JADE and JADE Board

Fabio Bellifemine, Telecom Italia Lab

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TELECOM ITALIA

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- JADE Board
  - Design and implementation of distributed security in JADE
- JADE 3.1
  - HTTP-based MTP (Universitat Autonoma de Barcelona)
- JADE 3.2
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- JADE 3.3

JADE Security – the goals

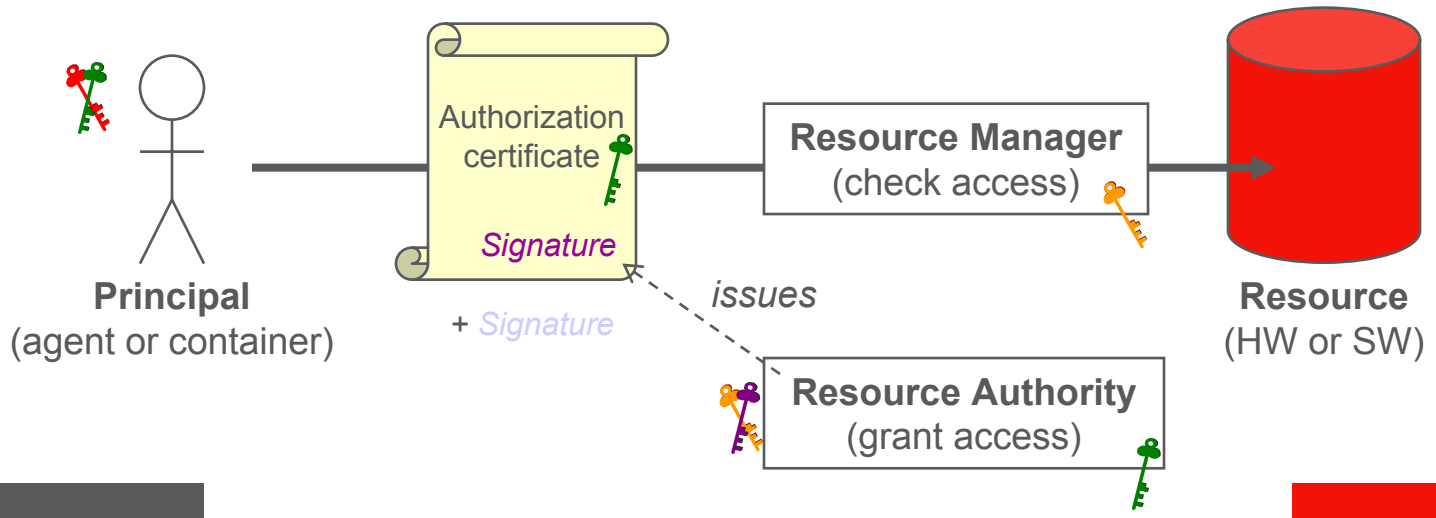
- ✓ Constrain/control through policies:
  - ❑ All the actions that an Agent can perform on the platform and on other agents
  - ❑ The access to the services provided by the platform
  - ❑ The access to the application-level services provided by other agents
- ✓ Make JADE a multi-user system
  - ❑ integrate “user” and “ownership” concepts, as for filesystem
  - ❑ assign “permessions” to users and agents of performing actions
  - ❑ “delegate” to others the own permissions
- ✓ Secure communication between agents
  - ❑ Confidentiality, integrity, data-origin authentication
- ✓ Both for J2SE and MIDP devices; fixed and mobile networks

JADE-S v.1.0 does not...

