

AdaPNet: Adapting Process Networks in Response to Resource Variations

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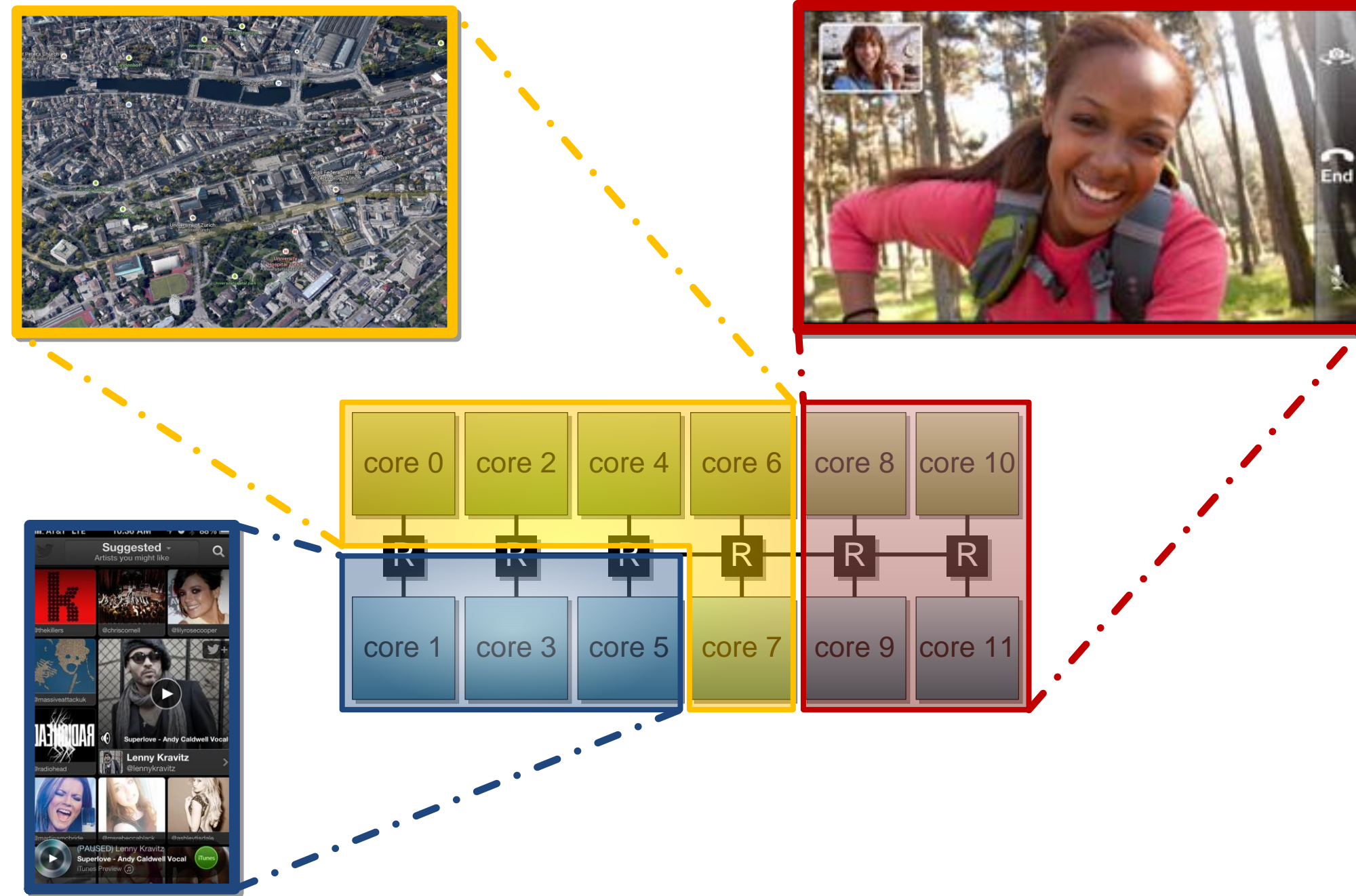
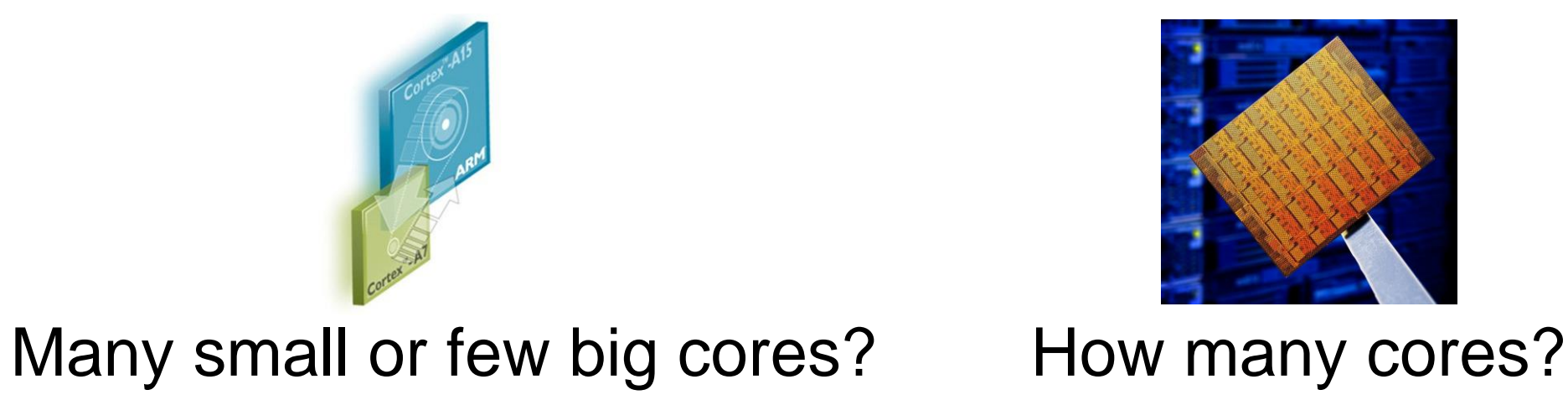


