Experiments planned by Fraunhofer FOKUS within onelab2
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Experiment 1: Adaptive Monitoring functional blocks in Functional composition Framework

ANA projects develops as part of Autonomic Network Architecture a monitoring infrastructure for self-managing autonomic networks. Such a monitoring has to be adaptive and programmable with measurement functions placed and configured dynamically in the network. A set of monitoring functional components is dynamic configurable and with self*-properties. The usage of Onelab2 testbed allows for validation and practical experimentation in real-world like environment. A testbed with nodes based on the ANAcore is planned for PlanetLab Europe. Those nodes allow the experimentation with the functional composition concept.

Based on this we plan to test various monitoring components implemented as functional blocks within the functional composition framework. According to the situation in the network and the availability and property of monitoring components the monitoring infrastructure can configure, add and adapt the monitoring functions in the corresponding nodes. With this we want to evaluate the potential impact of dynamic functional composition in distributed environment on overall monitoring behaviour in various situations. For example in a case of an attack a monitoring nodes can adopt their behaviour (e.g. observe some flows more detailed, reduce sampling rate for 'good' flows) according to the situation, optionally delegating some task to other nodes. The usage of a testbed for real tests will allow for observation and evaluation of the deployed adaptation mechanisms.

Experiment 2: SYNC Principle for Congestion Control

The spontaneous phase synchronisation of pulse-coupled oscillators is a well known phenomena in biology and physics. An application of this synchronisation property of oscillators to networking problems is of interest because of the following reasons:

- The observed synchronisation property is based on emergent behaviour. No configuration or management is required.
- Once archived, synchronicity corresponds to a stable equilibrium. Small variations of oscillators do not dramatically change the behaviour of the whole group.

Recent research in the networking area has investigated in the question if pulse coupled oscillators can be used e.g. for time synchronisation in Ad-Hoc networks. With the planned set of experiments we target at new and different applications of the synchronisation property. The question behind the performed experiment is if pulse coupled oscillators can be applied to congestion control in IP based networks. The experiments will follow a two step approach:

Step1

With a first set of experiments we plan to analyse the impact of network transmission delays in case of a groups of oscillators distributed in the network. We will implement a network application containing an oscillator following the Mirello/Strogatz model.

Sine the network topology used to interconnect oscillators plays an important role we will further analyse the impact of different network topologies interconnecting the oscillators.

As the result of the experiments we expect to obtain practical experience with regard to optimal parameter selection for the oscillator internal mechanics as thresholds, charging curves and fire capacity for real networking scenarios. In addition we collect a reference set of topologies to be used to interconnect oscillators as well as information with regard to their properties.

Step 2

In a second set of experiments we plan to evaluate the impact of coupling strength and frequency changes to the synchronisation phenomena.