- J2ME MIDP
- Multi-authority
- No support for application-specific services
- Per-message encryption and signature
- Container-scoped a.c. policy
- Inter-platform
- Security is not a service (SoC, new JADE 3.1 structure)
- Other required features: more tools, more flexibility, dynamic policy and user management, …and others…

Overall architecture

- Initial assumptions/requirements
  - Distributed management of permissions
  - Each principal (agent & container) holds a key-pair
  - Inter-platform message signature mechanism
  - Use of SPKI principles
  - Trust ONLY local container (HW & SW)
  - If agent does not have a key, container may provide his own or create a new pair



Summary

Feature	Design status	Impl. status
Overall architecture	Medium	Low
Authentication of users	Medium	Low
Signature and encryption	High	Medium
Permission (and delegation)	Medium	Medium
Secured inter-container communications	Low	Medium
MIDP constraints	Medium	Low
Authentication of agents	Low	Low
Securing platform services	Low	Low

Plans

- Security
  - Mar 2004: draft unstable version, for J2SE only
  - Jun 2004: open source release
- JADE 3.2 (Jun. 2004)
  - persistence
  - distributed security
  - test suite framework
- JADE 3.3 (Dec. 2004)
  - Web Service Integration
  - Bluetooth support
  - Methodology and Tools
  - Scalability

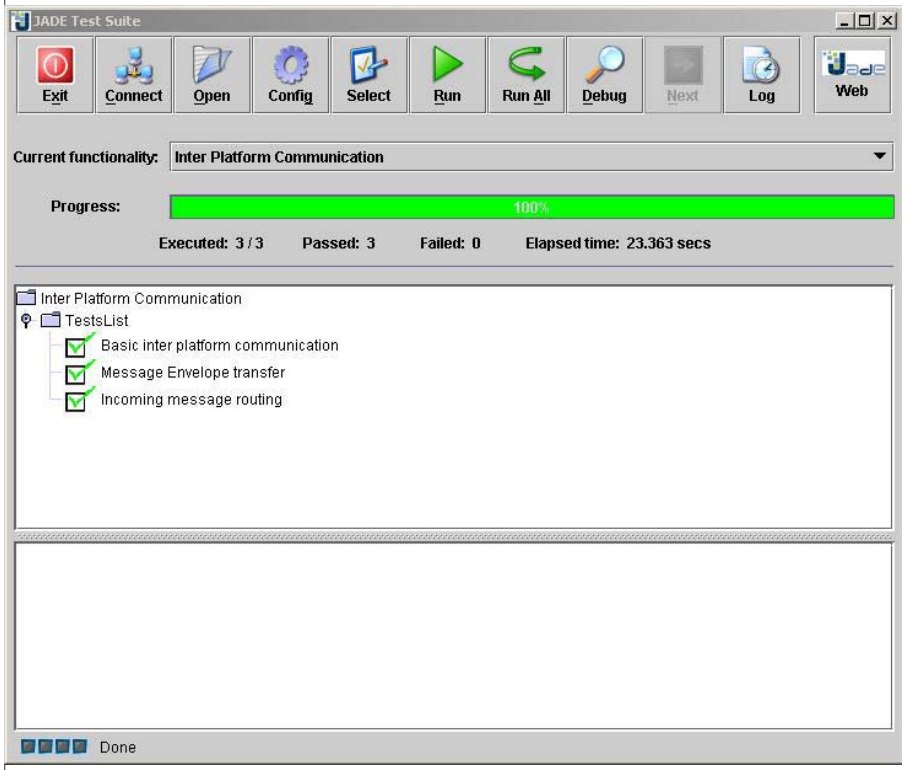
JADE 3.1

- Released on 17th December 2003
- MAIN GENERAL IMPROVEMENTS:
  - New service-based kernel based on a Distributed Composition Filter pattern
    - all JADE kernel features (e.g. messaging, mobility, logging, notification, main replication, …) are implemented as platform services that can be configured, activated, deactivated by the platform administrator
  - Added support for replication of the main container
  - Added support for FIPA Propose and 2phase-committ interaction protocol
- MAIN NEWS ABOUT ADD-ONS:
  - Added new highly efficient and scalable HTTP MTP - LEAP ADD-ON for running JADE agents on cell phones and PDAs:
  - Big performance inprovements of JADE over MIDP (alias JADE-LEAP)
  - Added Beangenerator add-on (Chris van Aart - University of Amsterdam)

