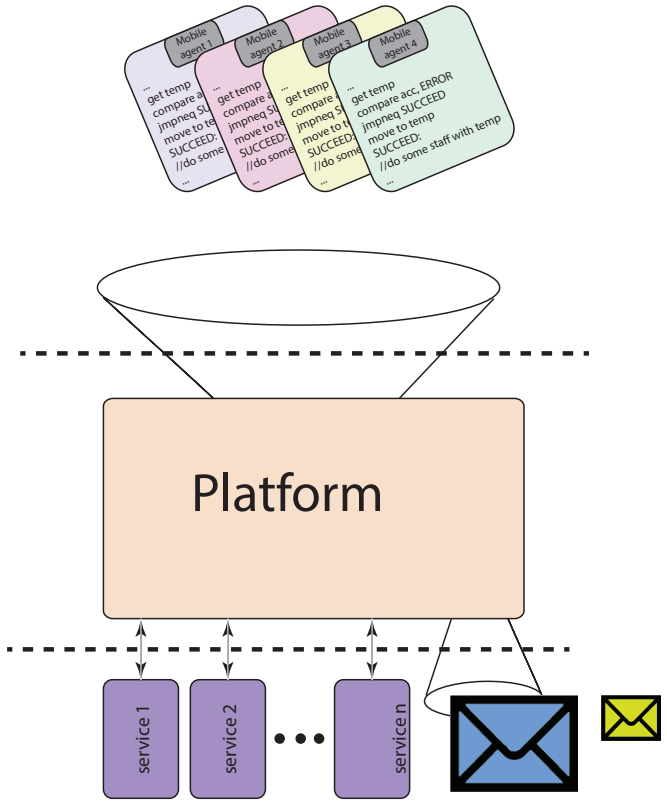
- Agent level
- Platform level
- communication & drivers



General overview

3 layered architecture:

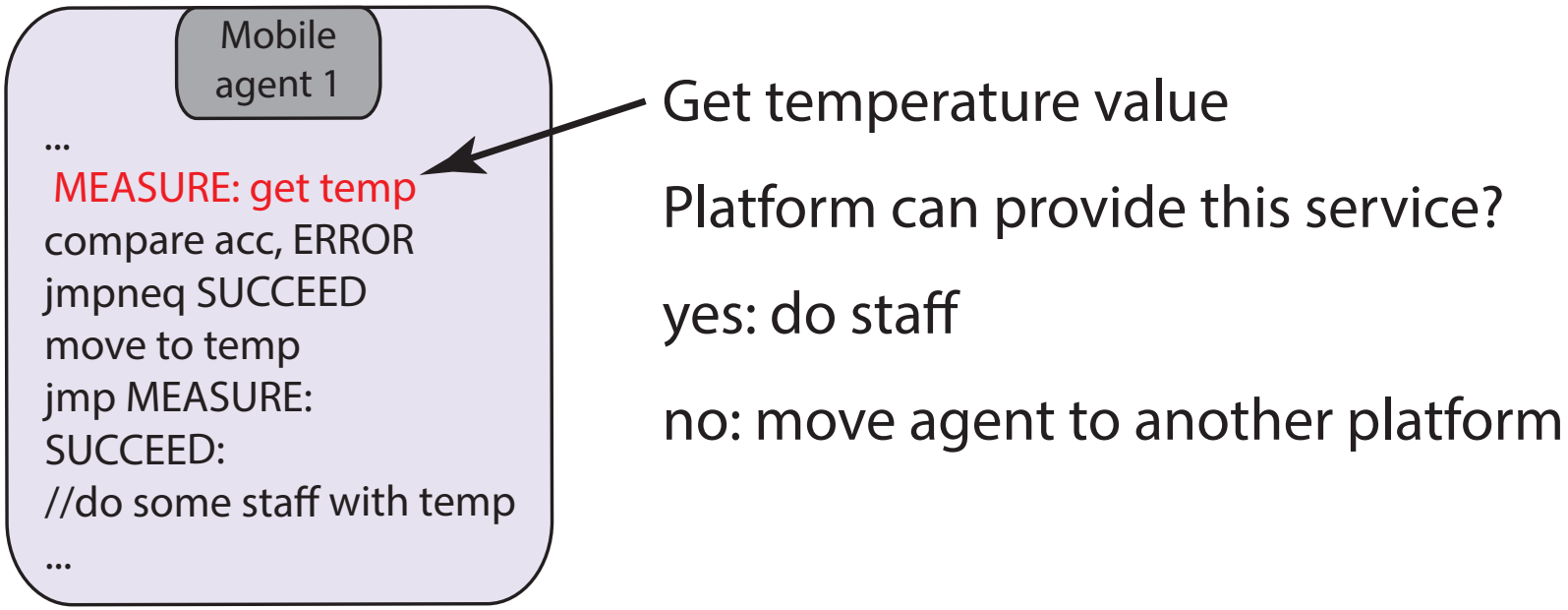
- Agent level
- Platform level
- communication & drivers