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Motivation

- If multiple applications share a system, the computing resources that an application can use depend on the overall workload of the system
- The programmer does not know the available computing resources at design time
- Applications must seamlessly adapt on-line to dynamic resource changes for increased efficiency – performance, memory usage

Best degree of parallelism for available resources?



ADAPNET HIGHLIGHTS

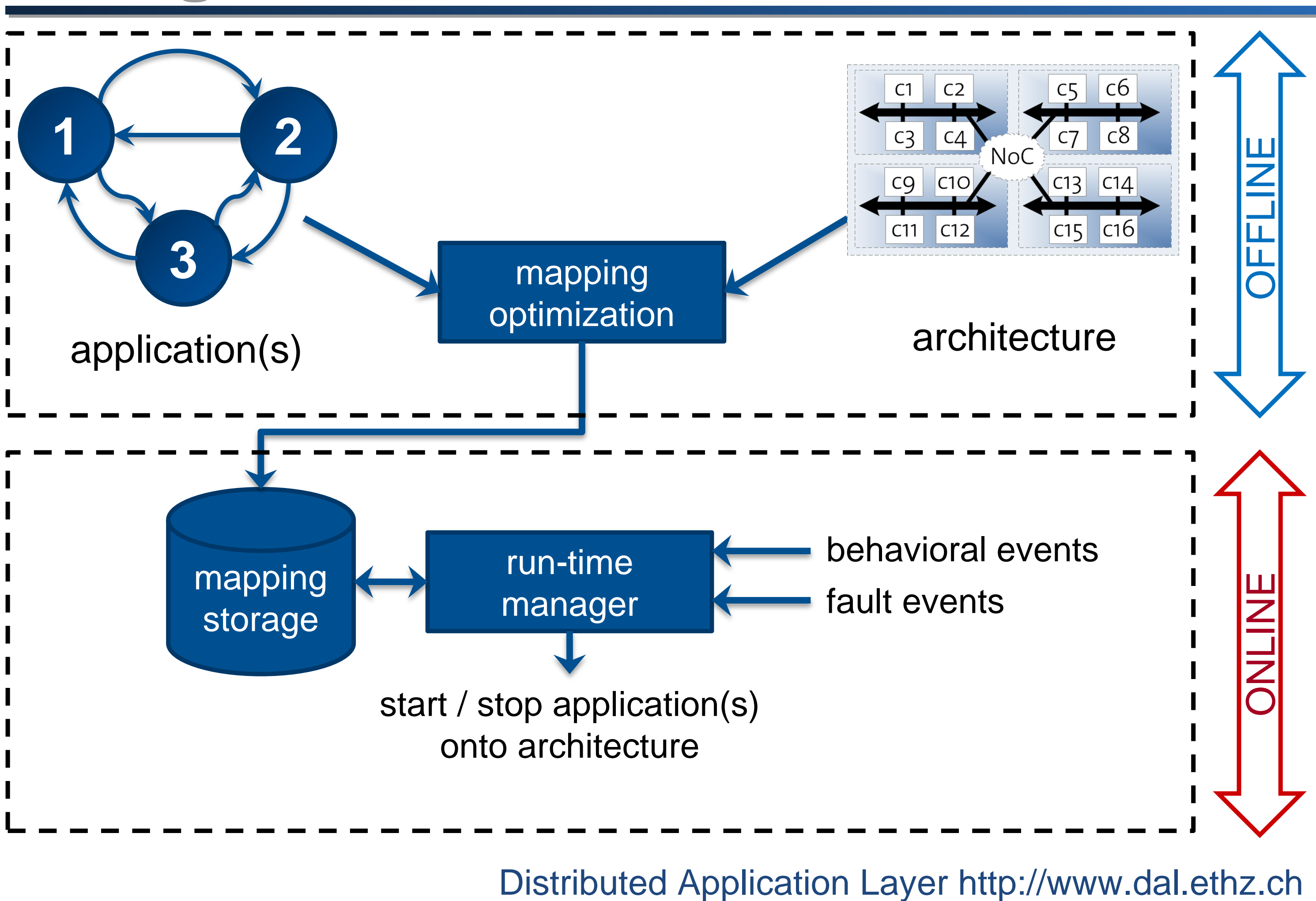
AdaPNet is a runtime system that efficiently executes streaming applications, on platforms with dynamic resource allocation.

AdaPNet responds to changes in the available resources:

1. it calculates a process network that maximizes the performance on the new resources
2. it transparently transforms the application into the alternative network without discarding the program state.

