

Security Approach Applied to Mobile Agent

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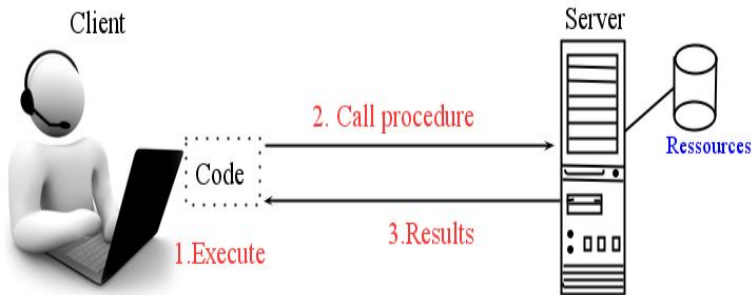
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The emergence of networks across the world has given rise to distributed applications. These applications require a strong interaction between network entities that share the same resources and purposes.

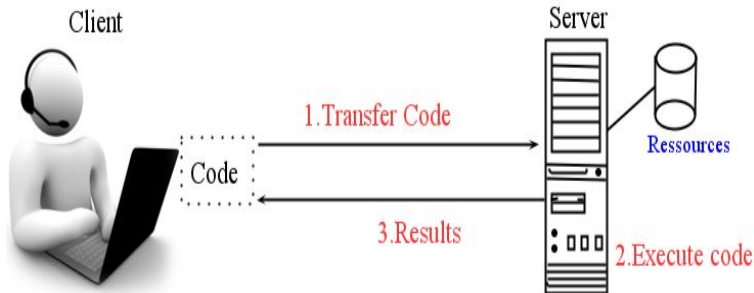
Client-Server Model



disadvantages

- network traffic
- permanent connection

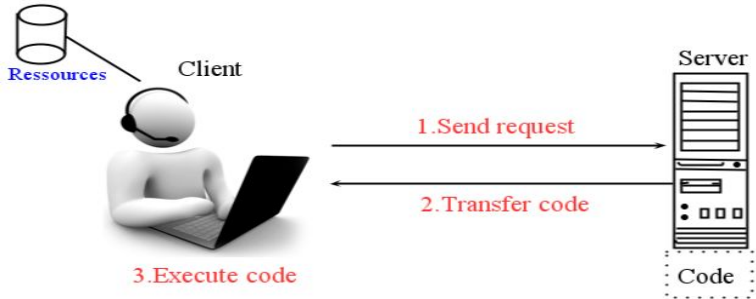
Remote Evaluation Model



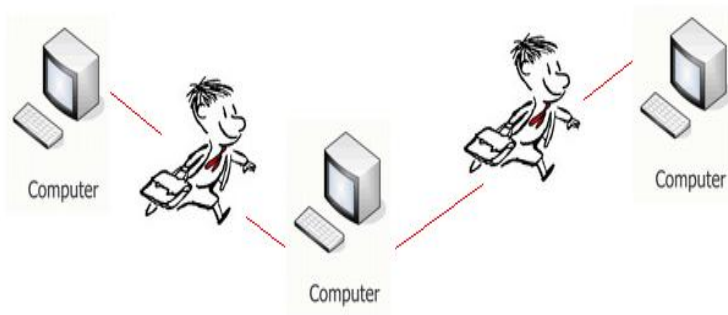
disadvantages

- Qualitative feedback is limited
- Tasks are fixed in advance, and cannot be adjusted for each participant, or be interview-based

Code-on-Demand Model



Agent mobile Model



What's an agent?



An agent may be a physical or virtual entity:

- able to move from one site to other in network, with a set of actions to execute and resources to deploy in order to satisfy and optimize its objectives.
- able to act in environment and directly communicate with other agents.

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Properties of Mobile Agent

- **Autonomous.**
- Communicating.
- Secure.
- Adaptable.

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Mobility advantages



- Reduce the network traffic.
- Be free of network response time.
- Reduce communication delays.
- Manage the robustness and fault tolerance.

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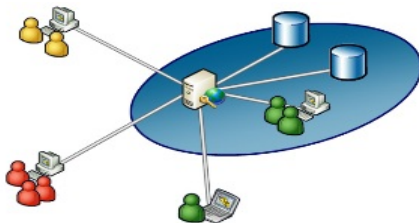
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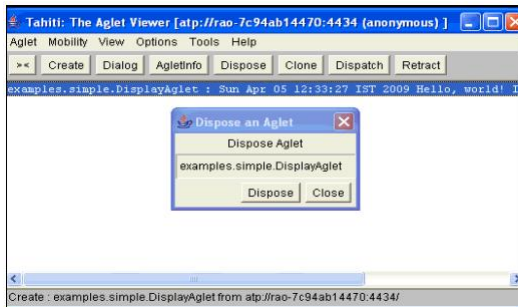
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Execution platform



The execution environment of mobile agents is an infrastructure offering services of quality and control to ensure properly, the execution of mobile agents.