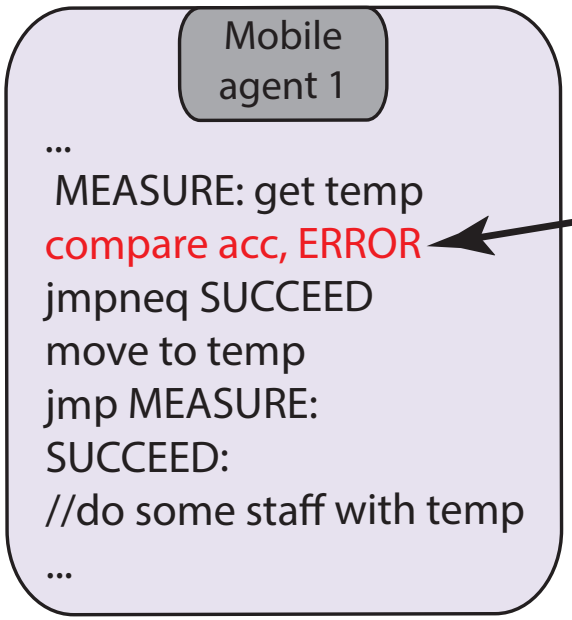
Agent language that support:

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

Agents


Mobile agent 1
...
MEASURE: get temp
compare acc, ERROR
jmpneq SUCCEED
move to temp
jmp MEASURE:
SUCCEED:
//do some staff with temp
...
Get temperature value
Platform can provide this service?
yes: do staff
no: move agent to another platform

Agents



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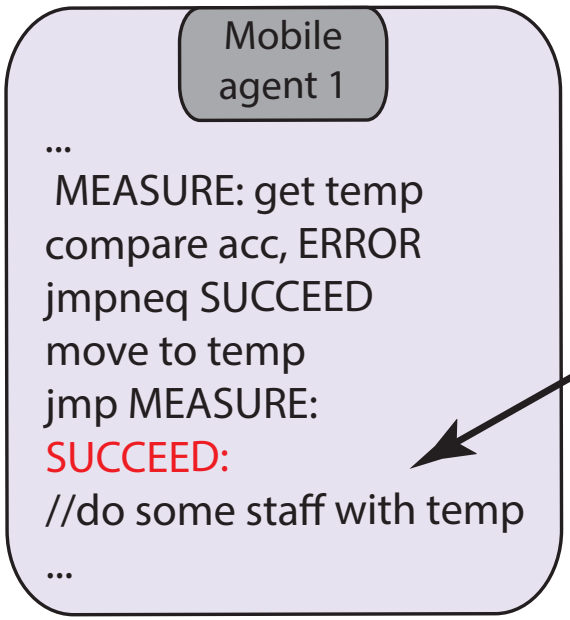

