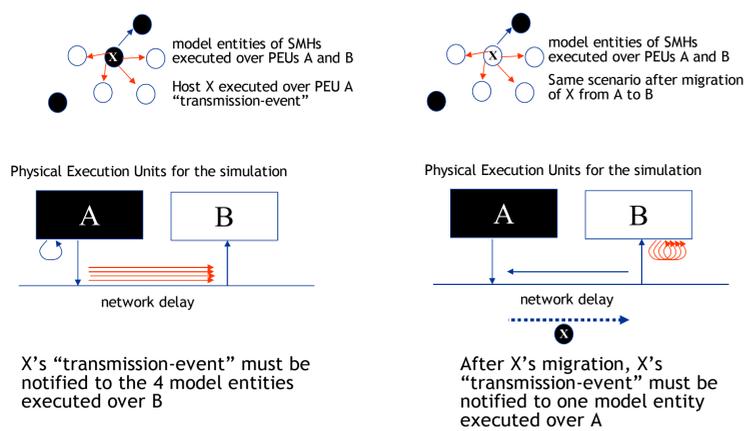


# What about faster simulations?

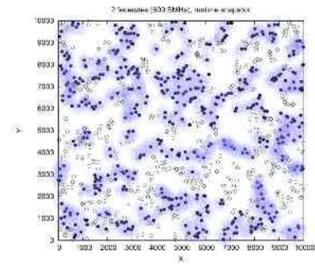
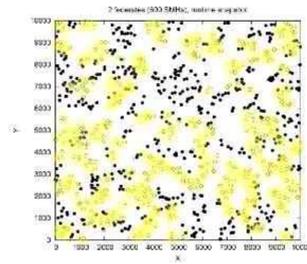
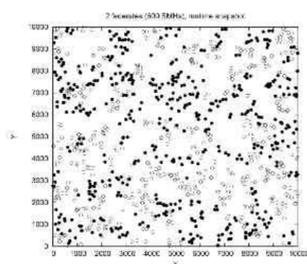
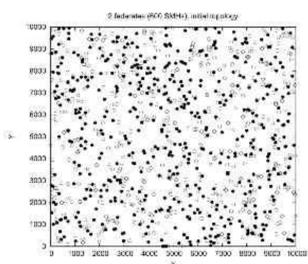
The design and implementation of a new middleware for *Parallel and Distributed Simulation* involves analyzing the limitations of actual simulation tools. Among the relevant scenarios, Ad Hoc networks are gaining and increasing importance but both centralized and distributed simulators does not scale.

## Wireless Ad Hoc network scenario: evaluating migration of SMH "X"

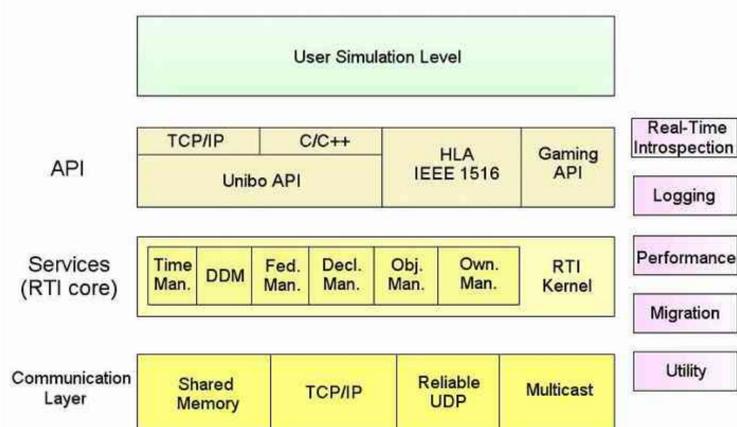


Networks currently considered of interest may include a massive number of simulate mobile hosts (SMH), a simple approach involves increasing the model abstraction level, modeling only a subset of the interactions. This "reduced approach" is often cause of unrealistic results.

We believe that a solution can be achieved exploiting the concept of **components' migration**. Our framework adopts migration heuristic based on *load balancing* and policies aimed to dynamically reallocate and *cluster the interactions* among the same Physical Execution Unit (PEU).



## The conceptual architecture of ARTIS



ARTIS (Advanced RTI System) is a brand-new middleware designed for parallel and distributed simulation.

The new Open Source middleware will natively support migration and data distribution management and so will be able to reduce the related overhead.

Actual implementation includes both synchronization algorithms for the *pessimistic* (Chandy-Misra-Bryant, Timestepped) and *optimistic* (Time Warp) approach.

Preliminary results shown a speed-up up to **23%** given by *adaptive distributed* simulation with respect to a *static distributed* simulation. The migration based approach could be extended to a wide set of simulations where the sequential approach gives low performance (e.g. Multi-agent systems, genetic and molecular systems, P2P models, massively populated network environments, Internet gaming).

## Contact

Gabriele D'Angelo <gdangelo@cs.unibo.it>  
http://www.cs.unibo.it/~gdangelo

Department of Computer Science  
University of Bologna

## Bibliography

- L. Bononi, G. D'Angelo, L. Donatiello. *HLA-based adaptive distributed simulation of wireless mobile systems*. PADS 2003
- L. Bononi, G. D'Angelo. *A novel approach for distributed simulation of wireless mobile systems*. PWC 2003
- L. Bononi, G. D'Angelo. *Dynamic host allocation for HLA-based distributed simulation of mobile ad-hoc networks*. ISCS 2002