Mice, Elephants, Turtles Dimes & Dollars HPC & Big Data

Marc Hamilton
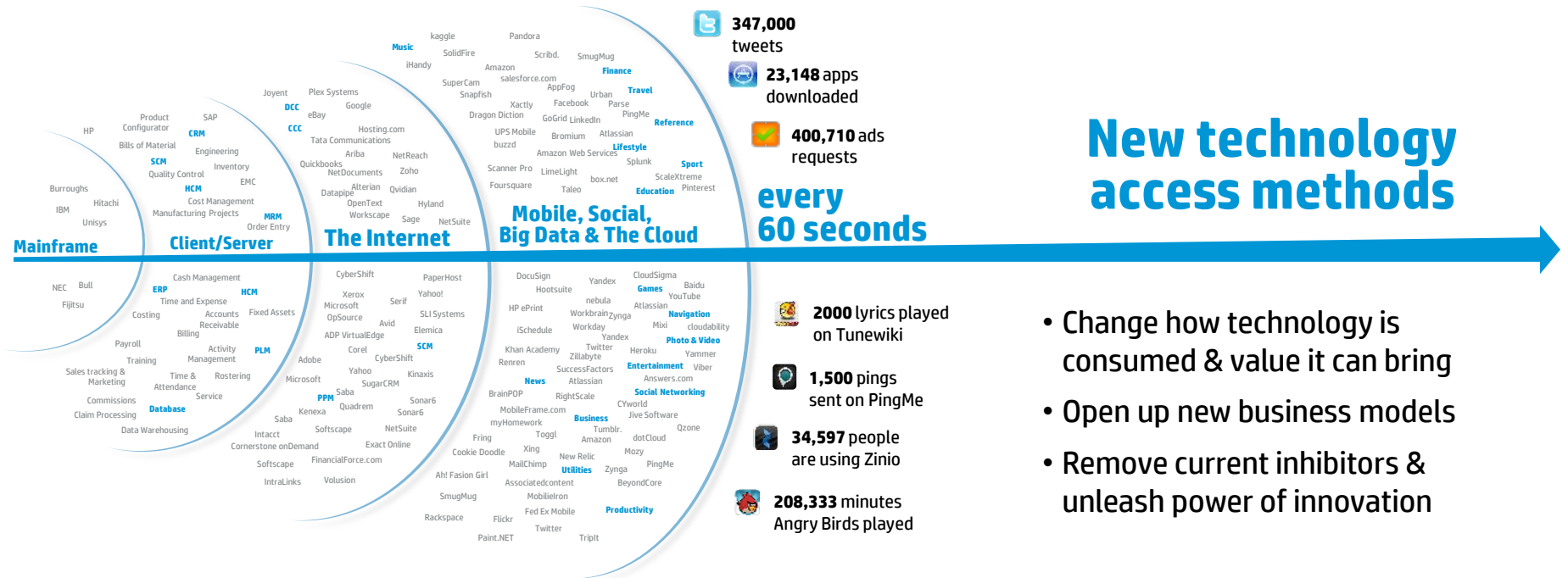
Hyperscale Business Unit

HP Enterprise Group

March, 2013

Big Data is Accelerating Innovation & Change

347,000 tweets

23,148 apps downloaded

400,710 ads requests

every 60 seconds

Mainframe

HP
Burroughs
IBM Hitachi
Unisys
NEC Bull
Fijitsu

Client/Server

Product Configurator
Bills of Material
SAP
SCM
CRM
Engineering
Quality Control
HCM
Cost Management
Manufacturing Projects
Inventory
EMC
MRM
Order Entry

Cash Management
ERP
Time and Expense
Costing
Accounts Receivable
Billing
HCM
Fixed Assets
Payroll
Training
Activity Management
PLM
Sales tracking & Marketing
Time & Attendance
Rostering
Service
Commissions
PPM
Claim Processing
Database
Data Warehousing
Intacct
Cornerstone onDemand
Softscape
FinancialForce.com
IntraLinks

Joyent
Plex Systems
DCC
eBay
Google
CCC
Tata Communications
Quickbooks Ariba
NetDocuments
Datapipe
OpenText
Workscape Sage
Alterian Qvidian
Hyland
NetSuite

The Internet

Music
kaggle
iHandy
SolidFire
SuperCam
Snapfish
Hosting.com
NetReach
Zoho

CyberShift
Xerox
Microsoft
OpSource
ADP VirtualEdge
Corel
Adobe
Yahoo
Microsoft
Saba
Kenexa
Saba
Quadrem
Fring
Cookie Doodle
Ah! Fasion Girl
SmugMug
Rackspace
PaperHost
Yahoo!
Serif
Avid
CyberShift
SCM
Kinaxis
SugarCRM
Sonar6
Quadrem Sonar6
NetSuite
Exact Online
New Relic
MailChimp
Associatedcontent
Mobileiron
Fed Ex Mobile
Flickr
Paint.NET
Volusion
FinancialForce.com
SLI Systems
Elemica

