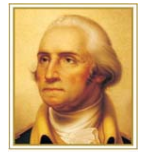


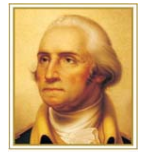
Designing with Extreme Parallelism: The Programming Issues

Tarek El-Ghazawi

The George Washington University

Co-Director, NSF Center for High-Performance Reconfigurable Computing
Director, Institute for Massively Parallel Applications and Computing Technologies (IMPACT)

Outline



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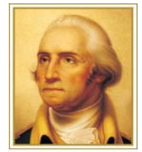
- Intuitional questions
- Classifications

Designing with Parallelism? What options do you have?



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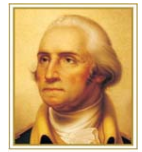
- Leave it all to a parallelizing compiler
  - Parallel computing community gave up!
- Take charge
  - Explicitly or Implicitly
    - Express Parallelism
    - Express Data exchanges

Designing with Accelerators? How integrative is the flow?



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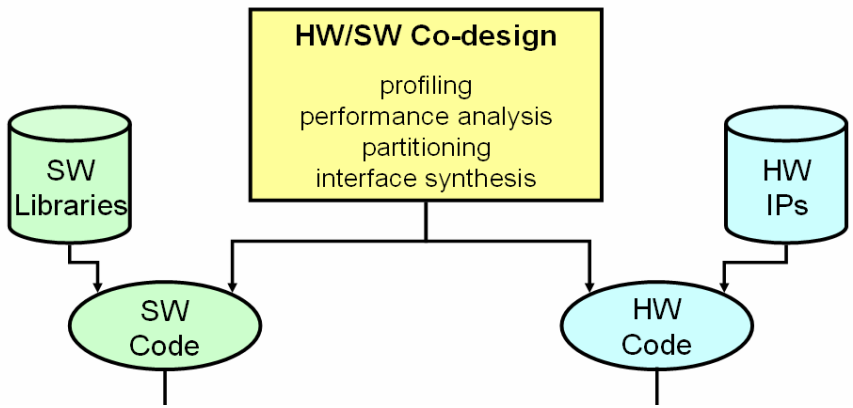
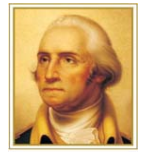
- Tool facilitates design for accelerator side only. Programmer creates a separate microprocessor solution and integrates the pieces.
- Tool supports co-design, e.g. partitioning and co-scheduling. See example from FPGAs.



A Taxonomy for Methods of Expressing Parallelism



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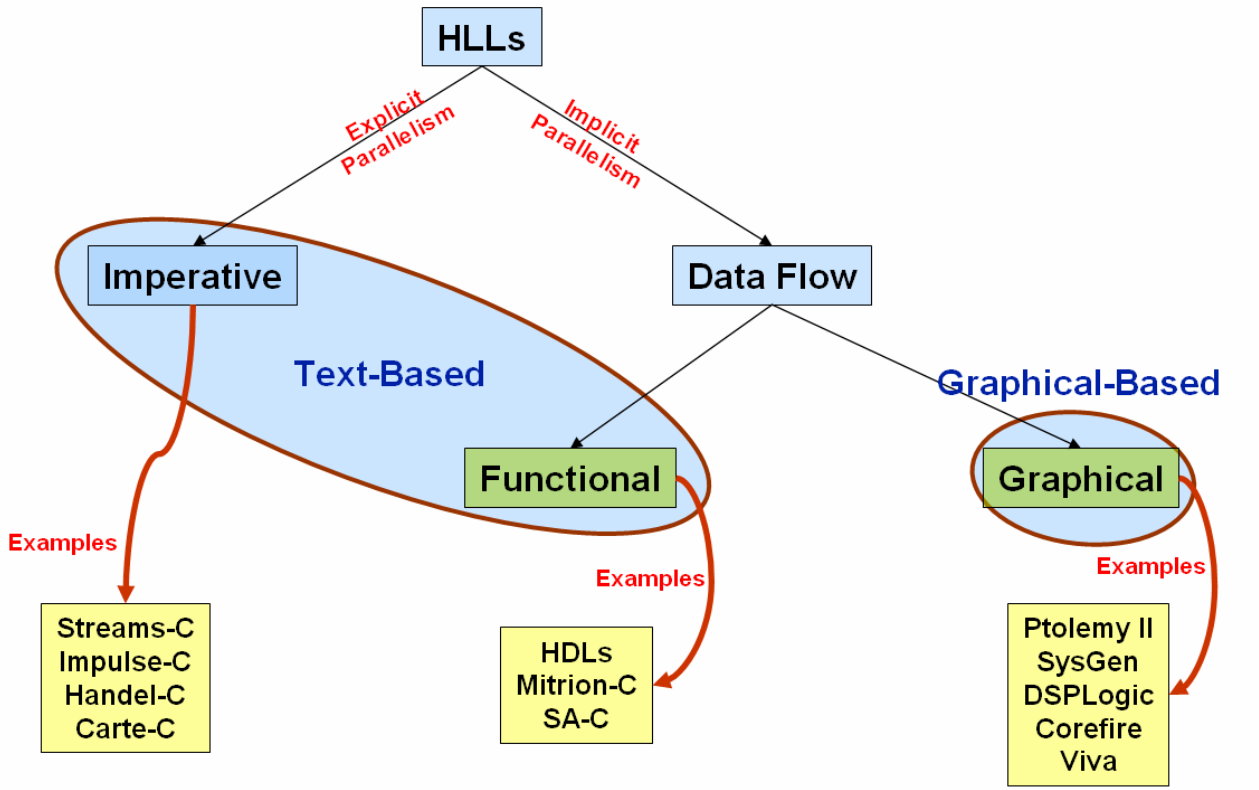
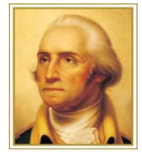
HLL Classification