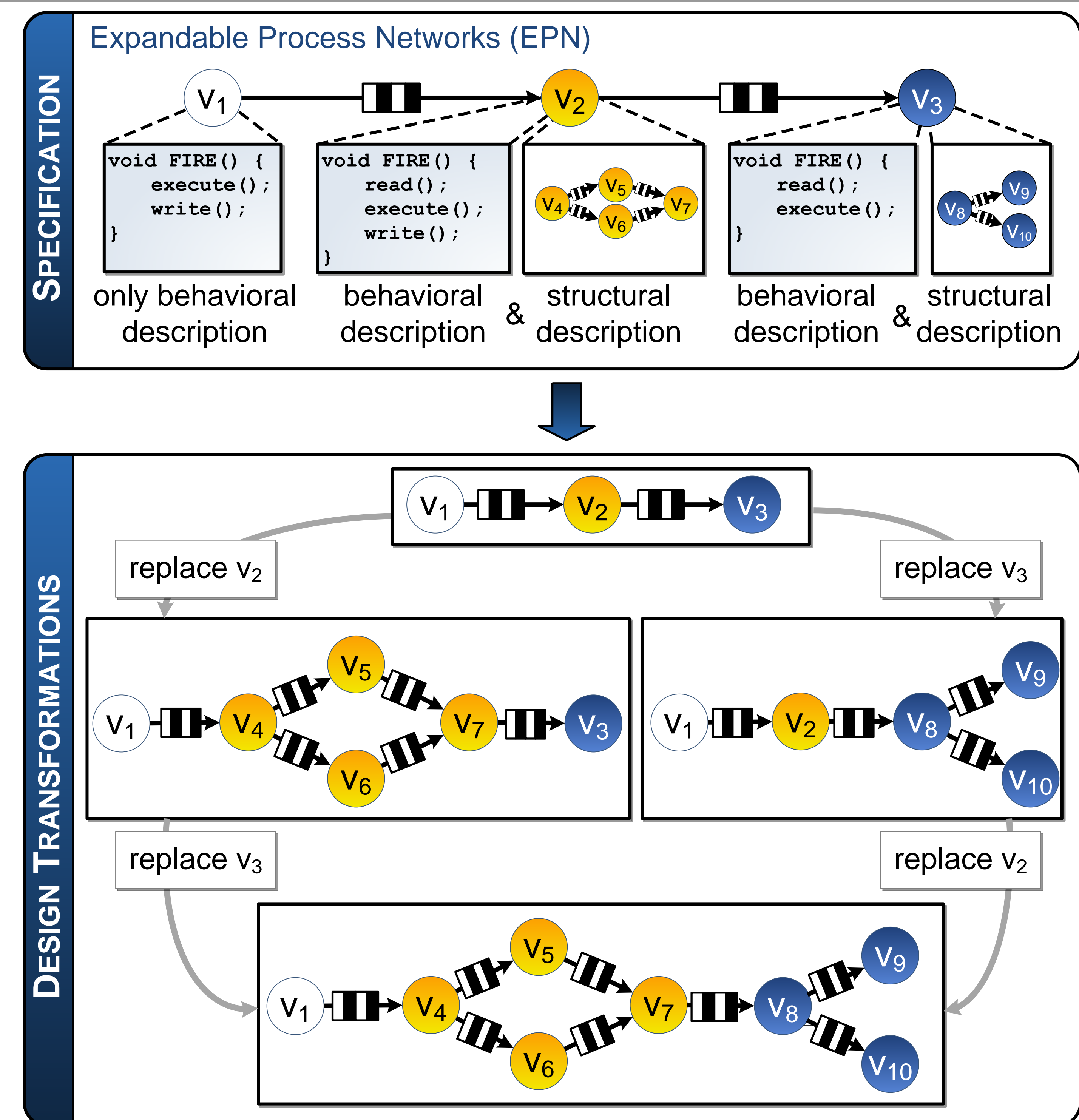
AdaPNet outperforms comparable run-time systems, in terms of *speed-up* and *memory usage*.