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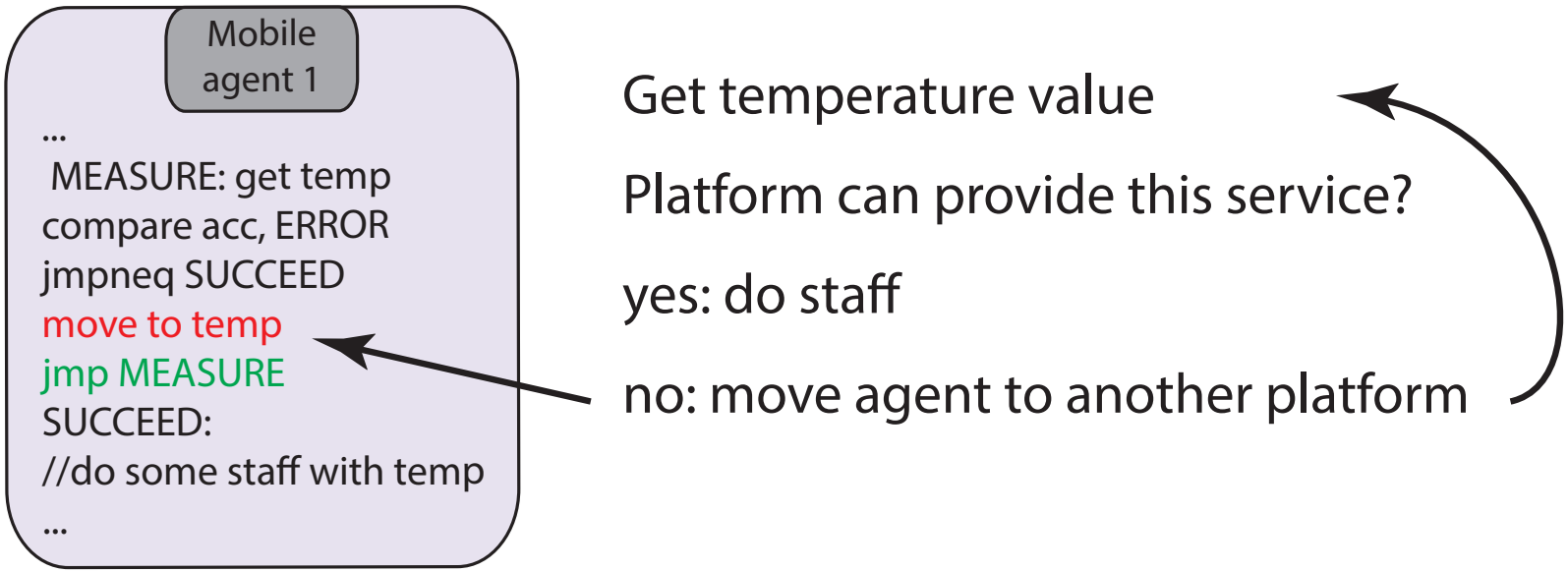
