TORSTEN HOEFLER
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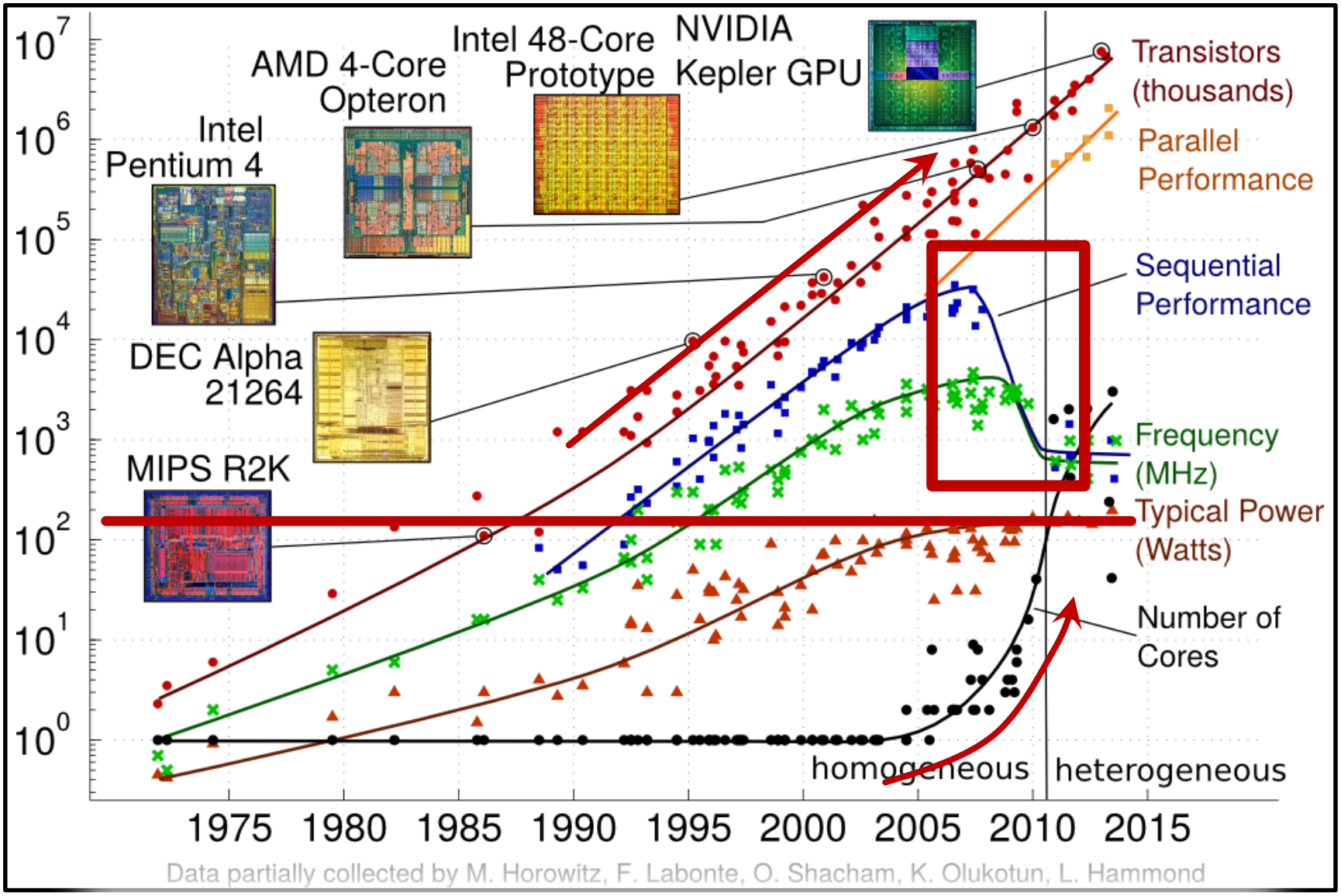