Design Flow

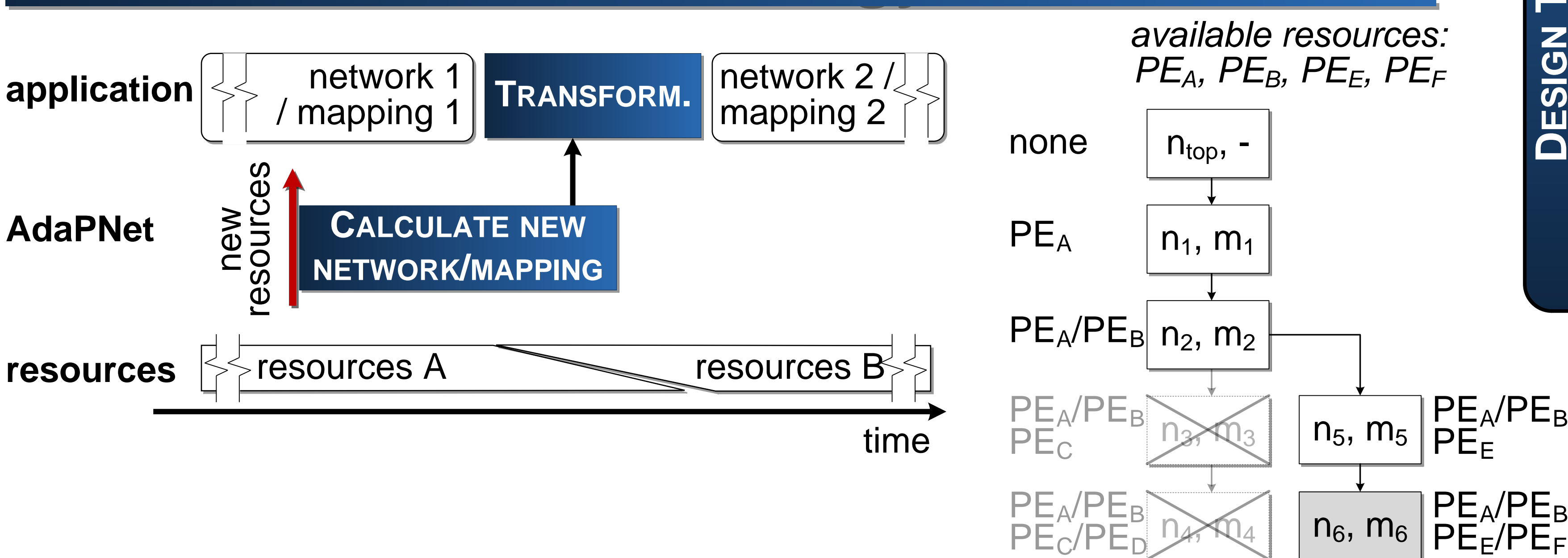


Distributed Application Layer <http://www.dal.ethz.ch>

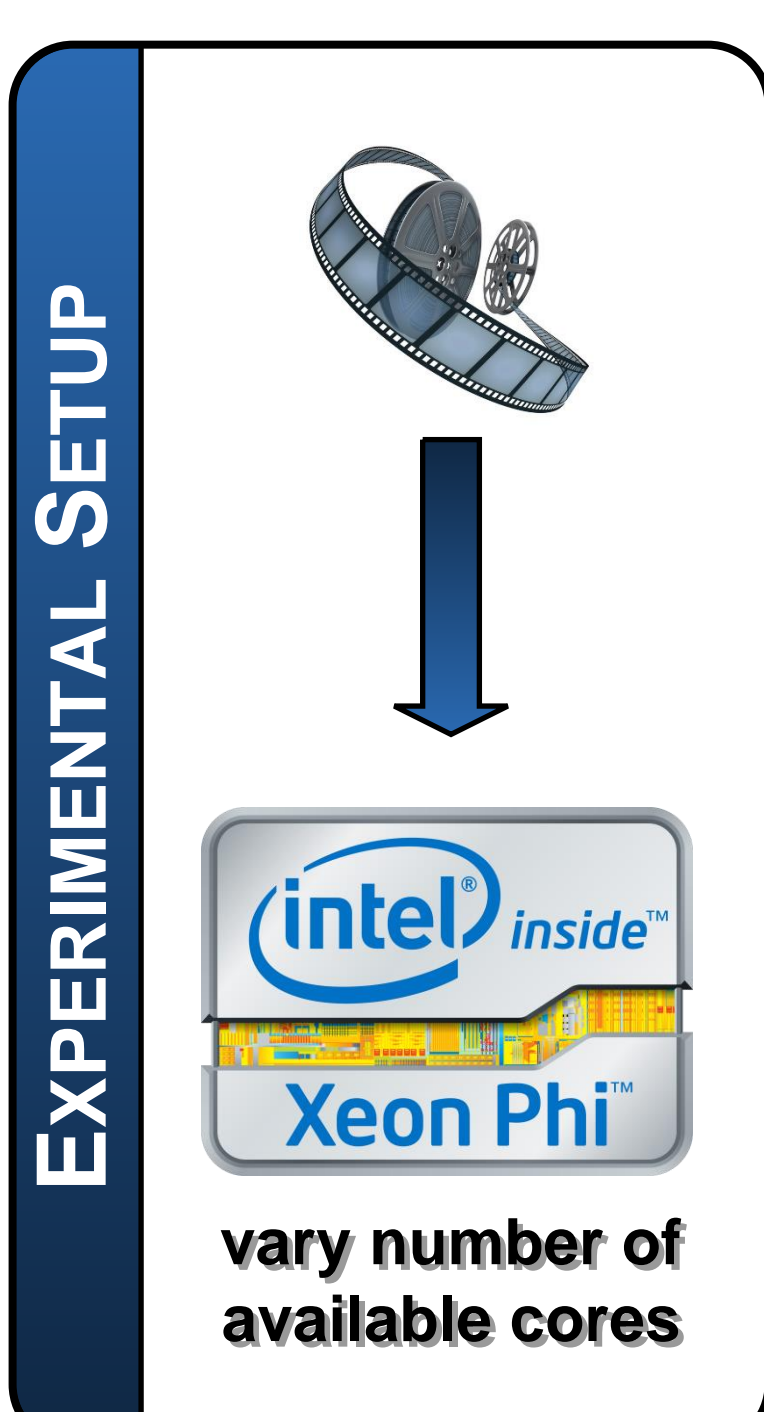
Design Transformations



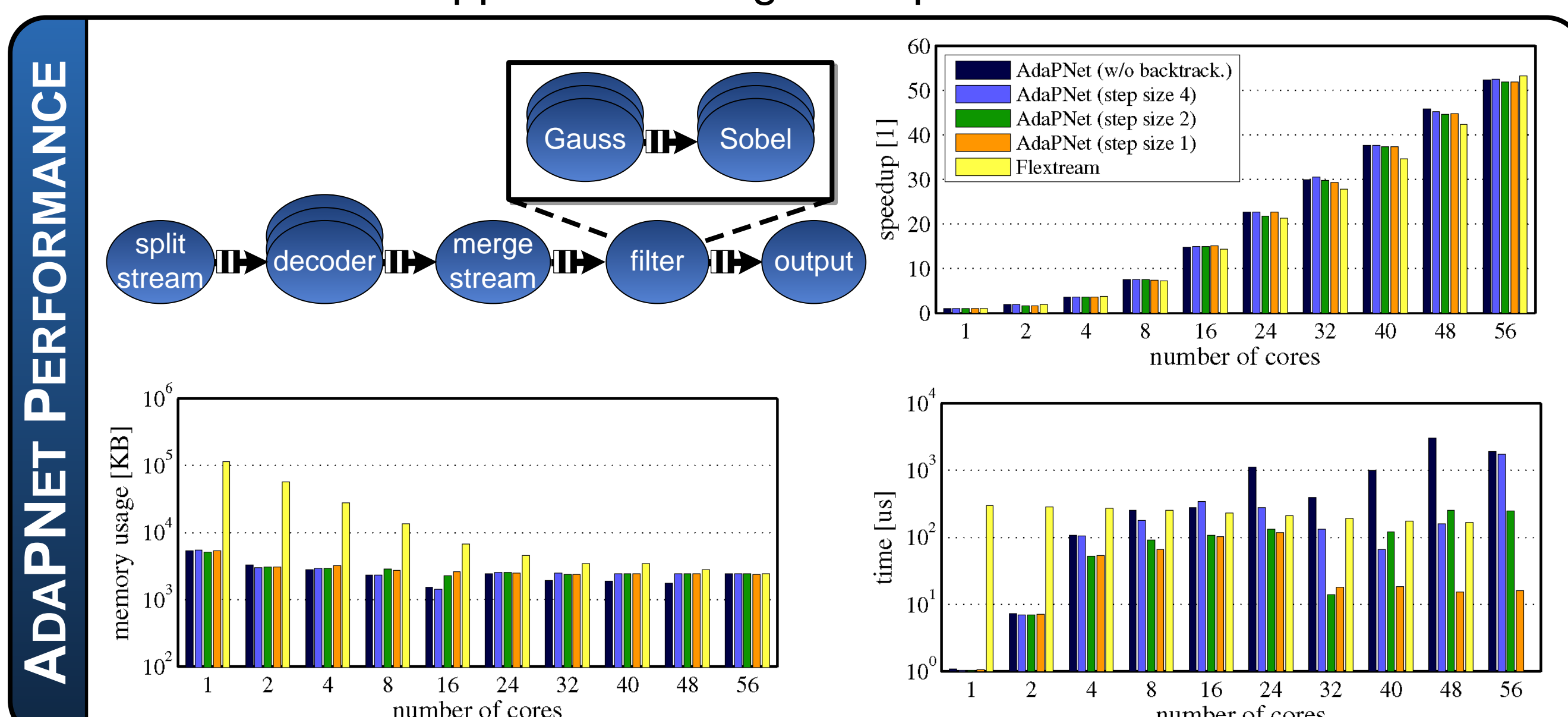