Agents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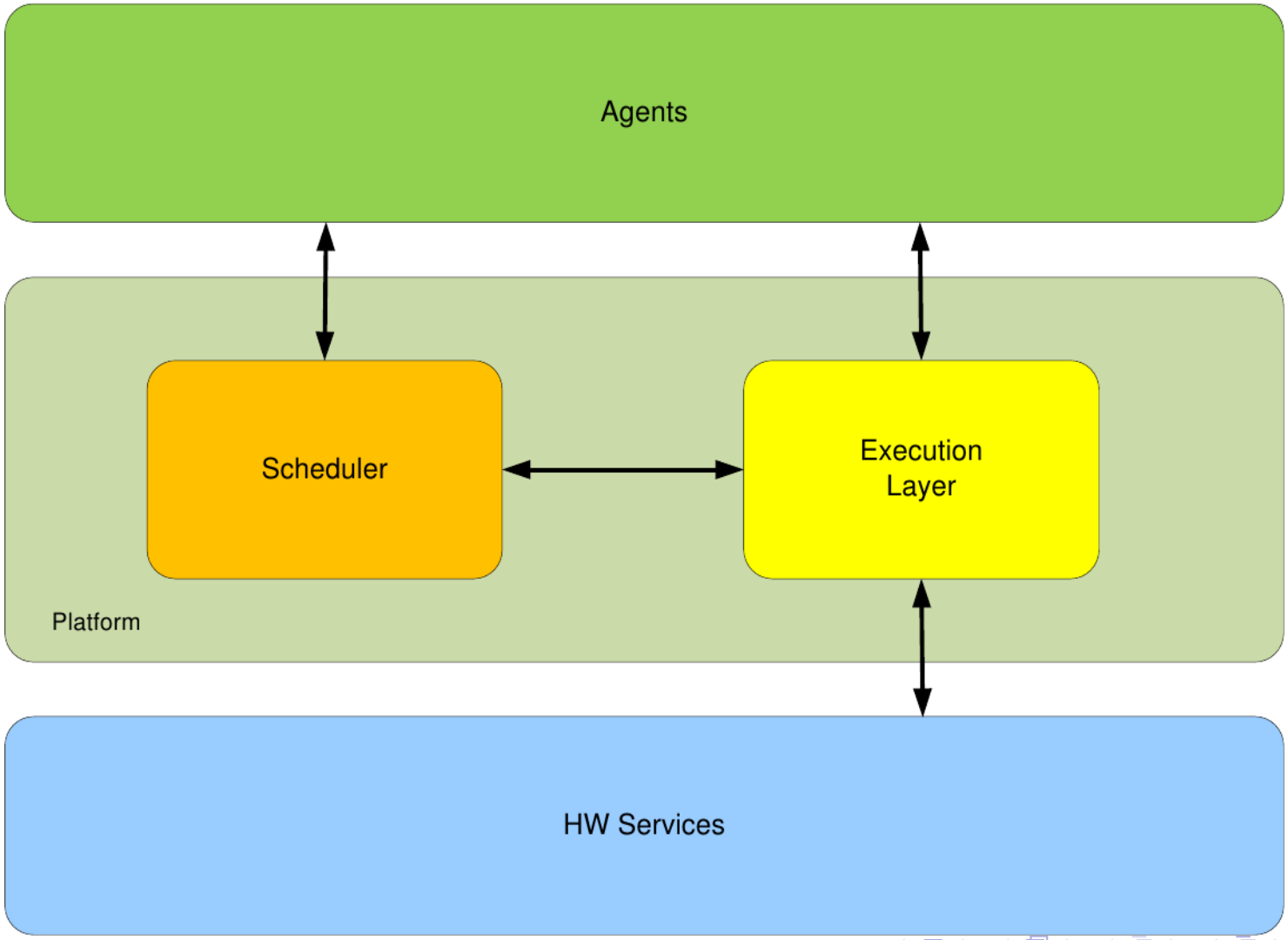