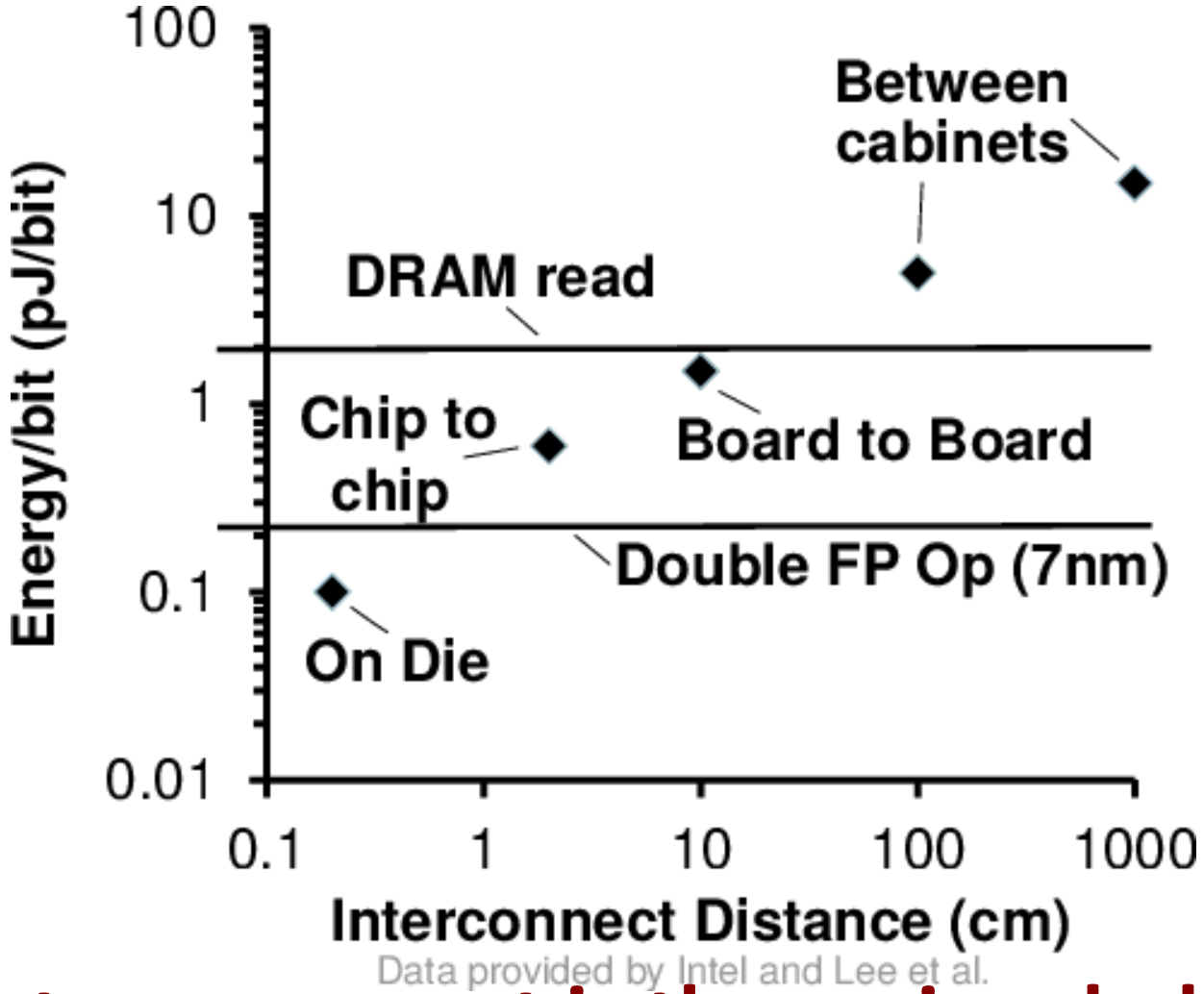
ROSS 2016 – Panel: The Role of System Software in the HPC Accelerator Space



