The Green Graph500 List

- In close collaboration with Graph500 (same rules)
  - Will have a separate list and separate awards
  - http://green.graph500.org/
- Measurement techniques compatible with established practice and Green500
  - Allows comparisons and cross-analyses
  - Only real measurements, no TDP etc.
Single Node (small+efficient)

Multiple Nodes (large-very large)
A NATURAL SPLIT

- Small Data vs. Big Data
  - Fundamentally different categories
  - Often: single node vs. multiple nodes
    - Or: in cache vs. in memory?
    - Or: in registers???

- Graph500 doesn’t limit the “minimal submission” (yet)
  - Median of Graph500 scales
  - June 2013 list: Scale 31
## THE SMALL DATA LIST

<table>
<thead>
<tr>
<th>Rank</th>
<th>MTEPS/W</th>
<th>Site</th>
<th>Machine</th>
<th>G500 rank</th>
<th>Scale</th>
<th>GTEPS</th>
<th>Nodes</th>
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<td>1</td>
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<td>GraphCREST-Tegra</td>
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### The Big Data List

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<th>Nodes</th>
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The Future of the List

- Next list: Nov. 2013
  - Submission deadline: aligned with Graph500
- Submission details:
  - Through Graph500, provide output data and energy information, or power trace
- Watch [http://green.graph500.org/](http://green.graph500.org/)
- Support:
  - Thanks to David Bader, Andrew Lumsdaine, Richard Murphy, and Marc Snir
BACKUP
- Big Data analysis may dominate datacenter cost
- Encourage vendors to provide “greener” hardware

Why not just Green500?

- Green500 is centered around HPL
  - HPL: extremely structured, FP/Cache intensive
  - Graph500: unstructured, no good separators, (main) memory and network intensive

- Completely different optimization goals!
  - Need to be addressed by vendors!
  - Maybe specialized machines?

Source: S. Borkar, Hot Interconnects 2011, Keynote
REAL COMPARATIVE MEASUREMENTS

Panel Bcast

Scale=32

Idle (calibrate wait)

~75 kTEPS/W

452 MFLOPS/W

Time
REAL COMPARATIVE MEASUREMENTS

Power Draw (kW) vs Time

- Idle (calibrate wait)
- ~75 kTEPS/W
- 452 MFLOPS/W
- Panel Bcast
- Scale=32

HPL, Graph500, Stream, DGEMM

Torsten Hoefler