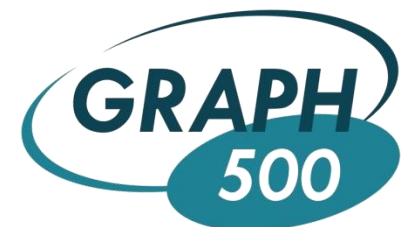




Torsten Hoefler
ETH Zürich
SC' 14, New Orleans, LA, USA

*With support of David Bader, Andrew Lumsdaine, Richard Murphy,
and Marc Snir*

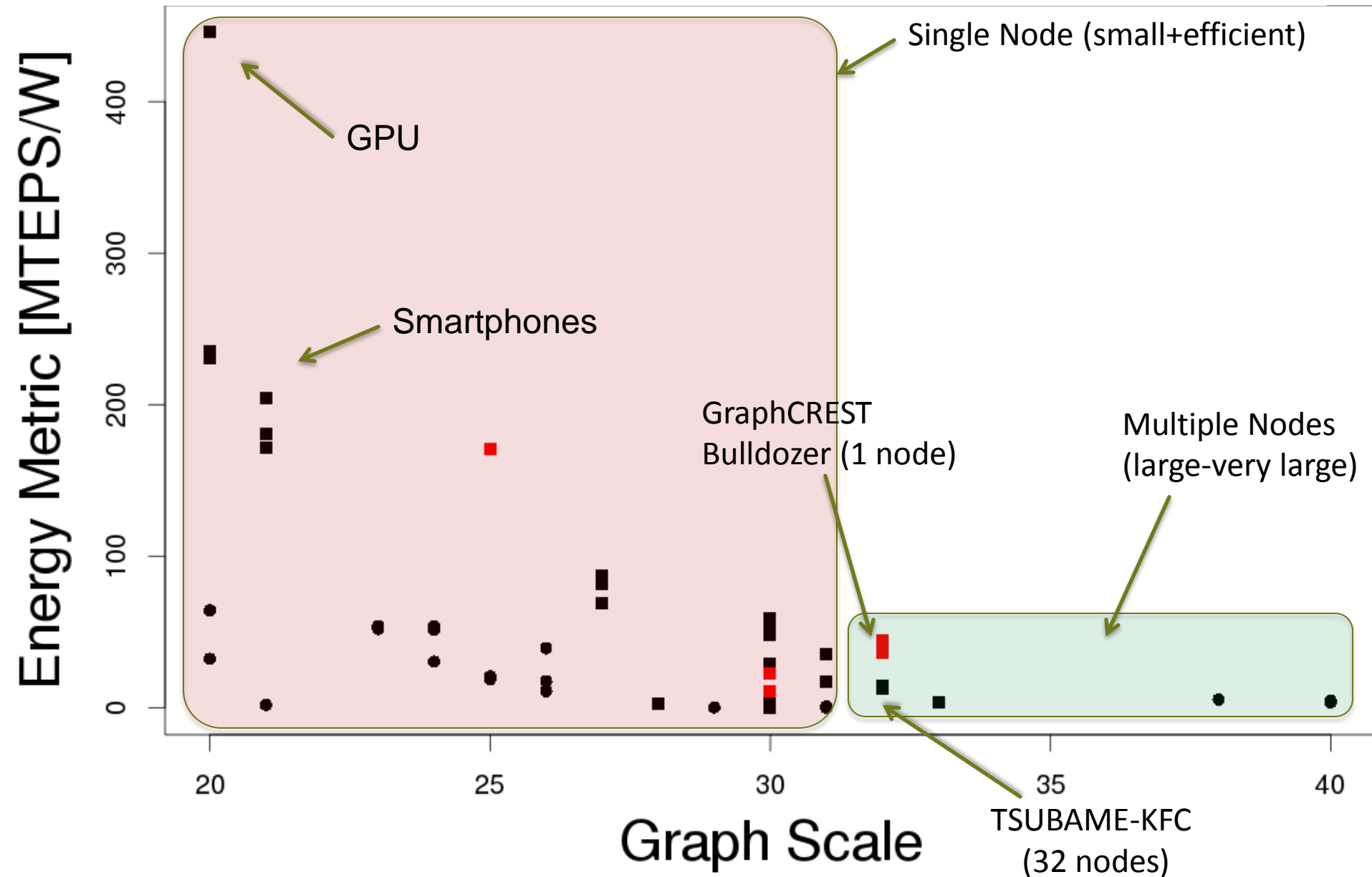


The Green Graph500 List

- **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.