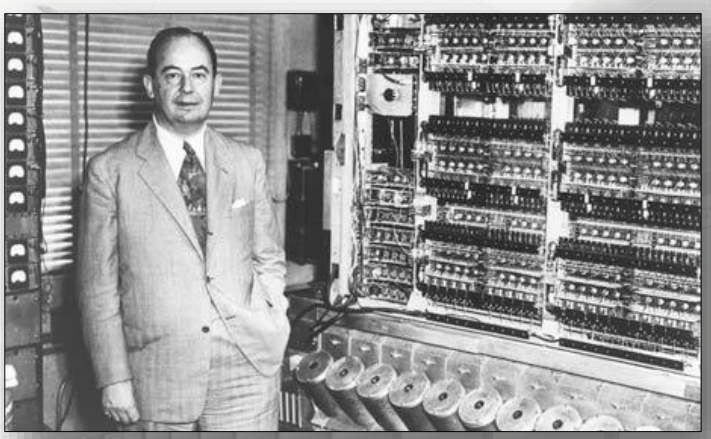
So more parallelism but what is the cost?

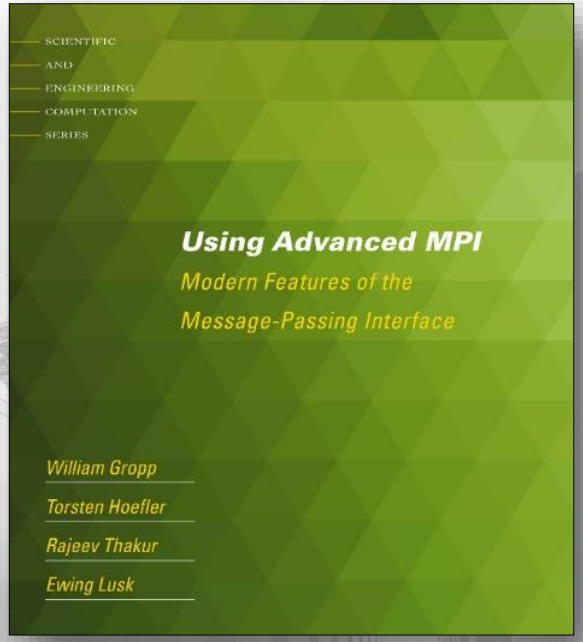
Energy Consumption Trends in Computing

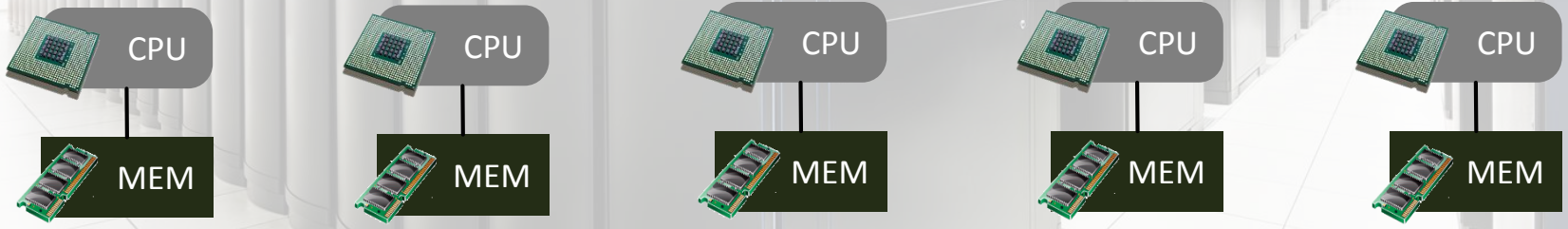


Data provided by Intel and Lee et al.