AdaPNet Runtime Strategy



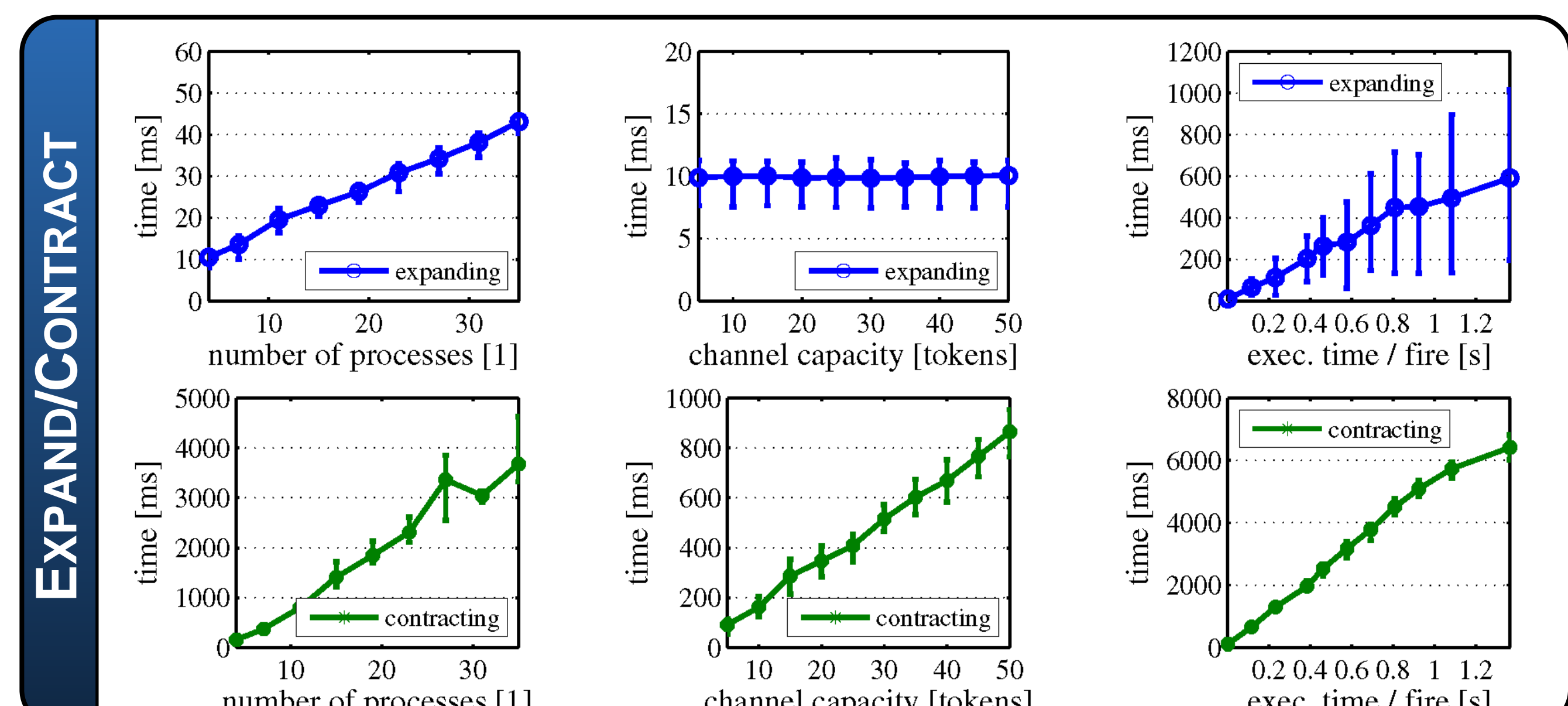
Experimental Results



Can AdaPNet outperform run-time systems that do not adapt the application's degree of parallelism?



How expensive is the transformation into an alternative process network?



AdaPNet is an adaptive run-time system that enables the efficient execution of streaming applications specified as stateful process networks, on multi-processor platforms with dynamic resource allocation.