Coordination 2005 - Namur, Belgium - April 20-23, 2005

Engineering Self-Organizing MAS with Coordination Artifacts and ACCs

Welcome Service



Elements

- Intrusion detection
- Human Immune System
- General MAS architecture
- Agent Coordination Contexts
- Coordination Artifacts as Resources
- Modeling in Stochastic pi-Calculus Simulation via Stochastic pi Machine

Luca Gardelli, Mirko Viroli, Andrea Omicini

Insights

- A system providing resources and services to be exploited by agents
- Authentication and authorization do not address dynamic security issues
- Evaluating the applicability of features of the human immune system

- Performance evaluation and parameters tuning
- Analysis of emergent phenomena and "self-" properties

Summary

- We propose an architecture and a methodology for engineering self-organizing applications, focussing on security for MAS (multi-agent systems).
- We argue the applicability of principles from human immune system to MASs, and take intrusion detection as a main subject of investigation.
- We sketch a possible architecture for a MAS, based on coordination artifacts and agent coordination contexts, which are building bricks of the TuCSoN technology.
- Because of the intrinsic complexity of the \bullet systems we consider, we find it useful to exploit simulation of abstract models of our systems, so as to assess security features and overall performance at design-time.

- Dynamic security layer provided by agents acting as Lymphocytes
- Detection of malicious behaviour via sinthetization of signatures
- Parameters of the security subsystem: lymphocyte (i) number, (ii) inspection rate, (iii) detection rate, (iv) lifetime
- Simulation of 4 scenarios: adding features and observing system evolution
- Comparison between the scenarios (charts below)



(C)

- We use stochastic pi-calculus and the SpiM implementation tool as a formal framework for specifying and running quantitative simulation of large-scale MASs.
- By applying this framework to our immune system we verify basic applicability of its principles and obtained a first evaluation of its main parameters.

