

Idea for GN4

Purpose: This NIF form is to be used for the submission of New Ideas suggested for inclusion in the GN4 Phase1 and beyond proposals. Budget estimates, information about objectives, impact, benefits, etc. as well as scope must all be supplied.

Submit to: pmo@GÉANT.net by January 31st, 2014 with the subject label starting: GN4Input

Overview

Project Name: Dependability models and measurements

Project Proposer: Prof Bjarne Helvik, NTNU, Olav Kvittem, UNINETT

Project Type: GN4 Phase1 or longer term

Phase1

Duration proposed

1 year

Deliverables proposed (If any can be defined at this stage)

Report

Milestones proposed (If any can be defined at this stage)

Estimated Project Costs (best effort!)

Manpower in person-months also identifying specific expertise required

8pm

Dependability professor
Senior network management developers

Hardware and equipment:

0

Other costs

Travel: 4 people 2 times :
8000 Euro

1 Background and Reasoning

Provide background information and the context of the project. Explain the reason for the project. What do you want to be different? What do you hope to improve? Why is the project needed? This should be the reason for the project, not the solution.

Research networks are to an increasing degree exposed for demands for service guaranties to be included in Service Level Agreements(SLA). This will be more important when using internal or buying external cloud services. One important parameter in the SLA is the availability (A), i.e., the fraction of the time during the

contract period, or another defined period, the service is provided with a satisfactory quality. The contracted availability is typically in the range $0.99 \leq A \leq 0.9999$, but even 0.99999 may be required. If the guarantee is not met, the customer will require a compensation. The size of the compensation may be significant, and does not reflect the cost of providing the service, but the loss of the customer if it does not get a service with a sufficient availability.

What makes this hard to deal with, is that in a highly available system, failures are and have to be rare. The number of failures of over a defined period is low and highly variable due to the nature of the underlying processes. The downtime (period with insufficient service quality) following the failure may be variable and the actual duration may span several orders of magnitude. Hence, what will be observed during the period defined by the SLA will be random and likely far from the long term ("theoretical") average value. Performing calculations based on an analytical mathematical model of real sized actual service provisioning infrastructures, under realistic assumptions is not feasible. Simulation is not a straight forward approach to assess these properties either.

This incurs a number of interrelated challenges for the research network provider:

1. How shall the network and service provisioning infrastructure be designed and operated to meet a range of availability requirements.
2. What is actually the distribution of the accumulated down time / interval availability over a contracted period. What may be guaranteed with an acceptable risk of breaking the guarantee.
3. The contracted SLA parameters, in this case the availability A , should ideally be measurable by both parties in a way that yield consistent results. This is non-trivial, and if the service contracted is a part of a compound service, e.g. a cloud service, it may be hard for the user to distinguish failures due to the cloud service provisioning from those due to the network

Neither a mathematical analytic approach nor simulation are appropriate means to deal with these challenges from an engineering and operating service providers point of view. For this reason we suggest to adopt a measurement based approach.

The proposing milieu (UNINETT and NTNU) have a strong background for dealing with a project following up this idea.

2 Objectives, Impact and Benefits

Provide one or more bullet points to briefly describe the primary objective(s) of the project in terms of the desired outcomes. This should be expressed in the form: 'To ensure...', 'To implement...', 'To service...', 'To improve...', 'To innovate...', 'To optimize...', 'To save...', etc. For each objective mention the benefits to identified stakeholders (e.g. end-users, NRENs, large international research projects, industrial research partners, high level education, etc.) should be mentioned. A description of the expected overall impact must also be provided.

- We want to improve the ability of an NREN to assess the actual dependability of a typical combination of a backbone and a cloud service provider.
- to get an improved insight into the issue of guaranteeing availability in SLAs,
- to get an empirical basis for establishing economically and technically sound availability guarantees in SLAs
- to establish a measurement framework that can be trusted by both service provider and customer in the supervision of an SLA. The framework may in follow up work also be sought extended to the provision of compound services with more providers, and
- to get a basis for improvement of the design and operation of networks, server parks, etc. to economically provide guaranteed services.

3 Scope

Describe the areas expected to be covered or impacted by the proposed activity, such as organisational areas, systems, processes, resources.. i.e. what is 'in scope'. This is not a list of what will be done but identifying the services, areas or what, will be affected.

Also please enumerate specific items which although they could perhaps be related are intentionally not addressed by your proposal ("Out of Scope").

1. In Scope

1. To design a measurement scheme suited for
 - data collection needed to supervise the availability provided to the end users by networked services and that is consistent with the end users' own observations.
 - managing the service provisioning process to meet a service availability guarantees.
 - yield a better understanding of how failures affect service availability in a compound system as a basis for improvements in design and operation.
1. To provide analytical tools to handle measurement data from the above scheme with respect to the above outlines purposes.

1. An initial reduced scale test/trial of the measurement scheme and analytical tools.

2. Out of Scope

1. To do large scale data collection for all NRENs or all components.

This might be a followup for a potential next phase to produce more comprehensive tools to back the Service Level Specification

2. The project should not produce legal considerations for an Service Level Agreement.

4 General Information

Outline any potential issues, risks, dependencies, assumptions, constraints and limitations or any other points that may be useful to help assess the proposal.

1. The project will preferably need academic staff like a phd-student or post-doc to build the dependability model and the availability of such personnel is not known at this point.
2. The project will need both academic and research networking expertise

