

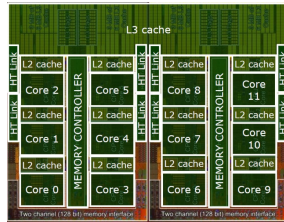
# Multicore and Empirical Research

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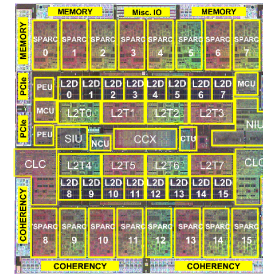
Institut für Programmstrukturen und Datenorganisation (IPD)  
Lehrstuhl für Programmiersysteme



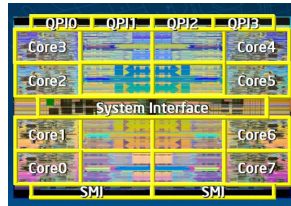
AMD Opteron **12** cores  
 ~1.8 Bill. T. on 2x3.46cm<sup>2</sup>



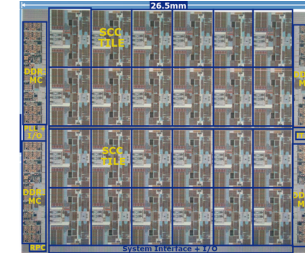
Sun Niagara3 **16** cores  
 ~1 Bill. T. on 3.7cm<sup>2</sup>



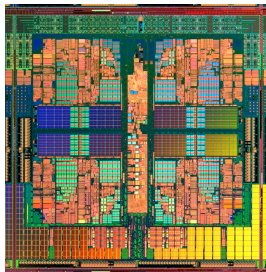
Intel **8** cores  
 ~2.3 Bill. T. on 6.8cm<sup>2</sup>



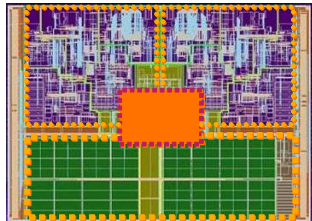
Intel SCC **48** cores  
 ~1.3 Bill. T. on 5.6 cm<sup>2</sup>



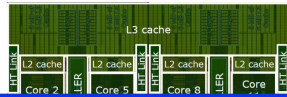
Intel **4** cores  
 ~582 Mio. T on 2.86cm<sup>2</sup>



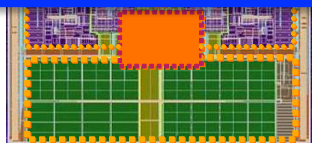
Intel **2** cores  
 ~167 Mio. T. on 1.1cm<sup>2</sup>



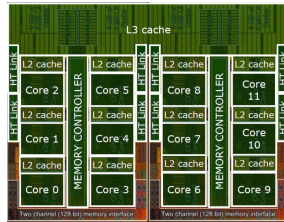
AMD Opteron 12 cores  
~1.8 Bill. T. on 2x3.46cm<sup>2</sup>



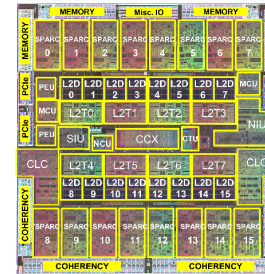
Sun Niagara3 16 cores  
~1 Bill. T. on 3.7cm<sup>2</sup>



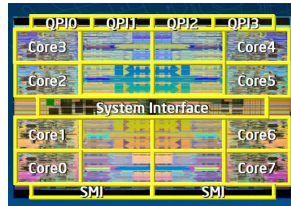
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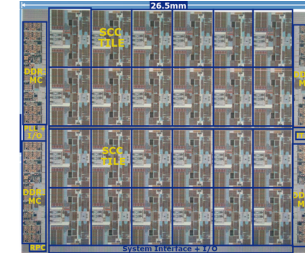
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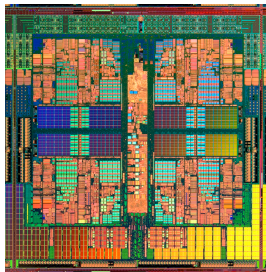
Intel **8** cores  
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Intel SCC **48** cores  
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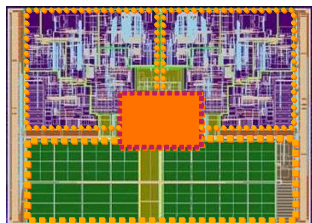


Intel **4** cores  
~582 Mio. T on 2.86cm<sup>2</sup>



# Software?

Intel **2** cores  
~167 Mio. T. on 1.1cm<sup>2</sup>



# Research Topics

- Multicore is ripe for method/tool development
- With Empirical evaluation in the loop
  - Re-engineering sequential applications (real ones)
  - Case studies on how parallelization works
  - Tools to clean up sequential programs for parallelization
  - Autotuning
  - New language constructs (with empirical eval.)
  - Memory models
  - Parallel testing and testing in parallel
    - Finding synchronization bugs and race conditions
- Don't even know the right questions to ask