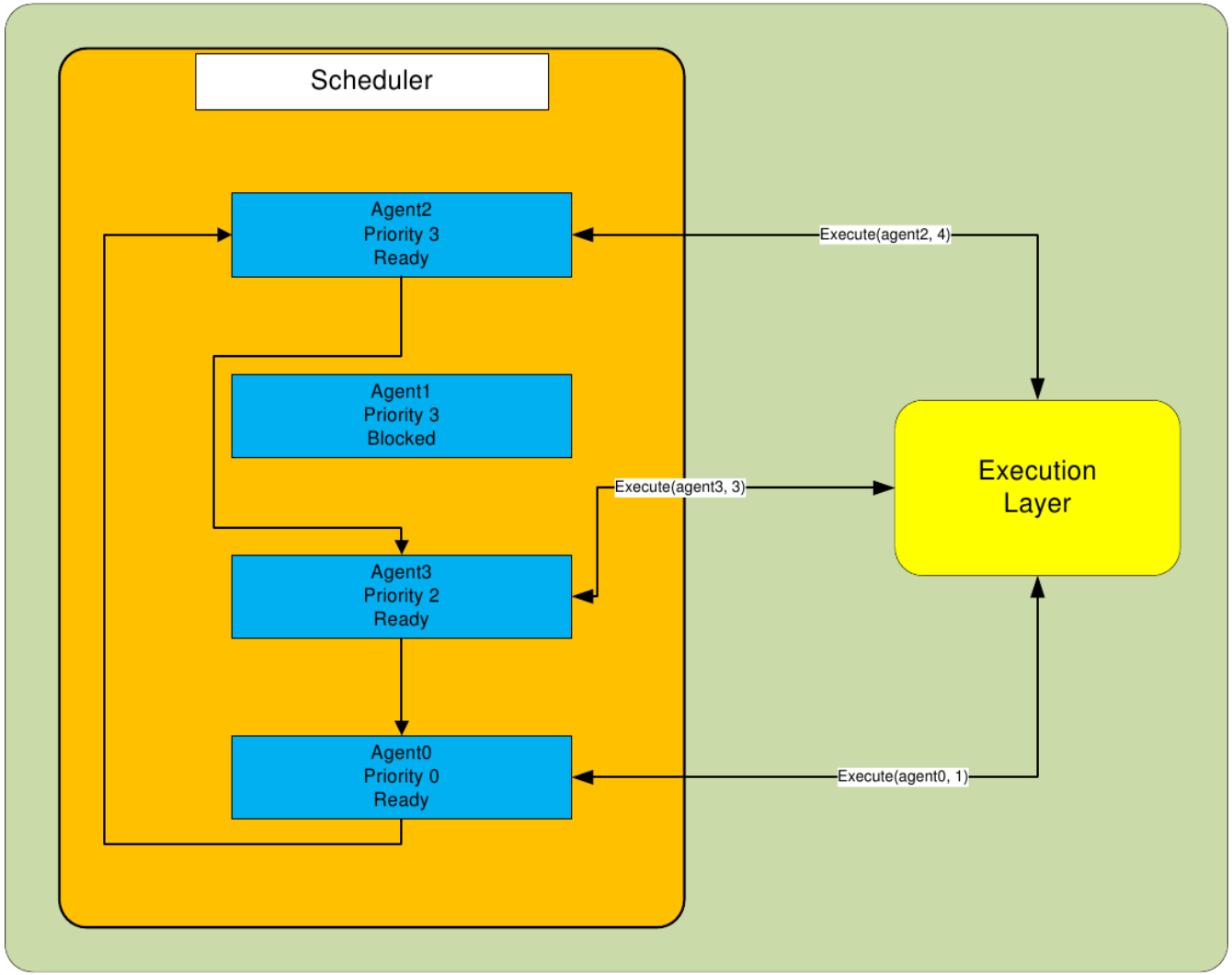
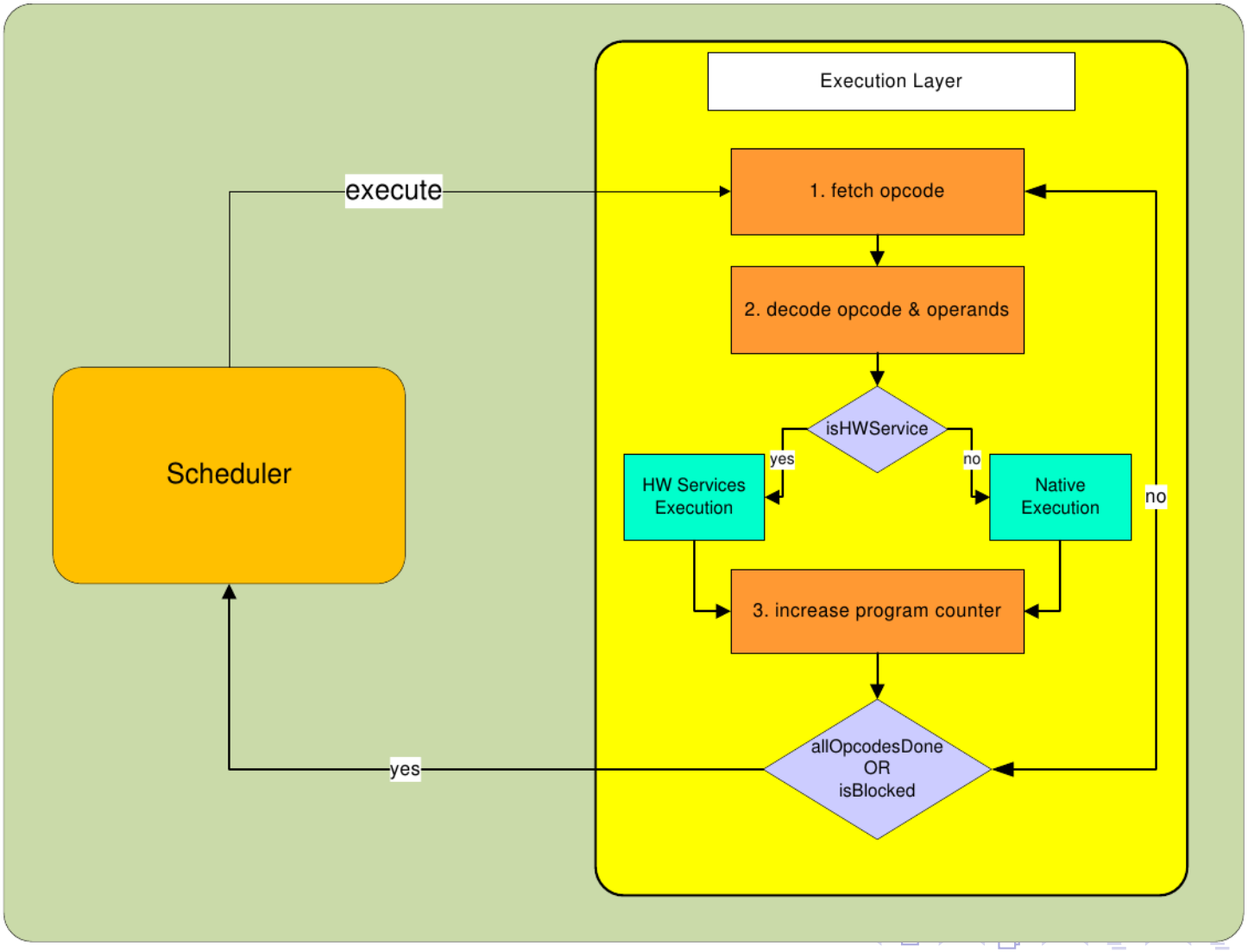
Platform