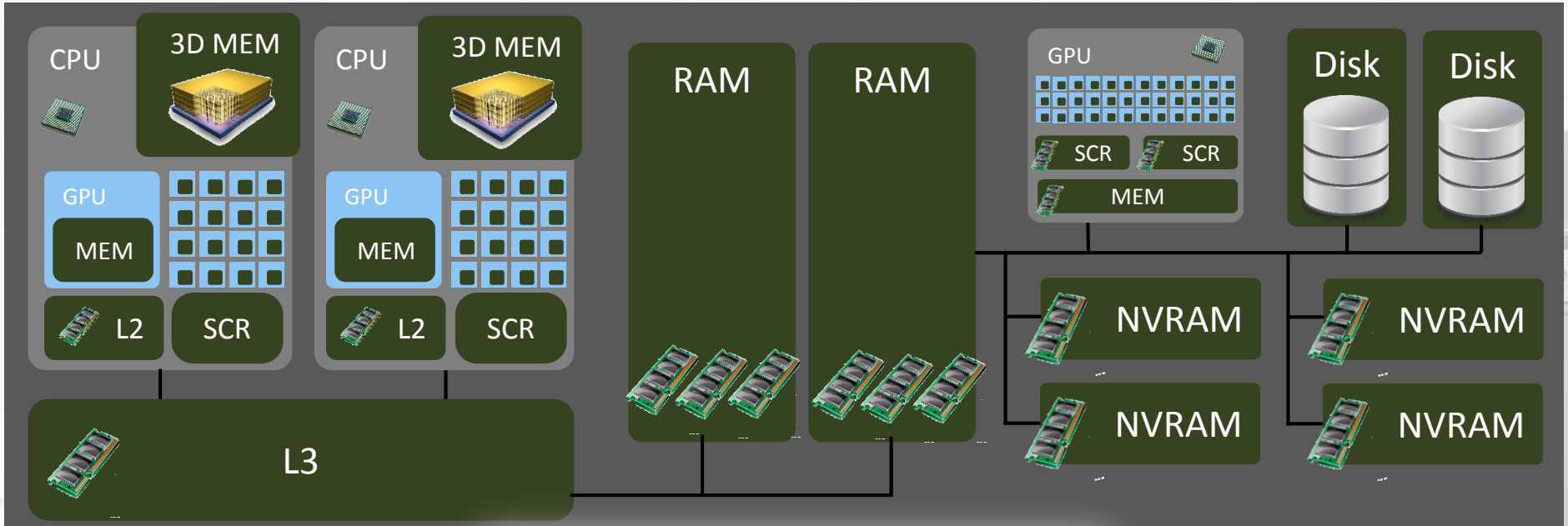
Data movement is the major challenge!