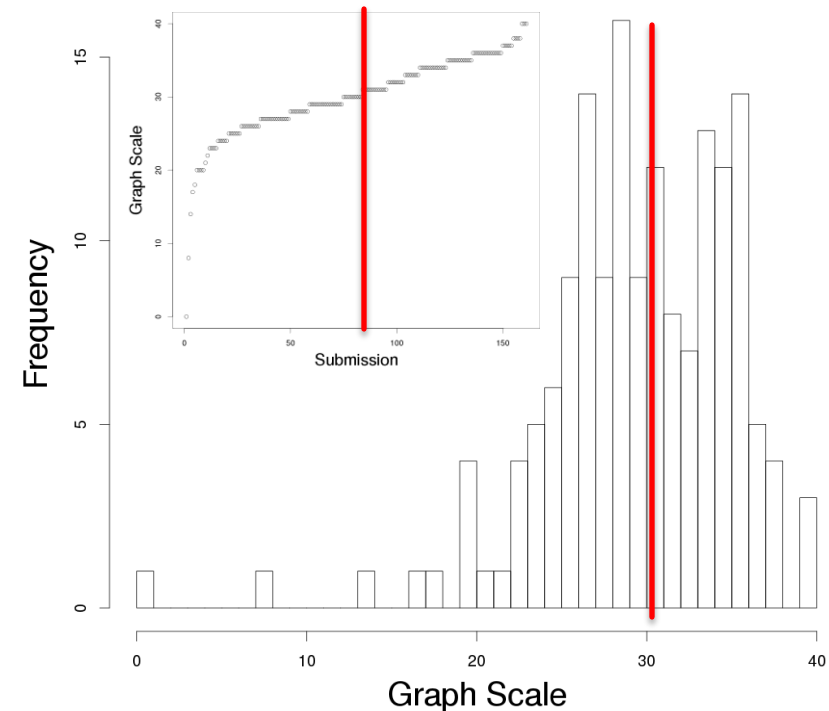
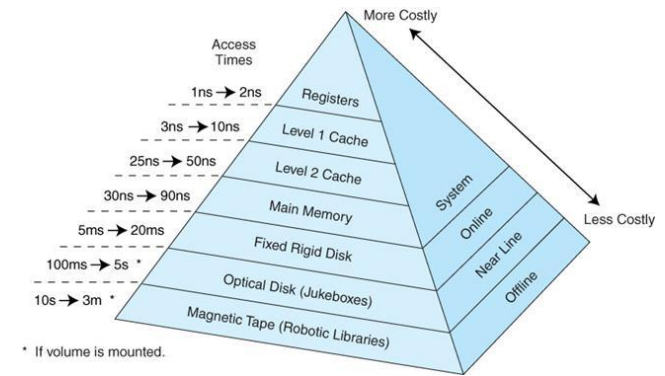
Received Submissions



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

Rank	MTEPS/W	Site	Machine	G500 rank	Scale	GTEPS	Nodes
<u>1</u>	445.92	George Washington University	Colonial		20	122.18	1
<u>2</u>	235.15	Kyushu University	GraphCREST-Xperia-Z1-SO-01F		20	1.03	1
<u>3</u>	230.40	Kyushu University	GraphCREST-Xperia-A-SO-04E		20	0.74	1
<u>4</u>	204.38	Tokyo Tech	EBD-GoldenBox-Prototype		21	1.64	1
<u>5</u>	180.76	Kyushu University	GraphCREST-Xperia-A-SO-04E		21	0.59	1
<u>6</u>	171.77	Kyushu University	GraphCREST-Xperia-Z1-SO-01F		21	0.91	1
<u>7</u>	170.64	University of Tsukuba	kitty6		25	35.18	1