Scheduler


Scheduler
Agent2
Priority 3
Ready
Agent1
Priority 3
Blocked
Agent3
Priority 2
Ready
Agent0
Priority 0
Ready
Execute(agent2, 4)
Execute(agent3, 3)
Execute(agent0, 1)
Execution
Layer

Execution Layer



Communication

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

Figure : Lower and Upper Level Communication Packet

Communication cont.

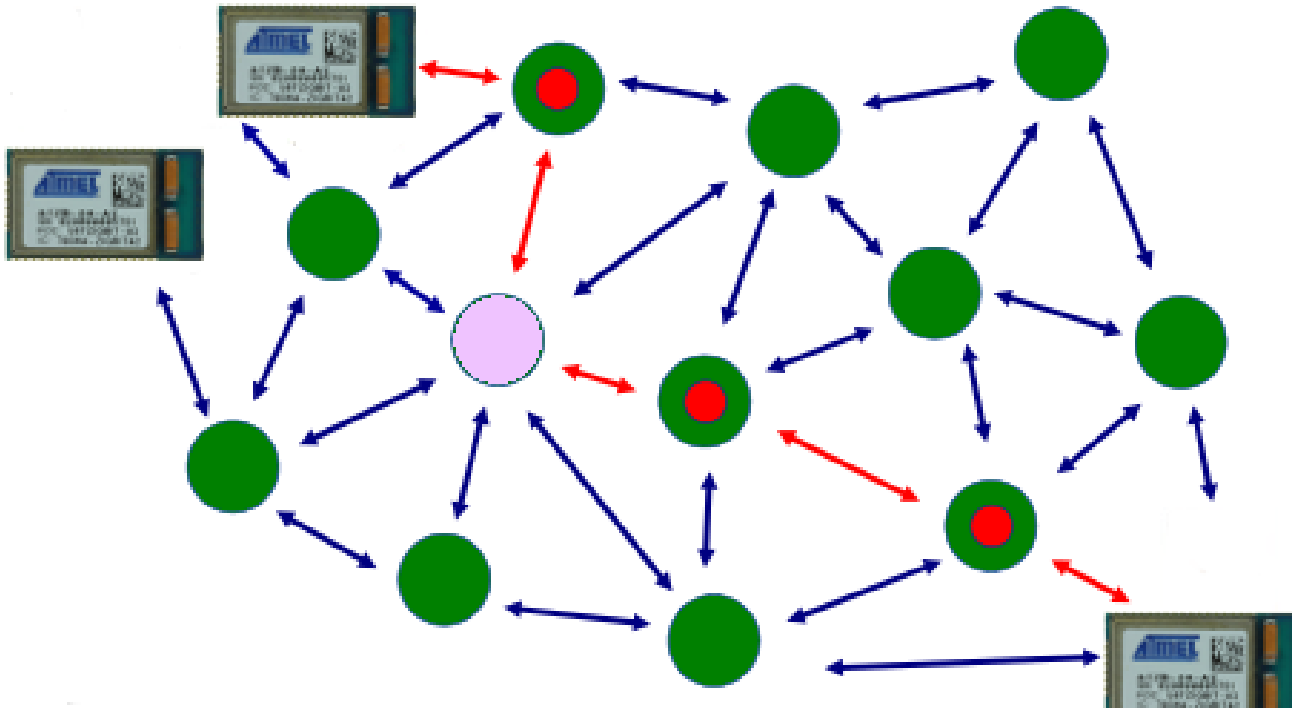


Figure : Cross-board communication

Communication cont.