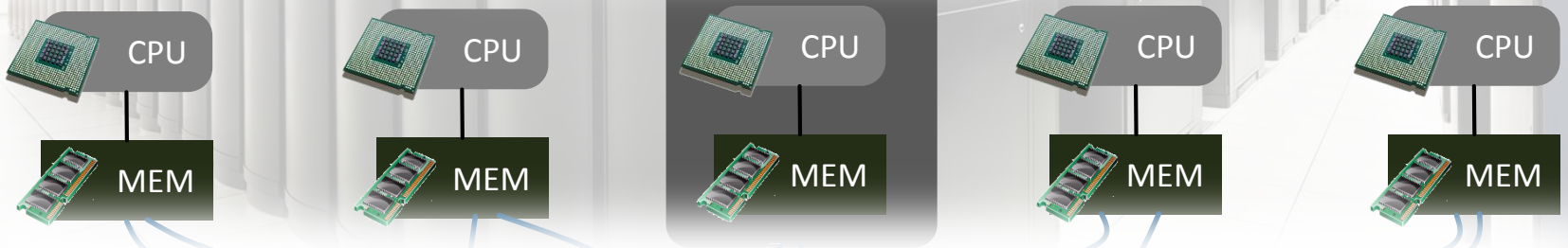




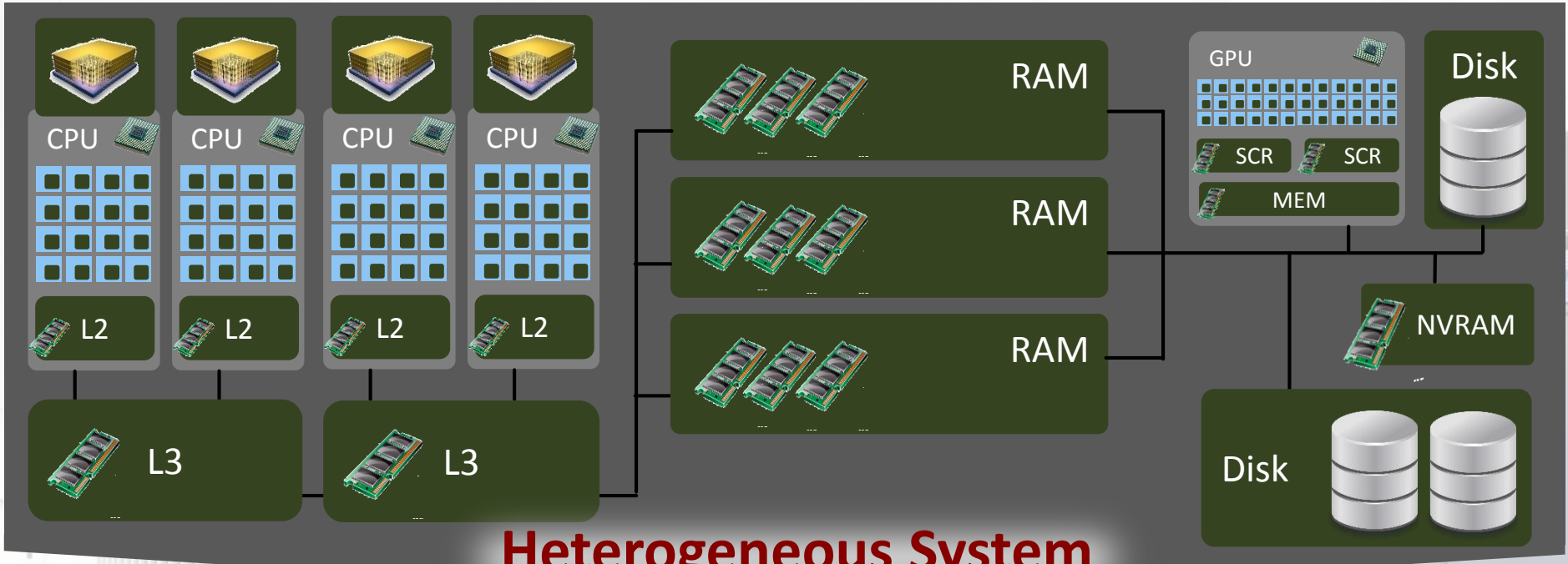
Well, managing data is the major challenge!



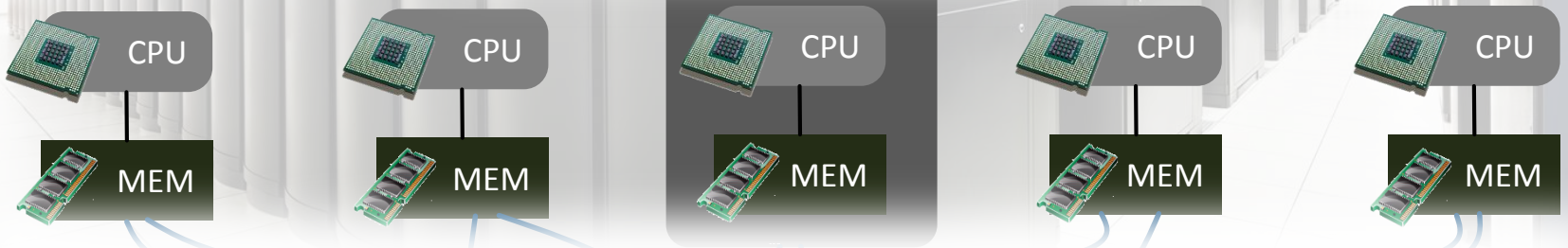
Heterogeneous System



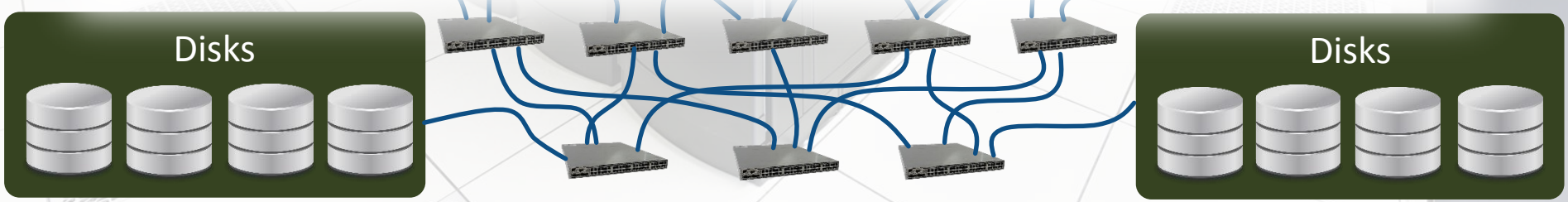
Memory systems become more complex!