HTTP-based MTP

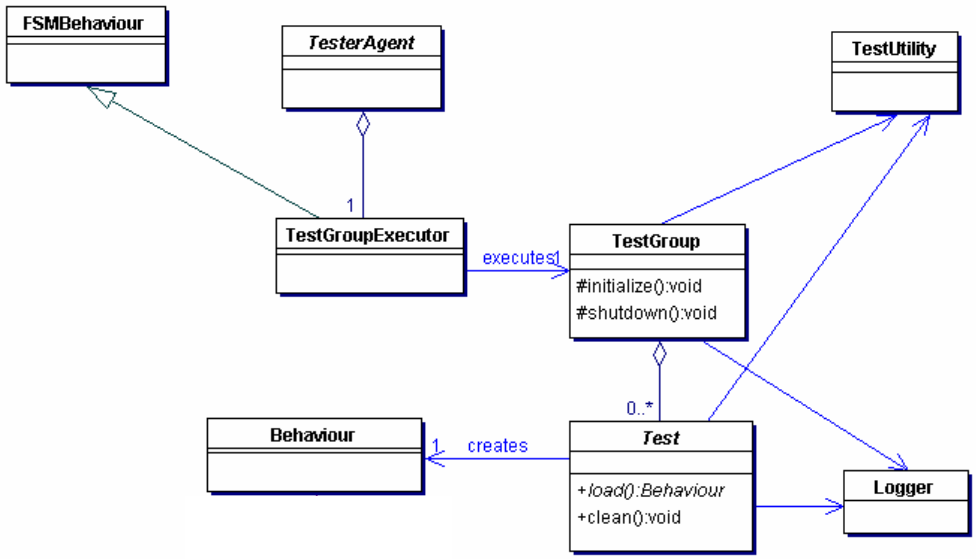
- new implementation provided by Sergi Robles, Joan Ametller, and Jose Antonio Expósito (Universitat Autonoma de Barcelona) and tested/improved by Nicolas Lhuillier and Jerome Picault (Motorola, JADE Board)
- Main features:
  - support several payload encodings (XML, bit-efficient, String, raw bytes)
  - configurable to allow defining the port to be used by the client (and the server) when opening(/accepting) a connection (for firewall configuration) => passes the firewall
  - compatible with pJava (JDK1.1.8)
  - performance have been strongly improved through the re-use of connections (keep-alive)
    - IIOP MTP: 234 msec, old HTTP MTP: 420 msec,
    - new HTTP MTP: 134 msec (keep alive supported) – 230 msec (no keep alive supported)
    - benchmark add-on, RTT for 2 platforms, 10 couples of agents and 100 iterations, JADE 2.61, JDK1.4
- Future enhancements (tasks not yet assigned)
  - Implement support for HTTP-S
  - Implement support for proxy-authentication (e.g. display a box to let user enter his Internet proxy password the first time the MTP is used).

Test Suite Framework



- framework developed by the JADE Team with contributions of the Univ. Parma (Paola Turci) for the development of GUIs
  - Agents do not expose methods. External entities may interact with them by sending messages that agents will process when and how they (the agents) want.
  - Existing testing frameworks, such as JUnit, are designed to test objects and stimulate them by calling their methods.
  - Since agents do not expose methods we believe that existing testing frameworks are not suited to test agent systems.
- The JADE Test Suite is also used by the JADE team to test JADE itself.
  - includes more than 100 tests
- Developers discovering bugs, problems or unexpected behaviors are encouraged to provide tests that can be executed by the JADE test suite highlighting the problem they found.
- the framework is the next add-on to be released Open Source

Test Suite Framework



Methods provided by the basic class Test:
- passed()
- failed()
- log()
- setTimeout()

```
TestGroup tgroup =
    UserDefinedTestGroupClass.getTestGroup();
tgroup.initialise();
For each test in the group {
  Gets the next Test from the
    TestGroup by means of the next()
    method
  Calls the load() method of the Test
    and adds the returned Behaviour to
    the agent scheduler
  Waits for that Behaviour to complete
    and logs its result
  Calls the clean() method of the Test
}
tgroup.shutdown()
```