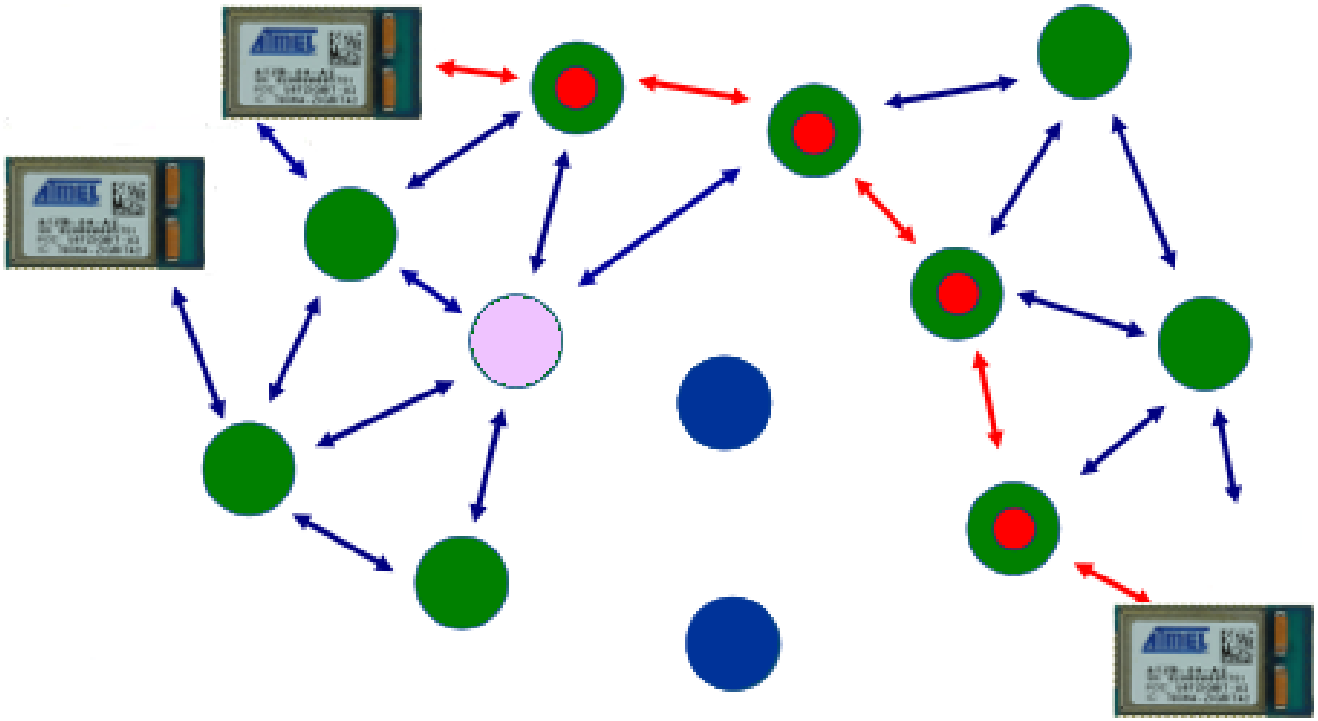
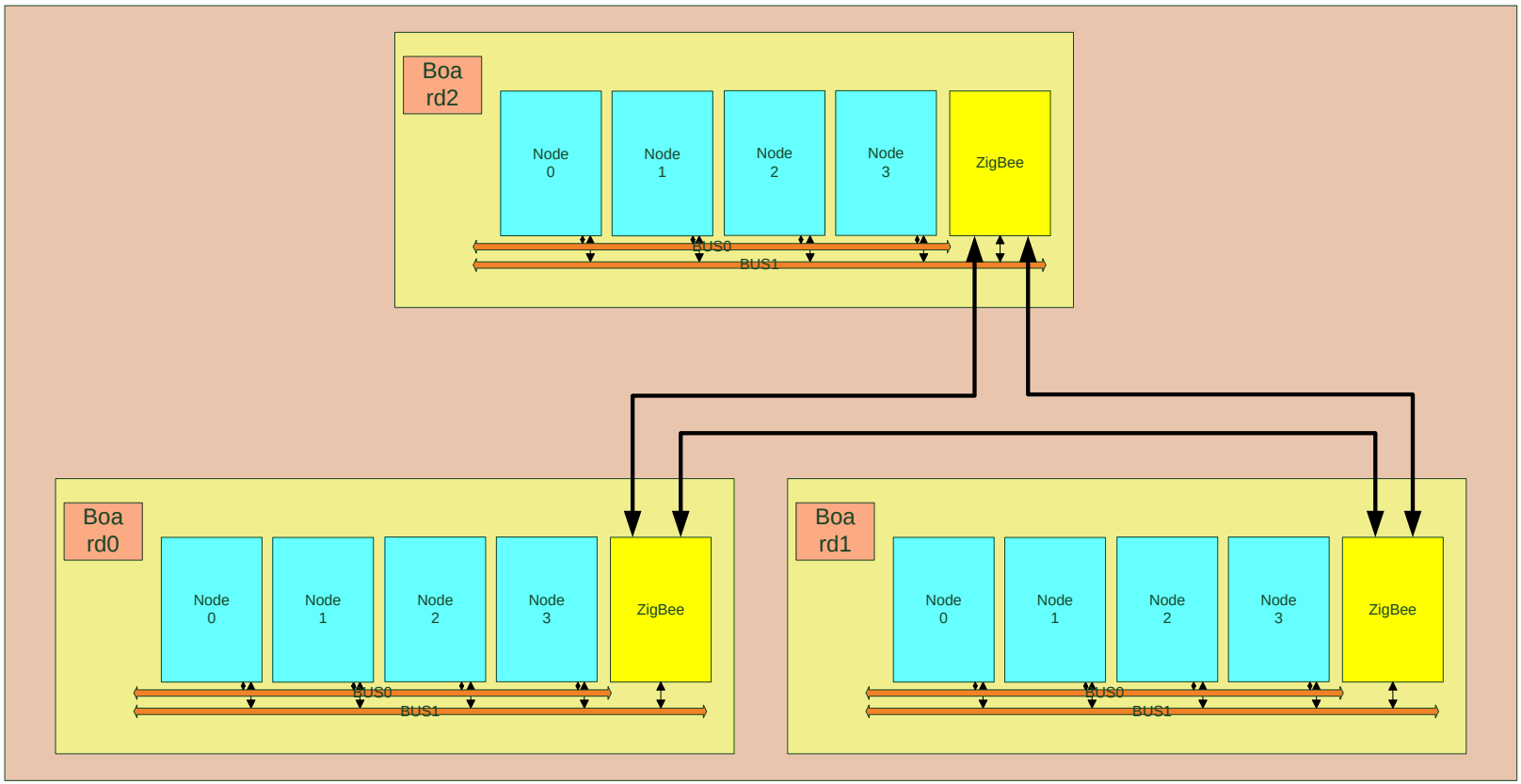


