

## EU Research Project provides a platform for integrating next-generation heterogeneous technologies into today's data centres

**London, 10 November 2015**—The HARNCESS project,<sup>1</sup> which received nearly €3 million EU funding from the European Community's Seventh Framework Programme (contract nr. 318521), has announced the release of its open source tools for integrating and managing heterogeneous compute, networking and storage technologies into today's data centres. The project is led by Imperial College London, and includes École Polytechnique Fédérale de Lausanne, Université de Rennes 1 and Konrad-Zuse-Zentrum für Informationstechnik Berlin, along with commercial partners Maxeler Technologies and SAP SE.

**A New-Era Cloud Stack.** To better service workloads in application domains currently not supported by existing data centres, the HARNCESS project has designed and implemented an enhanced cloud platform stack that fully embraces heterogeneous technologies. A key principle is that both specialised and commodity resources are treated as first-class cloud entities. Thus, the platform supports standard VMs and LXC containers, but can also be used to instantiate virtualised FPGA resources and PCIe-based accelerators (e.g., GPGPUs) as well as managed storage volumes and virtual network links with QoS guarantees.

The modular architecture and novel layered management approach developed by HARNCESS, along with a set of innovative APIs, render the platform resilient to different types of heterogeneous resources and able to easily incorporate future innovative compute, networking and storage technologies.

**Demonstrated on Challenging Testbeds.** The HARNCESS platform has been demonstrated on two testbeds: Grid'5000, which is a large-scale and versatile testbed spanning France and consisting of 1000 nodes along with heterogeneous compute and networking technologies, and a smaller testbed at Imperial College London that incorporates virtualised FPGA-based dataflow technology from Maxeler Technologies.

**Impacting Open Source Projects.** Moving forward, Prof. Guillaume Pierre of Université de Rennes 1 anticipates that ConPaaS,<sup>2</sup> a major open-source Platform-as-a-Service (PaaS) system “will leverage HARNCESS extensions in its upcoming 2.0 release in Q4 2015, creating a PaaS system with a new range of functionalities not currently supported by any other platform.” In addition, QoS-aware storage technologies developed within HARNCESS was made available in the October 2015 release of XtremFS.<sup>3</sup> Two new EU projects and three national projects will be extending the HARNCESS results.

**Exploited by Industry.** Commercial partner Maxeler Technologies recognises its HARNCESS participation as a major step towards seamless integration of dataflow engine (DFE) technology<sup>4</sup> into data centres. “Our group management mechanism, drastically improved by HARNCESS, brings the competitive advantage of our DFE technology closer to the end user,” said Oskar Mencer, CEO of Maxeler. SAP SE will also leverage key HARNCESS technologies for commercial advantage.

*Core components of the HARNCESS cloud platform, along with deployment scripts, are available on GitHub,<sup>5</sup> while key findings and experimental results are detailed in articles available from the project website.*

<sup>1</sup> <http://www.harness-project.eu/>

<sup>2</sup> <http://www.conpaas.eu/>

<sup>3</sup> <http://www.xtremfs.org/>

<sup>4</sup> <https://www.maxeler.com/technology/dataflow-computing/>

<sup>5</sup> <https://github.com/harnesscloud/>