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With support of David Bader, Andrew Lumsdaine, Richard Murphy, and Marc Snir
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.
Received Submissions

- Single Node (small+efficient)
- GPU
- Smartphones
- GraphCREST Bulldozer (1 node)
- Multiple Nodes (large-very large)
- TSUBAME-KFC (32 nodes)
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
  - Nov. 2014 list: Scale 30 (unchanged)
## 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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<tr>
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<td>EBD-GoldenBox-Prototype</td>
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## The Big Data List

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

- **Next list: Jun. 2015**
  - 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/)
- **Thanks for Support:**
  - Thanks to David Bader, Andrew Lumsdaine, Richard Murphy, and Marc Snir
Backup
Motivation

- 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

Power Draw (kW)

Idle (calibrate wait) ~75 kTEPS/W 452 MFLOPS/W

Panel Bcast Scale=32

HPL
Graph500
Real Comparative Measurements

- Time
- Power Draw (kW)
- Panel Bcast
- Scale=32

- Idle (calibrate wait)
- ~75 kTEPS/W
- 452 MFLOPS/W