

Proposal 2

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Title: Discrete-event simulation for compartmental stochastic processes on graph

Summary of the proposal

Discrete-event simulations [1] are common programs used to simulate large scale stochastic processes in order to evaluate their performances. The idea of such programs is based on events that occurs at random time, and then the dynamic evolution of complex systems can be studied. Many application domains are based on such approaches like performance evaluation of communication systems, virus propagation, road traffic management, etc.

We propose in this project to build from scratch a discrete-event simulator aiming to simulate compartmental stochastic processes. A well-known compartmental model that can be used as a benchmark is the *Susceptible-Infected* model [2], which is basically used to study epidemics. The simulator has to be reconfigurable such that variants of the SI model can be easily configured. We can cite for example SIR, SEIR and others specific compartmental stochastic models. All these models are based on Markov chain framework with particular transition rates. This is why simulation helps to understand both transient and stationary behavior of such complex system.

References

- [1] Pierre-Jean Erard et Pontien Déguénon, *Simulation par événements discrets*, Lausanne/Paris, Presses polytechniques et universitaires romandes,
- [2] Brauer F., « Compartmental models for epidemics », Centre for Disease Modelling, Preprint 2008-02, University of York. Consulté le 13 mars 2010.