

Published on *CERN openlab* (<http://test-static-05.web.cern.ch>)

[Home](#) > Evaluation of ?OpenCL for FPGA? for Data Acquisition and Acceleration in High Energy Physics

Evaluation of ?OpenCL for FPGA? for Data Acquisition and Acceleration in High Energy Physics ^[1]

Date published:

Monday, 13 April, 2015

Document type:

Journal paper

Author(s):

S. Sridharan

The increase in the data acquisition and processing needs of High Energy Physics experiments has made it more essential to use FPGAs to meet those needs. However harnessing the capabilities of the FPGAs has been hard for anyone but expert FPGA developers. The arrival of OpenCL with the two major FPGA vendors supporting it, offers an easy software-based approach to taking advantage of FPGAs in applications such as High Energy Physics. OpenCL is a language for using heterogeneous architectures in order to accelerate applications. However, FPGAs are capable of far more than acceleration, hence it is interesting to explore if OpenCL can be used to take advantage of FPGAs for more generic applications. To answer these questions, especially in the context of High Energy Physics, two applications, a DAQ module and an acceleration workload, were tested for implementation with OpenCL on FPGAs². The challenges on using OpenCL for a DAQ application and their solutions, together with the performance of the OpenCL based acceleration are discussed. Many of the design elements needed to realize a DAQ system in OpenCL already exists, mostly as FPGA vendor extensions, but a small number of elements were found to be missing. For acceleration of OpenCL applications, using FPGAs has become as easy as using GPUs. OpenCL has the potential for a massive gain in productivity and ease of use enabling non FPGA experts to design, debug and maintain the code. Also, FPGA power consumption is much lower than other implementations. This paper describes one of the first attempts to explore the use of OpenCL for applications outside the acceleration workloads.

Event published at:

CHEP 2015, Okinawa, Japan

[For more information](#) ^[2]

Technical document file:



[CHEP2015PaperEvaluation%20of%20%27OpenCL%20for%20FPGA%27%20for%20DAQ%20and%202.pdf](#) [3]

- [Visit Us](#)
- [RSS Feeds](#)

DISCLAIMER: This Web page contains pointers to material related to the management of CERN openlab in the Information Technology Department at the European Organization for Nuclear Research (CERN). Their use and distribution are regulated by the [CERN copyright notice](#).



Source URL: http://test-static-05.web.cern.ch/publications/technical_documents/evaluation-%E2%80%98opencl-fpga%E2%80%99-data-acquisition-and-acceleration-high

Links

[1] http://test-static-05.web.cern.ch/publications/technical_documents/evaluation-%E2%80%98opencl-fpga%E2%80%99-data-acquisition-and-acceleration-high

[2] <http://chep2015.kek.jp/index.html>

[3] [http://test-static-05.web.cern.ch/sites/test-static-](http://test-static-05.web.cern.ch/sites/test-static-05.web.cern.ch/files/technical_documents/CHEP2015PaperEvaluation%2520of%2520%2527OpenCL%2520for%25)

[05.web.cern.ch/files/technical_documents/CHEP2015PaperEvaluation%2520of%2520%2527OpenCL%2520for%2520for%2520DAQ%2520and%25202.pdf](http://test-static-05.web.cern.ch/files/technical_documents/CHEP2015PaperEvaluation%2520of%2520%2527OpenCL%2520for%2520for%2520DAQ%2520and%25202.pdf)