Example 1 : Aglet : Agent-Applet



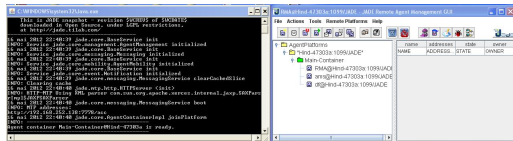
- Edited by IBM.
- Uses JAVA as programming language.
- Uses serialization for mobility of code and agent status.

Example 2 : ARA (Agents for Remote Action)

- A platform for mobile agent execution in heterogeneous networks.
- Uses Tcl or C/C++ language programming.

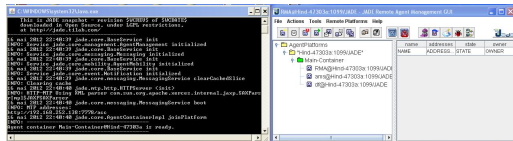


Example 3 : JADE (Java Agent DEvelopment)



- A platform for multi-agent created by the laboratory TILAB (Italy).
- Compliant to FIPA standard.
- Implemented in JAVA and uses 3 main components :
 - ▶ DF : Directory Facilitator
 - ▶ ACC : Agent Communication Channel
 - ▶ AMS : Agent Management System

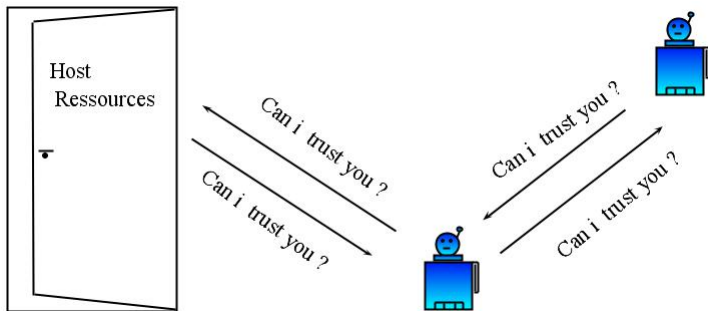
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Problematic

Mobile agent migrate from one host to another and can be run on each of them.



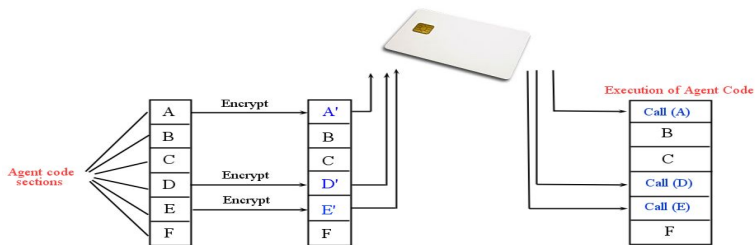
TPE (Trusted Processing Environment)



- The agent is executed only inside the TPE.
- Disadvantages :
 - ▶ High cost to the manufacture of TPE.
 - ▶ The execution efficiency of the agent is reduced.
 - ▶ No ability to run multiple agents in parallel.

Smart-card

Subdivide the agent code in some sections that will be encrypted by the public key of the smart-card. Those sections are replaced by procedural calls to smart-card.



Disadvantages :

- Analysis and deduction of code features.
- Black Box attack.

