

SIMULBED AYAME Associate Team

Report for 2012

Web site: <http://planete.inria.fr/Simulbed/>

1 Summary of work done in 2012

Note that in Japan the project officially started on June 2012 with the kick-off meeting at INRIA.

As part of the efforts to simplify set-up and execution of mixed experiments, NEPI was extended to automate deployment and customization of routing overlays on PlanetLab. Thanks to this ability and to the additional support to deploy and control ns-3 simulations on PlanetLab nodes, it is now possible through NEPI to conduct experiments where PlanetLab nodes and ns-3 simulations are part of a same routing overlay. This extension to NEPI not only allows a better control over the routing between PlanetLab nodes, thanks to the use of customizable tunnels, but it also enables researchers to easily scale PlanetLab experiments using ns-3 simulations[1, 4, 6]. Additionally, support for easy experimentation with CCNx on PlanetLab was added to NEPI[3, 7]. CCNx is an interesting use case for NEPI since it is a promising technology for future Internet architecture with a rapidly growing industrial and academic community.

Work is underway to support a fourth experimentation environment, OMF, in NEPI, to enable wireless network experimentation. NEPI will interact with the OMF resource control layer by implementing the OMF XMPP protocol. In the future we foresee to support the ability to deploy ns-3 simulations in OMF nodes and to integrate the simulated network in a same overlay with OMF nodes. Finally, extensions to support automatic IP address assignment and routing table population during experiment design time are being added to NEPI with the objective of easing the high time expense involved in manual configuration of large experiment topologies.

DNEmu was also introduced to provide smooth experimentation control over distributed PlanetLab nodes with ns-3. As NEPI does, DNEmu is also able to control and synchronize the experimental scenario among multiple nodes, but DNEmu more focuses on the ns-3 specific feature and tries to reduce the dependency of external software and toolset. This work was presented at the WNS3 workshop and on TridentCom'12 conference[2, 5].

Concerning Direct Code Execution (DCE) of ns-3, we have added the support the recent 3.4.5 Linux kernel, and different versions of Fedora and Ubuntu Linux distributions. Other works include the creation of an helper to automatically create the static routes for a static network like the helper existing in ns-3, and the support of Message Passing Interface (MPI) for two loaders of DCE (CoojaLoader and CopyLoader). Further details on DCE functionalities added and planned to be added can be found in bugzilla[10].

2 Next Year Program

The next steps consist of (1) improving further DCE, DNEmu and NEPI by adding new functionalities, and (2) building the SIMULBED testbed. The first task consists mainly of improving DCE by adding the wrapping for missing system calls. Moreover, we want to make easier the debugging of ns-3/DCE (e.g. by allowing DCE to run gdb while using vcontext). We also plan to add the bindings between NEPI and DCE in order to simplify the setup of ns-3 simulations that involve DCE. Concerning the second task, we will build a testbed to evaluate two different architectures proposed for the future Internet, namely HANA (Hierarchical Automatic locator Number Allocation Protocol)[8] and CCN (Content Centric Networking) [9]. We will deploy HANA and CCN on SIMULBED in order to evaluate performance and to identify pros/cons of both architectures. The first deployment will be done on a few nodes distributed in PlanetLab Europe and Japan to validate the SIMULBED design. Then we will deploy the two architectures on a larger number of nodes to evaluate the scalability of the two architectures. In summary, the testbed deployment will allow us to:

- evaluate HANA and CCN architectures proposed for the future Internet taking into account the underlying network conditions,
- generalize the SIMULBED architecture (NEPI/DNEmu + DCE) for a network experiment toolset.

As for the evaluation of control method of network experimentation, NEPI and DNEmu will be evaluated in terms of the following metrics:

- the number of nodes operable with controller (NEPI/DNEmu),
- the traffic volume capable to process by both tunneling method.

3 Budget requested for 2013

3.1 Exchanges scheduled for 2013

Exchanges scheduled from France to Japan

- Meeting at NICT in Tokyo, one week in June 2013
Visitors: Walid Dabbous, Thierry Turletti, Daniel Camara, Frederic Urbani

Exchanges scheduled from Japan to France

- Meeting at INRIA Sophia Antipolis, one week in April 2013
Visitors: Hitoshi Asaeda, Hajime Tazaki, Tsuyoshi Hisamatsu
- Meeting at INRIA Sophia Antipolis, one week in October 2013
Visitors: Hitoshi Asaeda, Hajime Tazaki

3.2 Expected expenditures for 2013

		Senior Researcher	Young Researcher	PhD Student	Engineer	Total
Visits from Inria to partner	# of persons Estim. costs	2 8K Euros		1 4K Euros	1 4K Euros	4 16K Euros
Visits from partner to Inria	# of persons Estim. costs	2 980,000 JPY	2 980,000 JPY		1 340,000 JPY	5 2,300,000 JPY

3.3 Budget proposal for 2013

Financial support request to INRIA	16000 Eur
Expected financial and/or material contribution from Japan Equipment: Desktop PC x 1 = 198,000 JPY Travel: 2,300,000 JPY Total: 2,498,000 JPY (= ~22350 Eur)	2,498,000 JPY
Total	~38350 Eur

References

- [1] Claudio Freire, Alina Quereilhac, Thierry Turletti and Walid Dabbous, "Automated deployment and customization of routing overlays on PlanetLab", in Proc. ICST TridentCom conference, June 11-13, 2012, Thessaloniki, Greece.
- [2] Hajime Tazaki and Hitoshi Asaeda, "DNEmu: Design and Implementation of Distributed Network Emulation for Smooth Experimentation Control", in Proc. ICST TridentCom conference, June 11-13, 2012, Thessaloniki, Greece.
- [3] Daniel Camara, Frederic Urbani, Mathieu Lacage, Thierry Turletti, Walid Dabbous, "Simulation Platform for Content Centric Networks Protocols Development", CCNxCon workshop, September 12-13, 2012, Sophia Antipolis, France.
- [4] Alina Quereilhac, Thierry Turletti and Walid Dabbous, "Managing heterogeneous ns-3 experiments with NEPI", poster at WNS3 workshop, March 23, Desenzano, Italy.
- [5] Hajime Tazaki, "An Architecture for Distributed Network Emulation", poster at WNS3 workshop, March 23, Desenzano, Italy.
- [6] Alina Quereilhac, Claudio Freire, Thierry Turletti, Walid Dabbous, "Controllable packet prioritization on PlanetLab using NEPI", demo at ICST TridentCom conference, June 11-13, 2012, Thessaloniki, Greece.
- [7] Alina Quereilhac, Anshuman Kalla, Thierry Turletti, Walid Dabbous, "Easy CCNx experimentation on PlanetLab", demo at CCNxCon workshop, September 12-13 2012, Sophia Antipolis, France.
- [8] K. Fujikawa et al., The Basic Procedures of Hierarchical Automatic Locator Number Allocation Protocol HANA, Proc. Asia Workshop on Future Internet Technologies (AWFIT 2011), pp. 124–131, October 2011.

- [9] V. Jacobson, D. K. Smetters, J. D. Thornton, M. F. Plass, N. H. Briggs, R. L. Braynard, "Networking Named Content", ACM CoNEXT Conference, Rome, December, 2009.
- [10] see <https://www.nsnam.org/bugzilla/describecomponents.cgi?product=dce>