Mobile, Social, Big Data & The Cloud

Pandora
Scribd.
SmugMug
Amazon
salesforce.com
Finance
AppFog
Urban
Parse
Travel
PingMe
Xactly
Facebook
Dragon Diction
GoGrid LinkedIn
Reference
UPS Mobile
buzzd
Bromium
Atlassian
Lifestyle
Amazon Web Services
Splunk
Sport
Scanner Pro
LimeLight
box.net
ScaleXtreme
Foursquare
Taleo
Pinterest
Education

DocuSign
Yandex
CloudSigma
Hootsuite
nebula
Baidu
HP ePrint
Workbrain Zynga
YouTube
iSchedule
Workday
Atlassian
Mixi
cloudability
Khan Academy
Yandex
Twitter
Renren
Zillabyte
Heroku
Photo & Video
News
SuccessFactors
Entertainment
Viber
BrainPOP
Atlassian
Yammer
MobileFrame.com
RightScale
Answers.com
myHomework
Jive Software
Qzone
Toggl
Business
Tumblr.
dotCloud
Xing
Amazon
Mozy
New Relic
PingMe
Zynga
Utilities
BeyondCore
Fed Ex Mobile
Productivity
Twitter
TripIt
Games
YouTube
Navigation
Social Networking
CYworld

2000 lyrics played on Tunewiki

1,500 pings sent on PingMe

34,597 people are using Zinio

208,333 minutes Angry Birds played

New technology access methods

- Change how technology is consumed & value it can bring
- Open up new business models
- Remove current inhibitors & unleash power of innovation

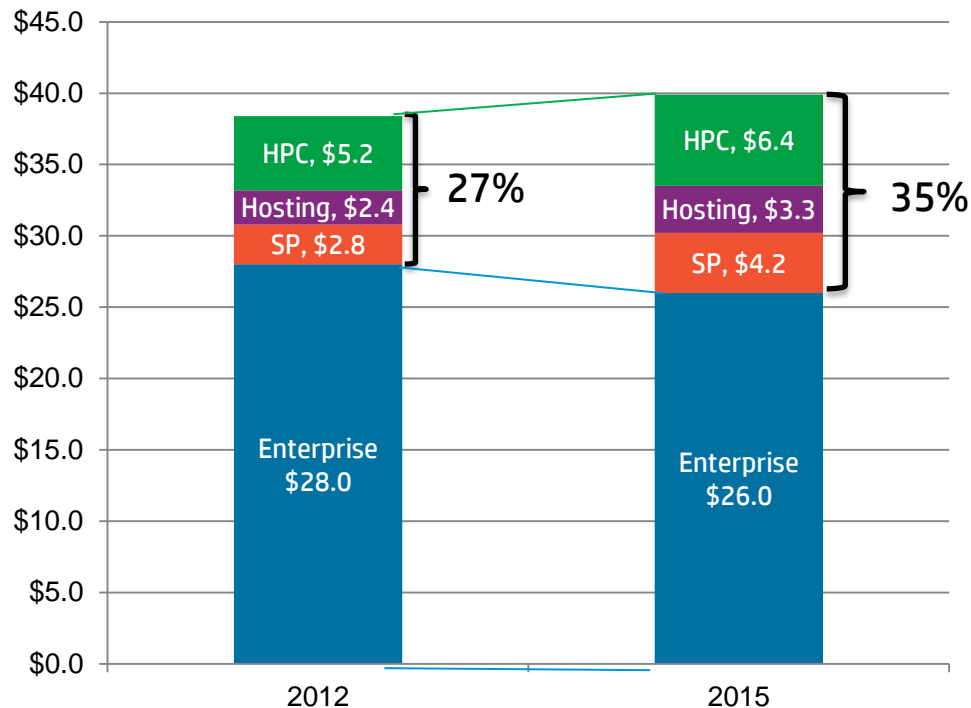# Anywhere, anytime demand increases opportunities

Hyperscale workloads growing significantly faster than overall market

Hyperscale to be 35% of x86 market

Customer demand for content
Device proliferation
Competitive edge
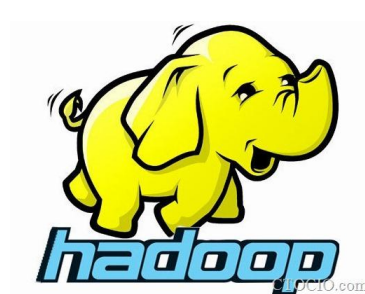
Driving the need for new and purpose built products!