The Big Data List

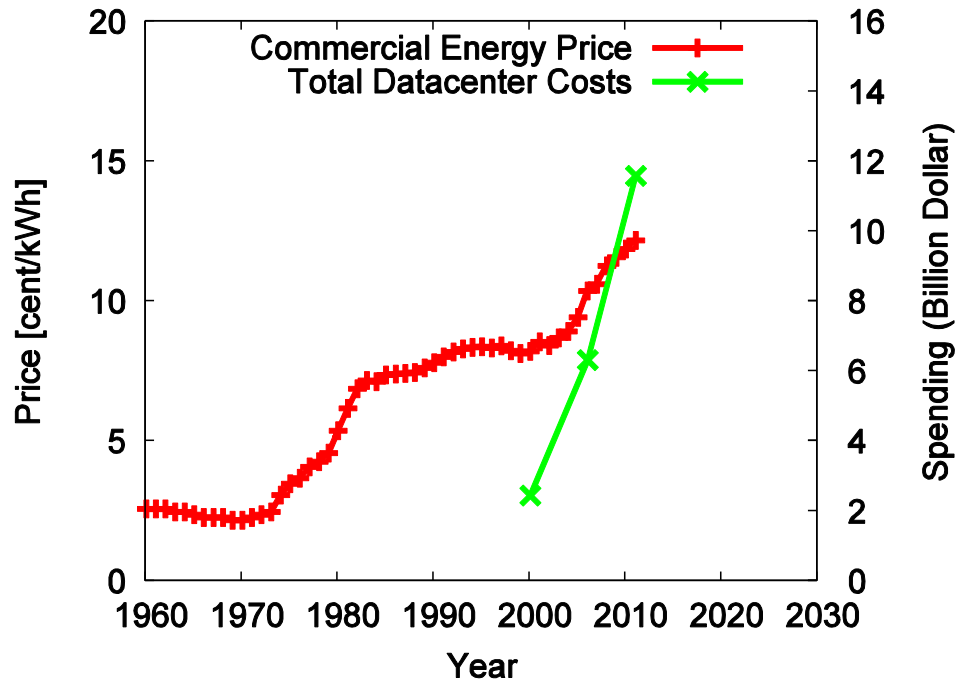
Rank	MTEPS/W	Site	Machine	G500 rank	Scale	GTEPS	Nodes
<u>1</u>	59.12	Kyushu University	GraphCREST-SandybridgeEP-2.4GHz		30	28.48	1
<u>2</u>	48.28	Kyushu University	GraphCREST-Sandybridge-EP-2.7GHz		30	31.95	1
<u>3</u>	44.42	Kyushu University	GraphCREST-Huawei		32	55.74	1
<u>4</u>	35.87	Tokyo Tech	GraphCREST-Custom #1		32	10.64	1
<u>5</u>	28.88	Tokyo Tech	MEM-CREST Node #2		30	7.98	1
<u>6</u>	22.36	University of British Columbia	Alkindi26-hybrid		30	10.31	1
<u>7</u>	17.24	Kyushu University	GraphCREST-Bulldozer		31	13.63	1

The Future of the List

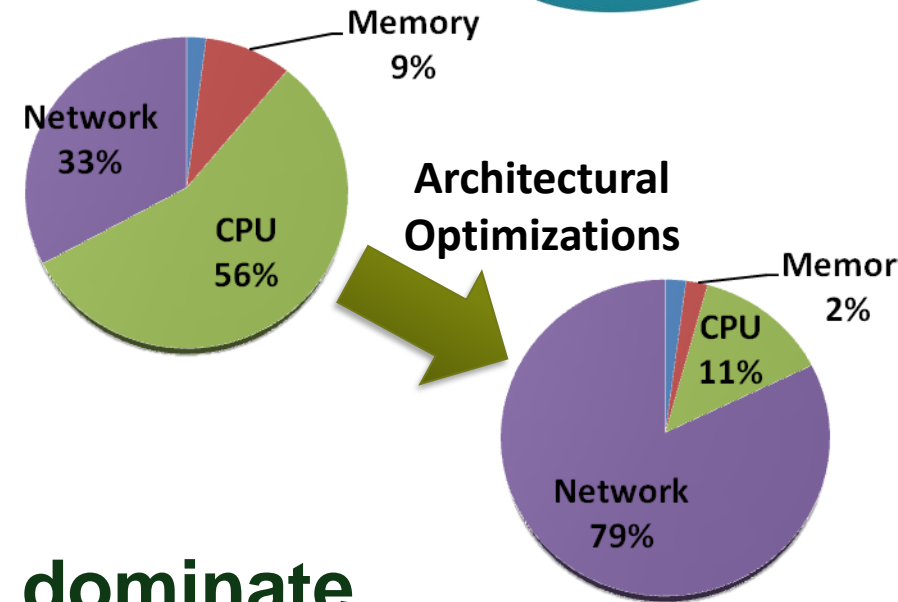
- **Next list: Jun. 2015**
 - Submission deadline: aligned with Graph500
- **Submission details:**
 - Through Graph500, provide output data and energy information, or power trace
- **Watch** <http://green.graph500.org/>
- **Thanks for Support:**
 - Thanks to David Bader, Andrew Lumsdaine, Richard Murphy, and Marc Snir