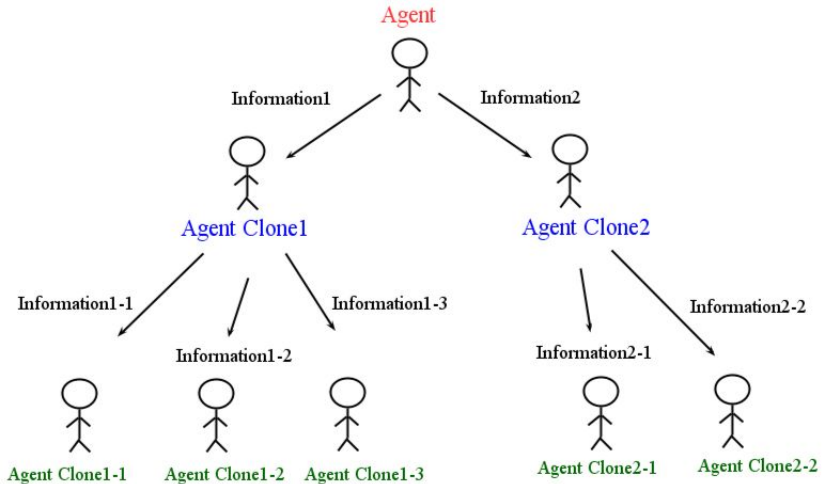
Cryptographic Traces

Each site visited generates a trace of agent. This trace contains line of code executed and external values read by the agent. Before migration of agent to new destination, the site calculates a hash signed and adds it to the agent while moving to the next host.

Disadvantages:

- It's a detective method
- Quietly expensive for systematic use.

Cooperative Agents



Cooperative Agents

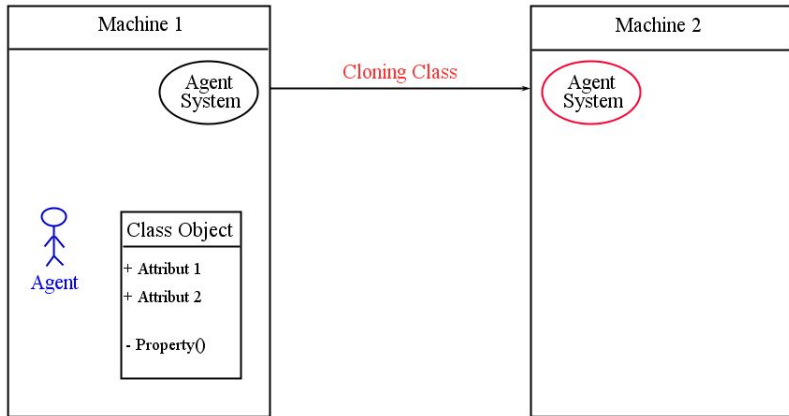
The principle is to share information between many agents called "clones".

Disadvantages:

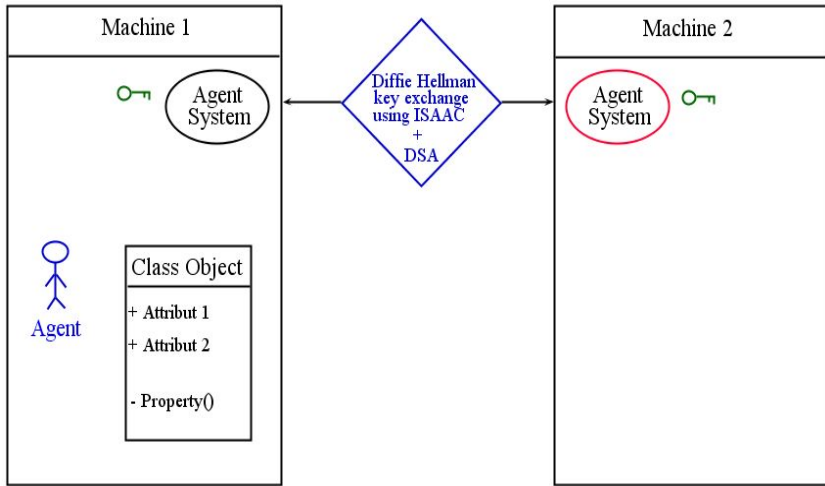
- Abuse in using network resources for communication between clones.
- Protect only data transmitted not totally the agent.

Basic situation

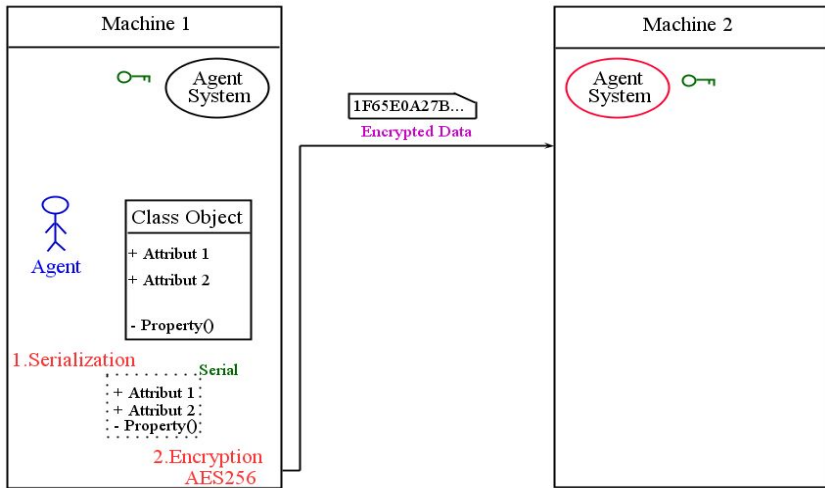
Each of the two machines has a platform for the management of mobile agents (JADE).