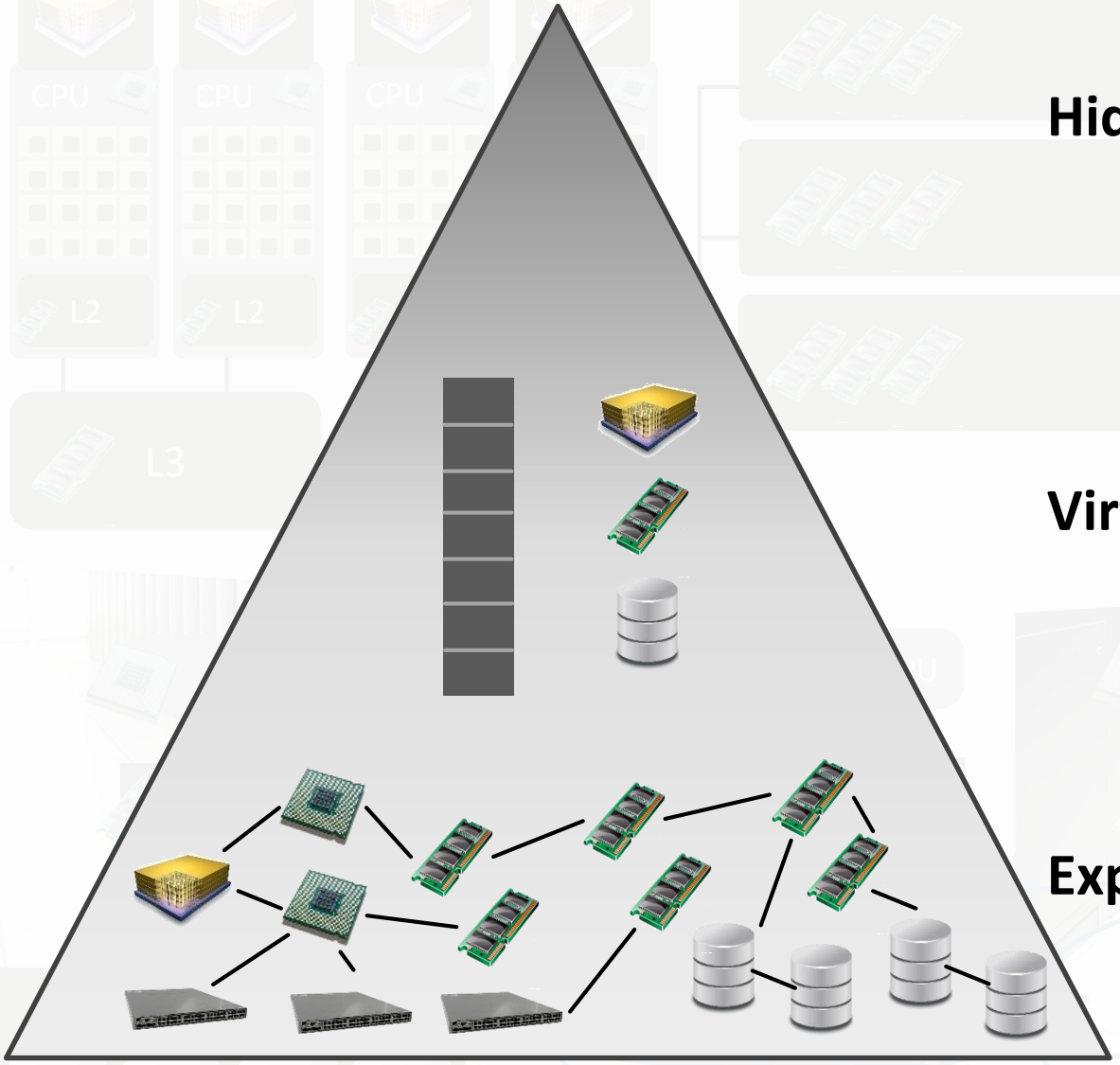


Heterogeneous System



Computing platforms change quickly!





