Time Dilation in the Distem emulator

Lucas Nussbaum

Executive summary: The goals of this project are (1) to extend the Distem emulator to support time dilation; (2) to evaluate the designed solution using large scale on the Grid'5000 testbed.
Key skills required: systems and network programming and administration on Linux, Ruby (could be learned during the internship)

Research team name:	AlGorille (leader: Martin Quinson)
Research Unit:	Nancy – Grand Est
Intern tutors:	Lucas Nussbaum `http://www.loria.fr/~lnussbau/`
Internship duration:	4 to 6 months
Followed by a PhD:	possible (but not mandatory)

Context

Distem is a distributed systems emulator. When doing research on Cloud, P2P, High Performance Computing or Grid systems, it can be used to transform an homogenenous cluster (composed of identical nodes) into an experimental platform where nodes have different performance, and are linked together through a complex network topology, making it the ideal tool to benchmark applications targetting such environments. Distem relies on modern Linux technology to steal resources from applications and reproduce the desired experimental conditions.

For a more detailed introduction to Distem, refer to
`http://distem.gforge.inria.fr/`

Description

The goal of this internship is to extend Distem to add support for *time dilation*. The basic idea is that if you change the perception of time to make it run slower, the applications will run faster. This enables the experimenter to create an experimental environment where hardware has performance that isn't available yet (want a 1 Tb/s network? Take your 1Gb/s network, and make the time run 1000 times slower).

The intern will add support for Time Dilation to Distem (a prototype for this already exists) and perform experiments using Distem on the Grid'5000 testbed to validate the approach at large scale.

For more information about the context of this internship, please refer to:

- Distem: `http://distem.gforge.inria.fr/`
- Grid'5000: `http://distem.gforge.inria.fr/`

Skills required

In addition to the skills that can reasonably be expected from Master-level students, the applicant should have some knowledge of systems and networking programming and administration on Linux, and ideally of Ruby programming (though Ruby could be learned during the internship).