Backup

Motivation



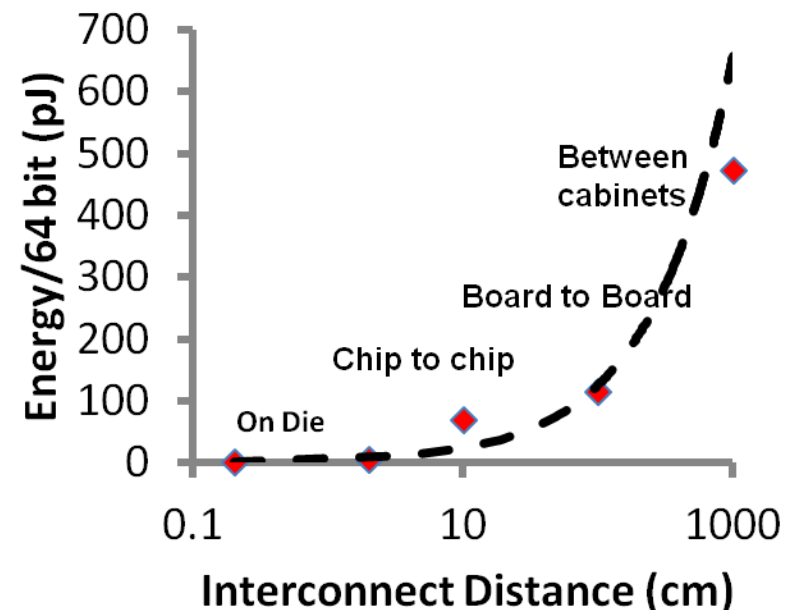
GRAPH 500



- **Big Data analysis may dominate datacenter cost**
 - Encourage vendors to provide “greener” hardware

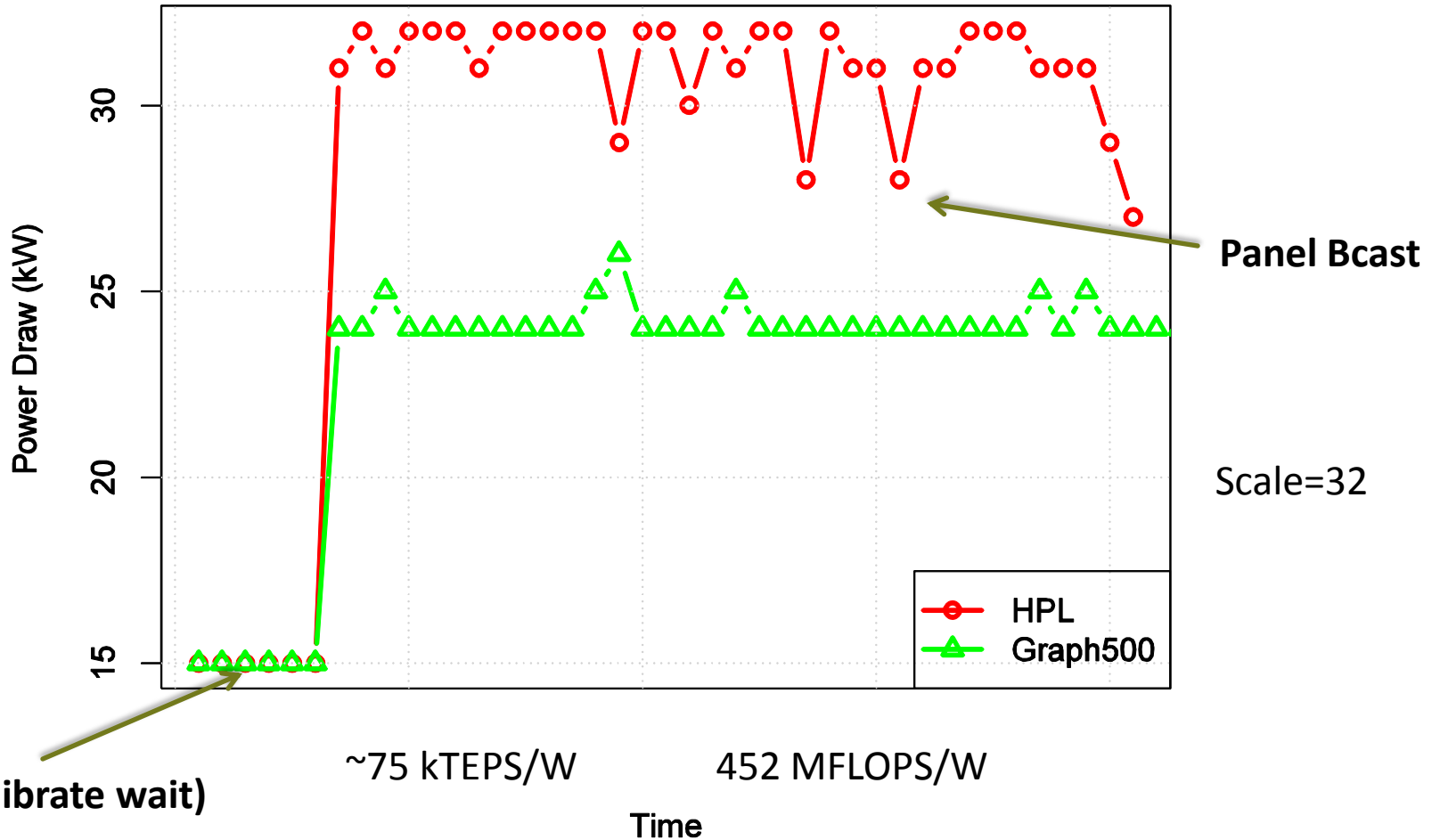
Why not just Green500?

- **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



Real Comparative Measurements