Hide
(e.g., variables)

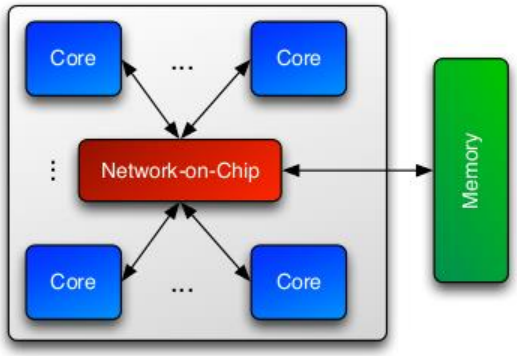
Virtualize
(e.g., virtual memory)

Expose
(e.g., physical memory)

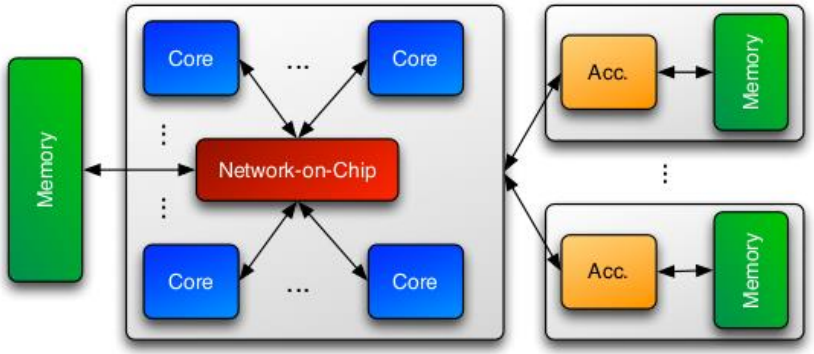
Abstraction

Memory Subsystem Complexity

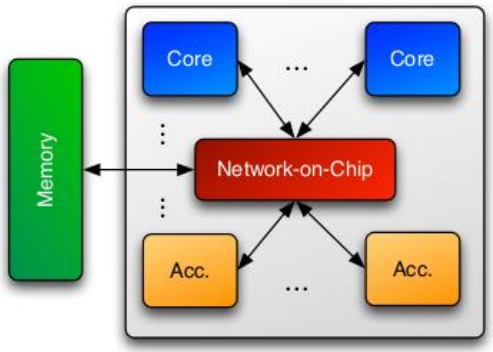
Likely Future Abstract Machine Models (2014)