Figure : Cross-board communication

Architecture revisited



Milestones

Phase 1. Product outline and information gathering

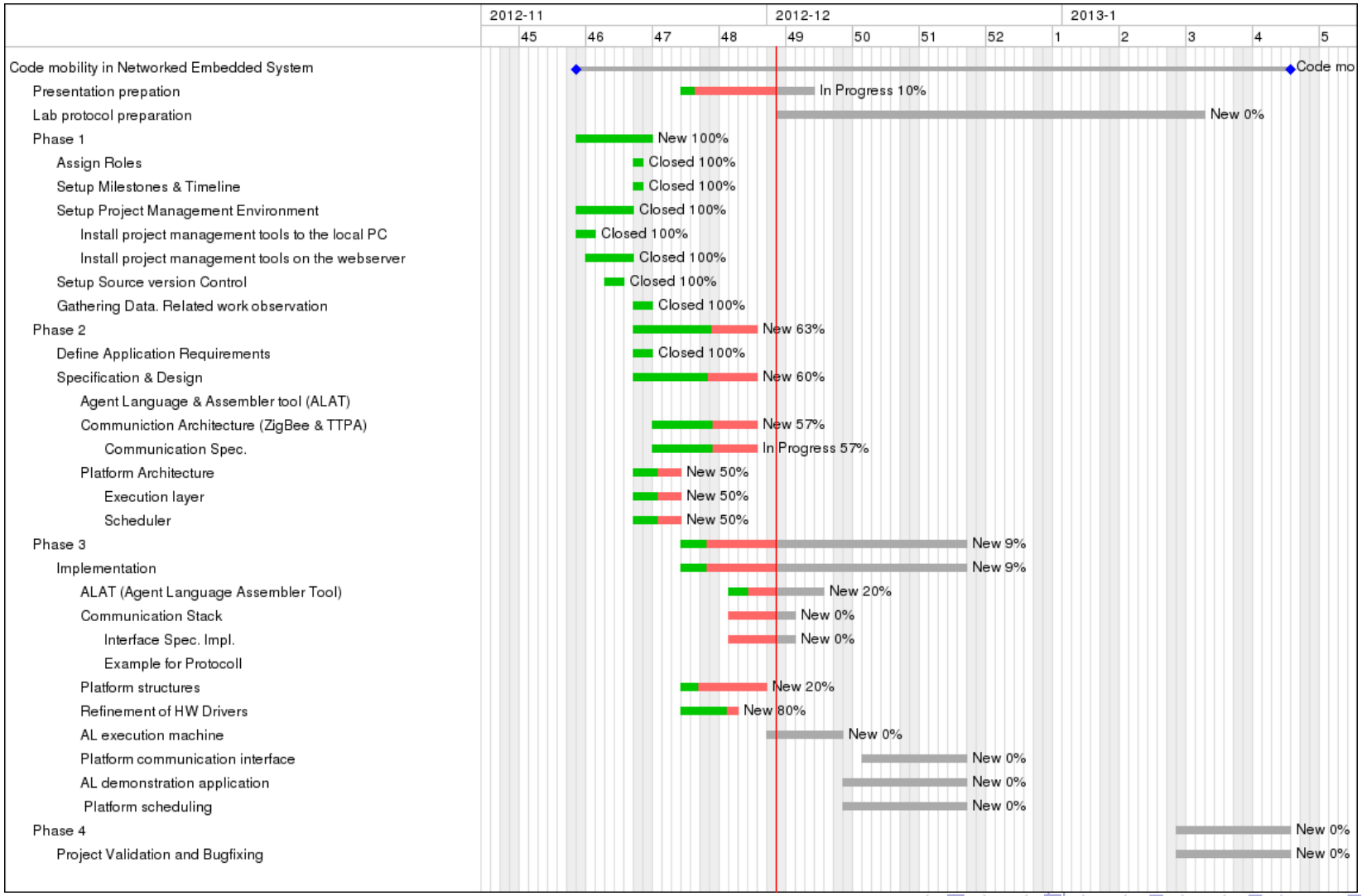
Phase 2. Application requirements and specification

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