Basic methods for expressing data exchanges



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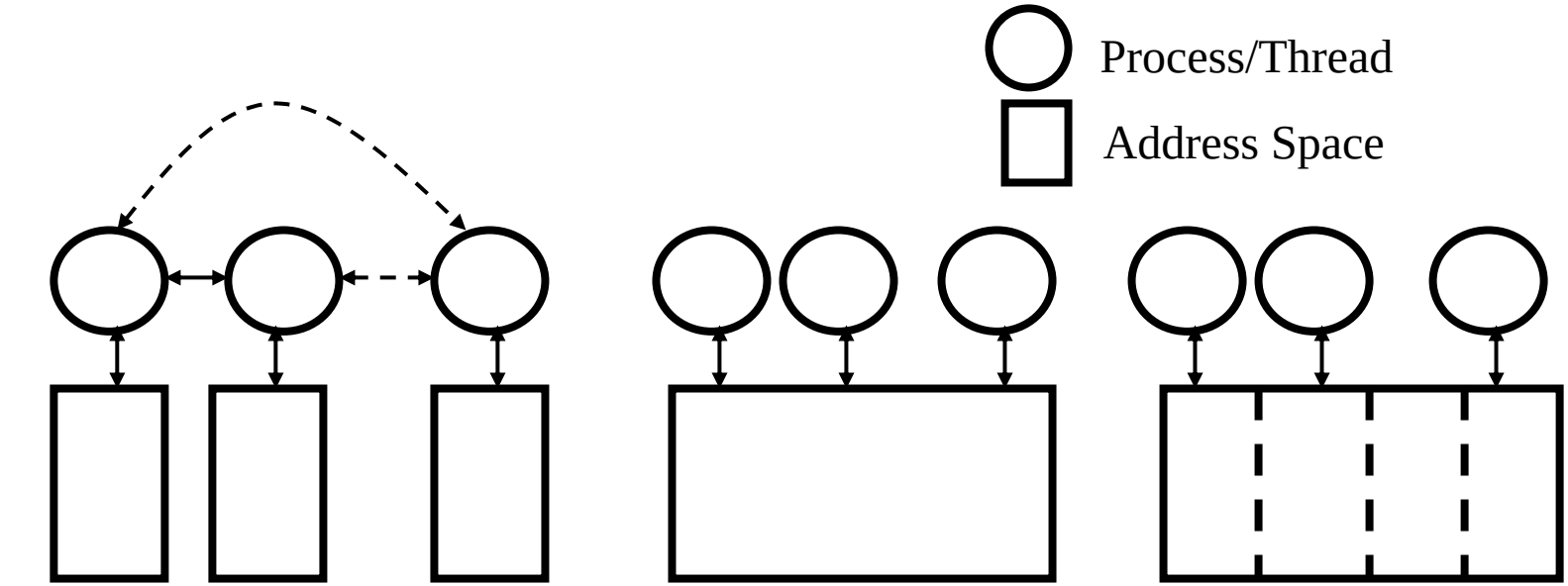
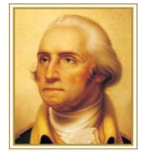
- Two basic models, derivatives exist
- Parallel activities do not see each others memory, data is exchanged via messages
- Parallel activities share the same memory view, data is exchanged via reads and writes into the shared space

Exchanging Data



MPI **OpenMP** **UPC**

Questionnaire



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