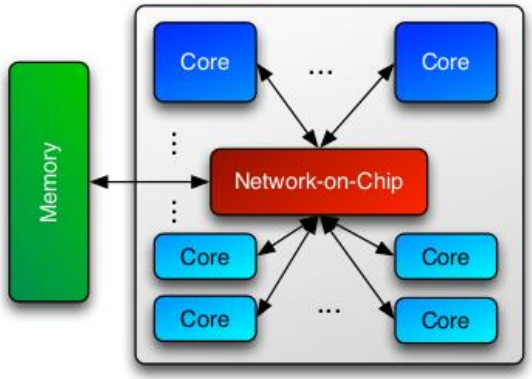
Homogeneous Many-Core Model



Multi-Core CPU + Discrete Accelerator



Integrated CPU + Accelerators



Heterogeneous Multicore

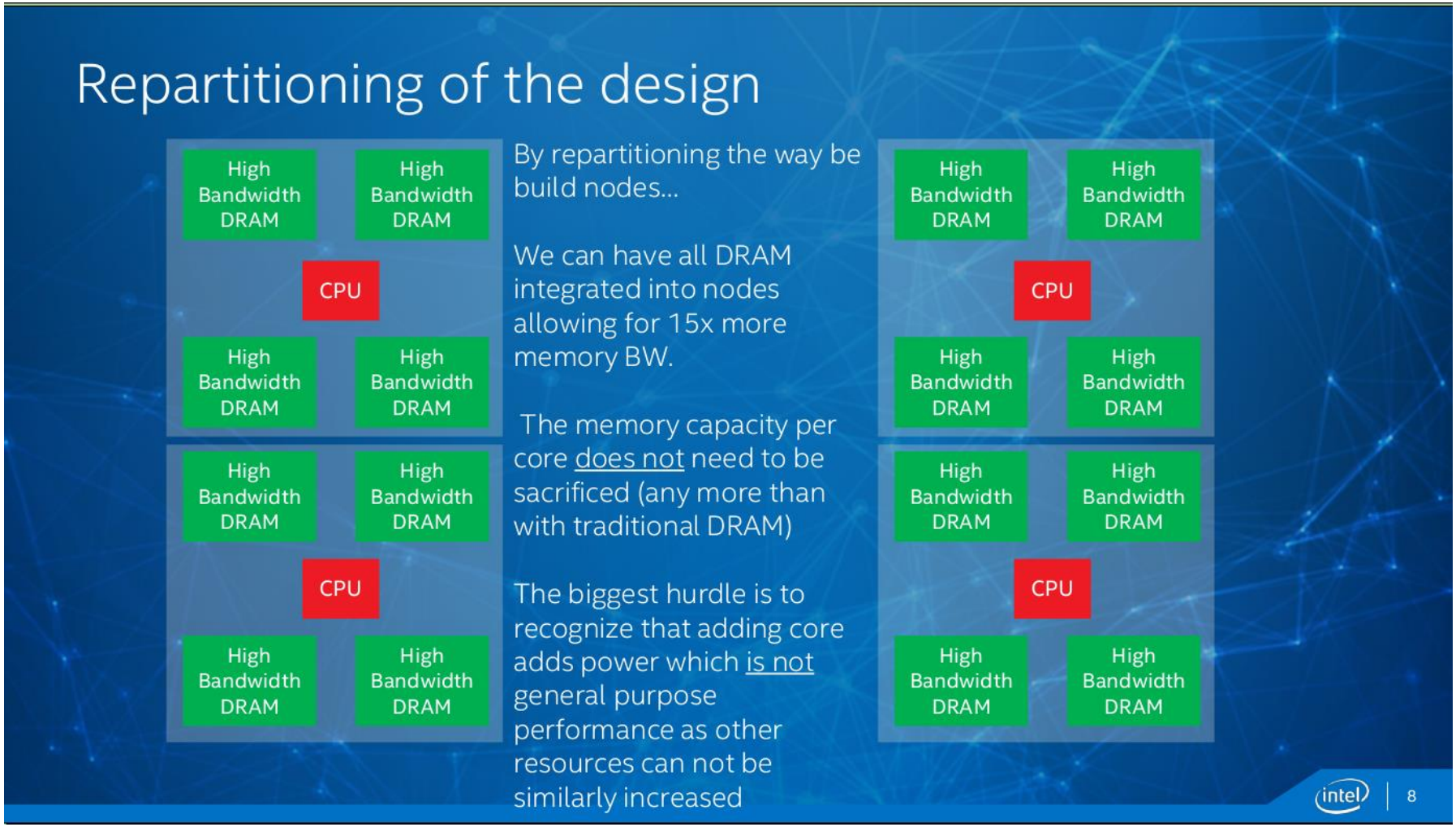
James Ang et al. “Abstract Machine Models and Proxy Architectures for Exascale Computing, 2014 Co-Design for HPC

So we'll all have to deal with accelerators?

- If we mean specialized logic: probably yes!
- Remember this guy?

- Do we need system software for him?

Intel's View (Slide from Alan Gara, 2015)



Memory-centric CPU design perspective from Intel (cf. Intel Xeon Phi KNC/KNL)

Alan Gara at Smoky Mountains Conference on Computational Science, Sep. 2015

And now to the battle of Yamazaki (reenacted)

source: wikipedia

The fighters, aehem panelists