Mice, Elephants, and Turtles

Mice and Elephants

- **The elephant in the room**

- **Not all big data comes from mouse clicks**

- **Hadoop becoming ubiquitous – good or bad?**
  - **Is storing 3 full copies of data really efficient or just easy?**
  - **Are Hadoop management tools ready for the enterprise?**

Breaking The Application Triangle

- **As more and more data is stored in HDFS, disruptive innovation becomes difficult – you can't break the APIs**
- **So how can you drive disruptive innovation?**

Users select widely available platforms to solve their business problems

Vendors pursue sustaining innovation of 2-socket x86 systems for Hadoop
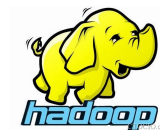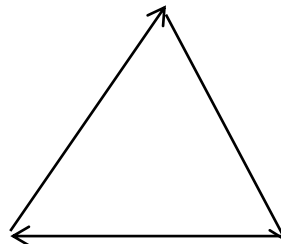
Hadoop originally ran on commonly available 2-socket x86 systems

SSDs are Turtles

- **SSDs usage with Hadoop growing**

- **Disk protocols too slow for SSD/Flash**

- **Better hardware is available (PCIeGen3, etc.)**

- **Flash nearing end of life just in time for new NVRAM**

- **Now its time to address the software bottlenecks**

- **HDFS on top, but what's inside?**

HP Insight Cluster Management Utility
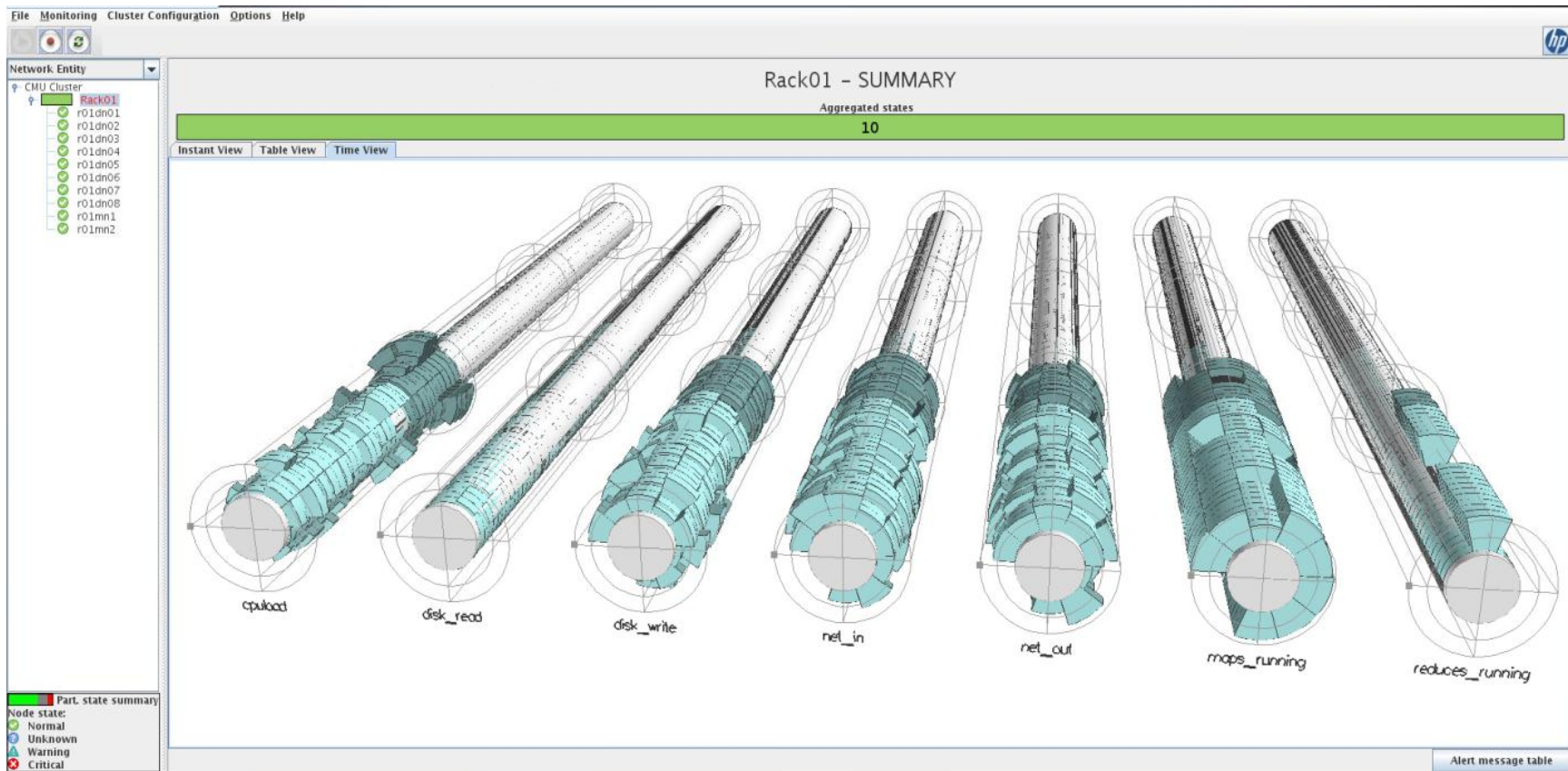
Dimes and Dollars