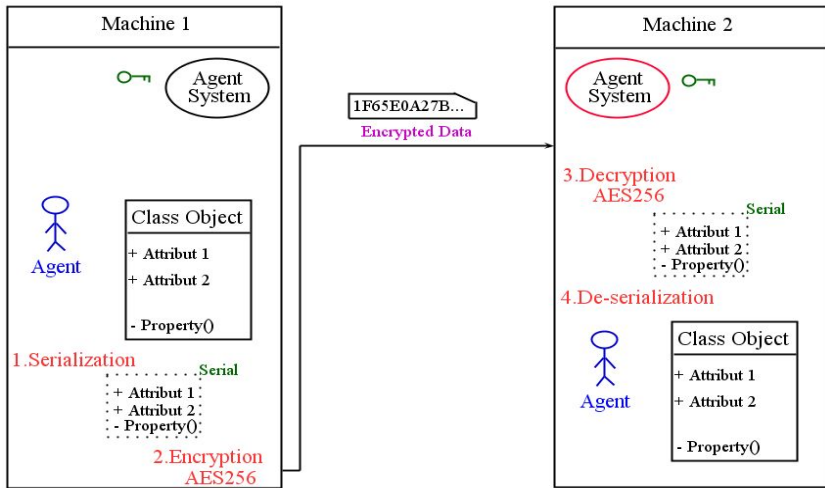
Authentication



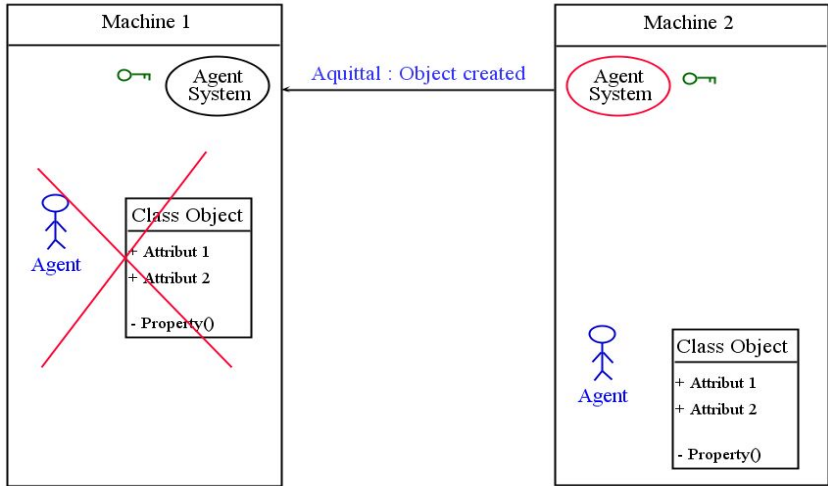
Confidentiality and Mobility



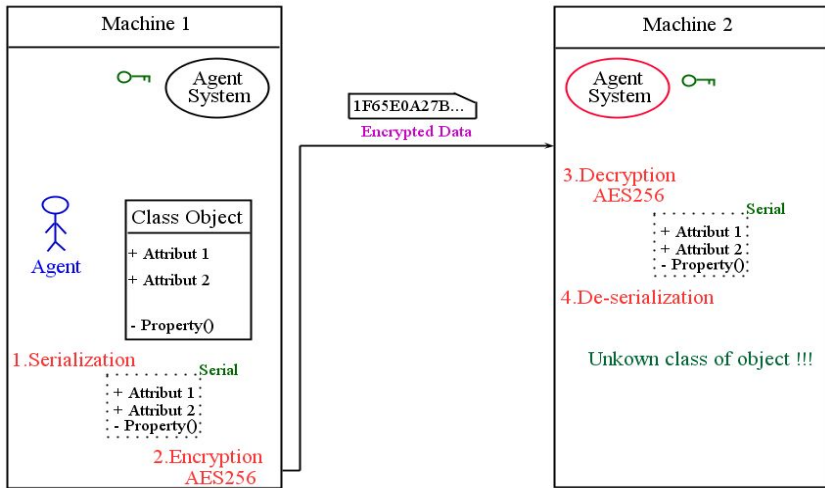
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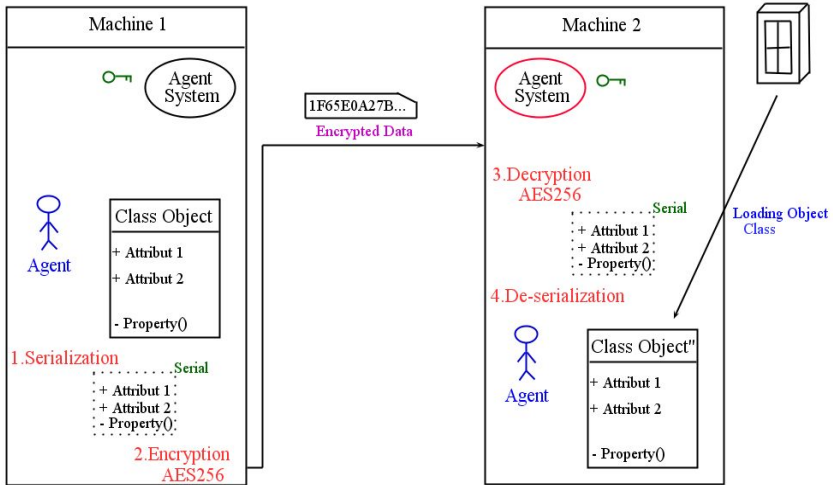
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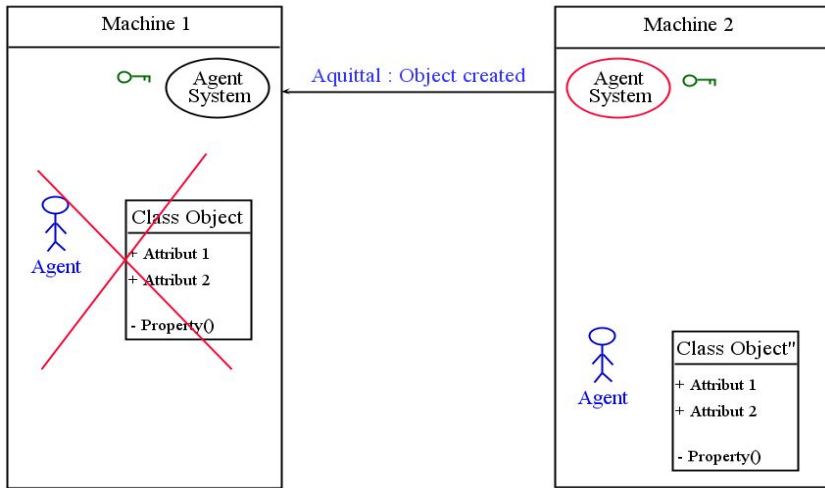
Particular situation



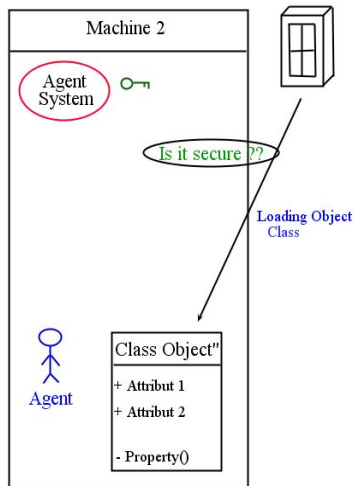
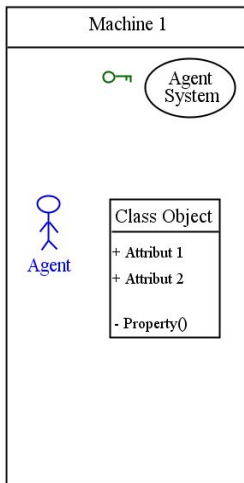
Particular situation



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Perspectives



Perspectives

- Run calculations to estimate execution time of the approach.
- Use of a trusted third part.
- WSIG (Web Service Integration Gateway) = Web Services + Mobile Agent.

Conclusion

In recent years, the size and variety of data accessible in networks have increased significantly and the need to manipulate this dynamic resources of information becomes crucial. Therefore, Mobile agent appears in this context.

However, the security problem that faces mobile agent and makes it vulnerable to attacks and exploitation, reduces its use.

Thanks for your attention

Any questions ??

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