

Analysis and Optimization of a Demographic Simulator for Parallel Environments

V. Büsing¹ C. Montañola¹ J. Casanovas¹ A. Pellegrini²

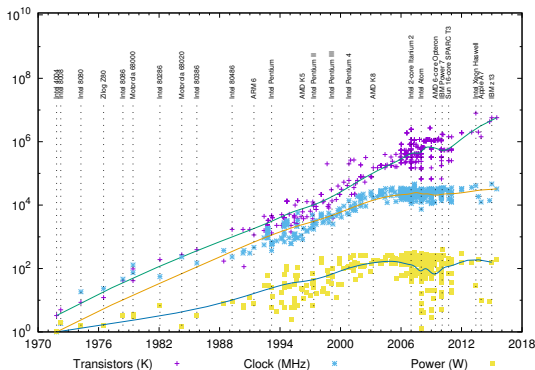
¹Universitat Politècnica de Catalunya
BarcelonaTech, Barcelona, Spain

²DIAG
Sapienza, University of Rome, Italy

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Motivations

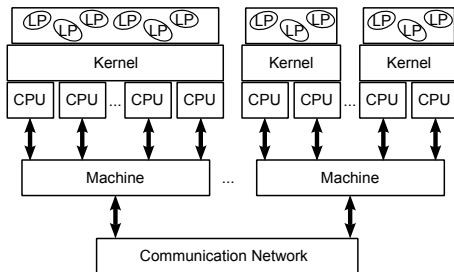
Multicore/multithreaded computing systems have become the de-facto standard for high-end applications.



Motivations

Abandoning the single-threaded approach in favor of a multi-threaded programming paradigm could increase the performance achieved by running PDES, due to the possibility to rely on access-optimized shared memory.

This reduces communication latency and enables for more advanced policies of load sharing.



Yet Another Demographic Simulator (Yades)



- Simulation library [3] to design specify agent-based demographic models and run them in parallel environments.
- There are two different versions using two different runtime PDES engines:
 - μ sik [5]: offers a lookahead-based conservative and a state rollback-based optimistic execution targeting the multi-process paradigm
 - ROOT-Sim [1, 4]: offers a rollback-based optimistic execution targeting multi-thread paradigm.

The ROme Optimistic Simulator (ROOT-Sim)



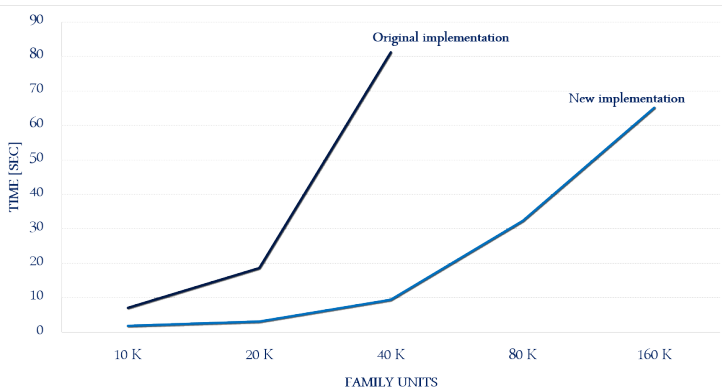
- Multi-threaded opensource optimistic simulation platform based on the Time Warp protocol [2].
- General-purpose solution.
- Tailored for UNIX-like systems.
- Support differentiated simulation models adhering to a very simple and intuitive programming model with a transparently platform.

Main Contributions

- Preliminary assessment of a multi-threaded runtime environment applied to large-scale agent-based demographic systems.
- Integrate Yades with ROOT-Sim.
- Add shared-memory capabilities to Yades.
- Reduction of the internal communications of Yades, decreasing its execution time.

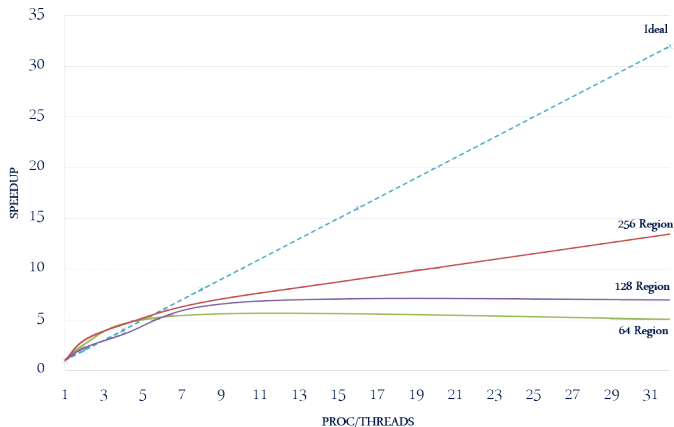
Main Contributions

- Results in sequential:



Main Contributions

- Results in parallel:



References I



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