



FP7 Coordination and Support Action to fund 50 technology transfer projects (TTP) in computing systems. This project has received funding from the European Union's Seventh Framework Programme for research, technological development and demonstration under grant agreement n° 609491.

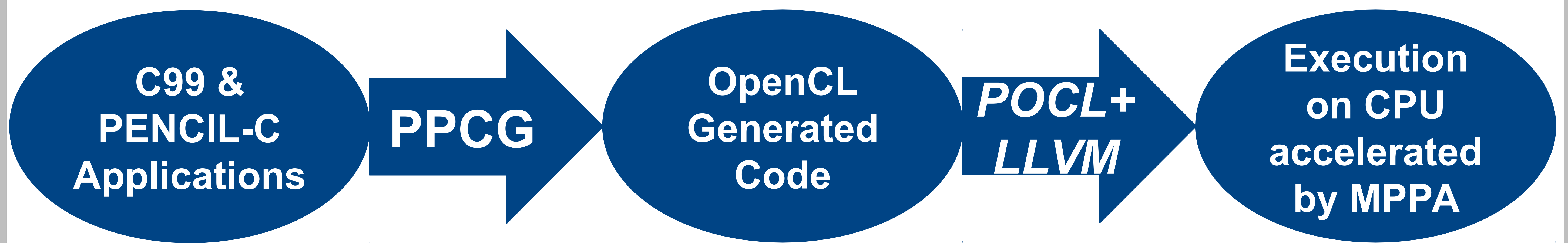
## OpenCL for the Kalray MPPA Manycore Processor

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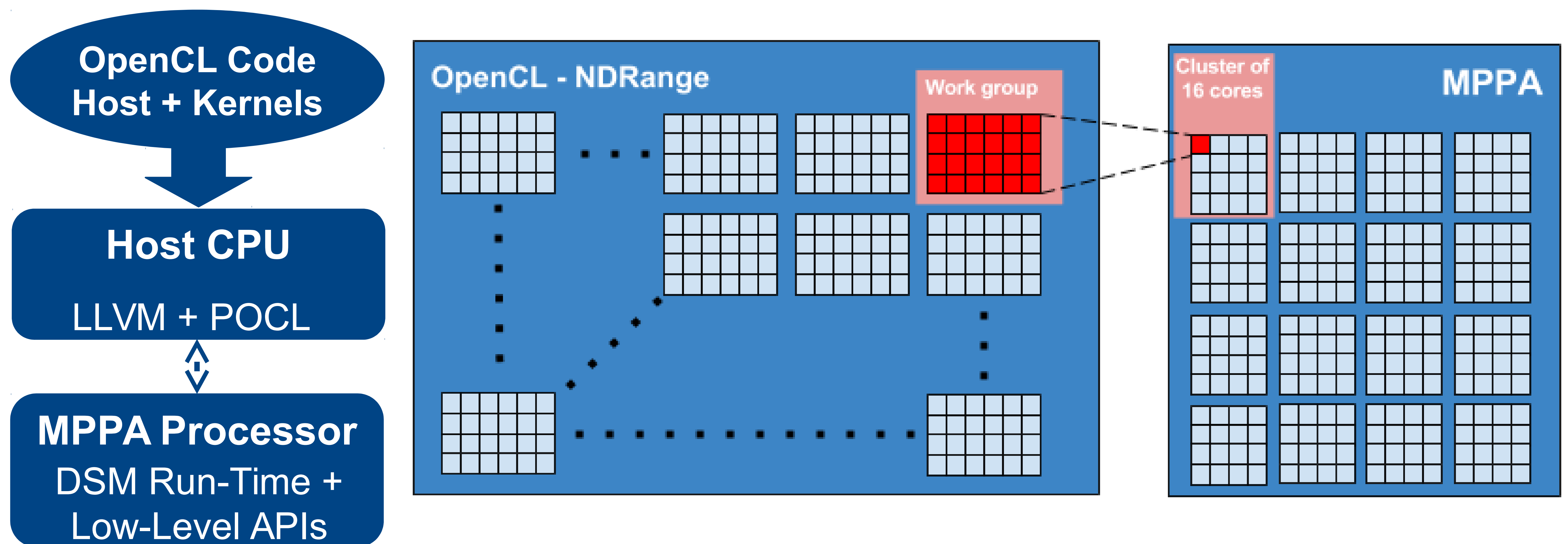
### OpenCL on the MPPA: Challenges

The MPPA processor has a clustered architecture with 16 clusters, each with 16 application cores and a shared local memory. Porting C99 application code for parallel execution is possible by using INRIA's PPCG (Polyhedral Parallel Code Generation). PPCG's OpenCL back-end contributed to motivate the support for OpenCL 1.2 on the MPPA processor.



### OpenCL on the MPPA: Implementation

The MPPA run-time system implements OpenCL global memory using a software distributed shared memory (DSM). The OpenCL host API is implemented by porting the POCL open-source framework to the MPPA (Kalray is a POCL contributor). The OpenCL-C compiler is based on LLVM, which has been retargeted to the Kalray MPPA processor cores.



### OpenCL for the MPPA Results

- Kalray contributed out-of-order OpenCL queues to the POCL project
- Kalray retargeted LLVM to its three VLIW core architectures (k1a, k1b 32-bit, k1b 64-bit)
- Kalray evolved its prototype OpenCL environment to support the standard combination of 'data parallel' and 'task parallel' models with OpenCL-C and the OpenCL host API.
- PENCIL-C benchmarks, including SLAMBench k-fusion, and the complete Polybench-4.1, can be accelerated on the MPPA after translation to OpenCL by PPCG.
- On-going work targets the OpenCL 1.2 conformance and using MPPA I/O cores as host CPU

### TTP Facts

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