

ECOSCALE

Highlights of project

ECOSCALE tackles the exascale challenge by providing a novel heterogeneous energy-efficient hierarchical architecture, a hybrid distributed OpenCL programming environment and a runtime system. The ECOSCALE architecture, programming model and runtime system follows a hierarchical approach where the system is partitioned into multiple autonomous Workers (i.e. compute nodes). Workers are interconnected in a tree-like structure in order to form larger Partitioned Global Address Space (PGAS) partitions. To further increase the energy efficiency of the system, the Workers employ reconfigurable accelerators that perform coherent memory accesses in the virtual address space while being programmed by OpenCL.

Technology (hw/sw/methodology) suggested for inclusion in an EsD project

The complete ECOSCALE framework including the hardware consisting of CPUs tightly interconnected with reconfigurable devices, together with the OpenCL programming environment and the runtime system that allows the efficient task distribution on the highly heterogeneous platform can be included in an EsD project.

How should this technology be used / integrated (I/F, APIs)

Any highly parallel application developed in OpenCL with relatively high Arithmetic intensity can potentially be accelerated by ECOSCALE.

Pre- or co-requisite items

No such items are required

Extra work/interaction (on top of current project roadmap) needed

Some additional work is needed so as to allow for several thousands of Workers to be employed. This may include a hybrid MPI+OpenCL programming model and runtime which can be built on top of the distributed OpenCL runtime system developed in ECOSCALE.

Information / actions needed for EsD projects

It will be highly desirable if some specific clusters of the existing projects are initiated and publicly lead some of the next EsD proposals/projects

The initiatives for the next EsD proposals/projects should be announced and then some workshops should be organized where any potential project/company/institution can participate and specify its potential contributions.

There should be a closer collaboration of the CoEs with the FET-HPC projects providing the technology/infrastructure so as to further investigate which applications from the CoEs can be efficiently executed in each developed system; this may be funded by ETP4HPC or HiPEAC

More information regarding how the new FET-HPC projects (that will start in 2017) will be considered in the EsD proposals/projects is also needed.