Dimes and Dollars

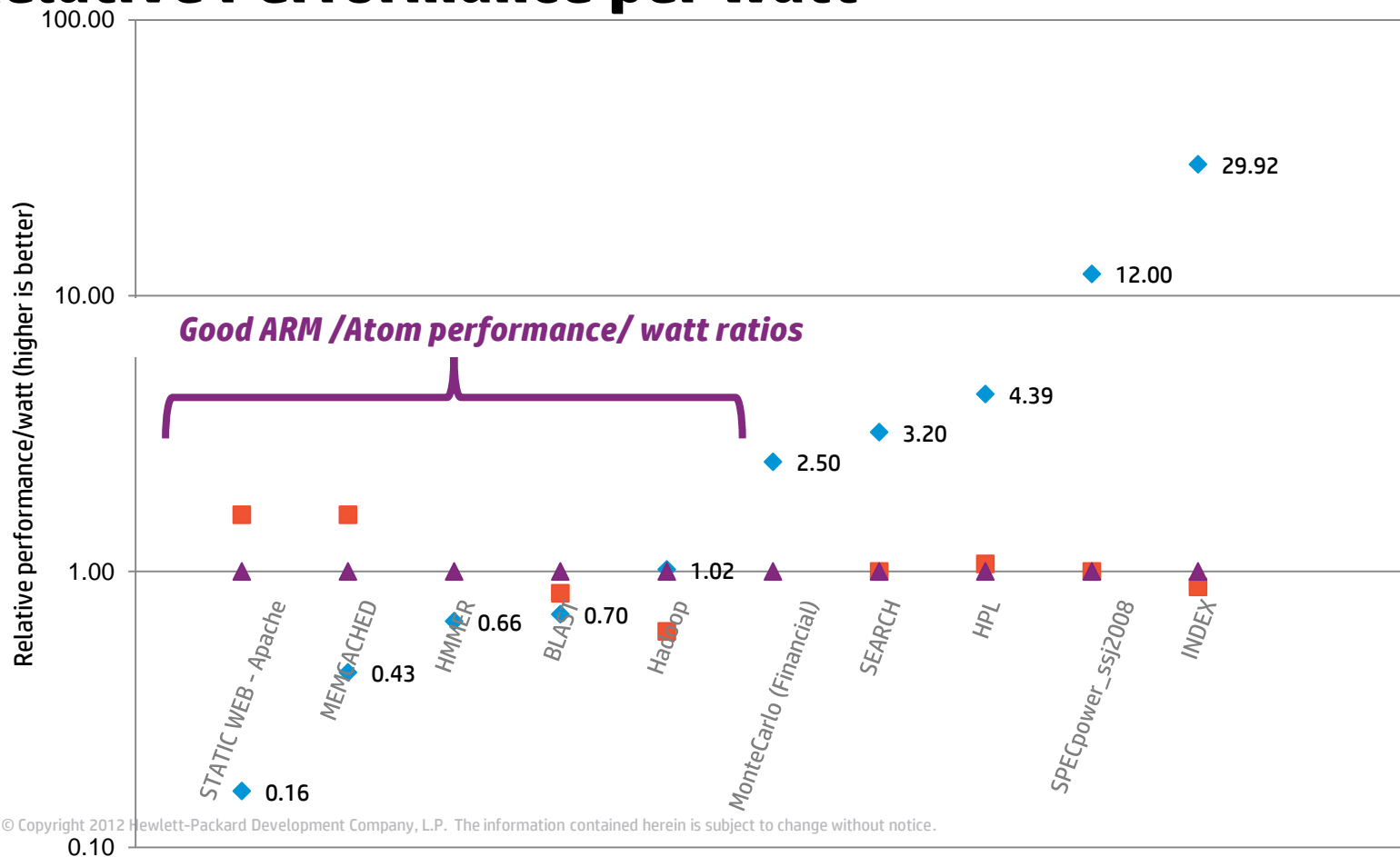Are HPC compute nodes getting too powerful for big data use?

- **Relative performance of mobile procesors increasing quicker than server processors**

- **Typical HPC compute node today, 300 watts, $300/year power**

- **Nvidia Tegra 5 mobile processor will be the size of a dime, run CUDA and OpenGL apps**
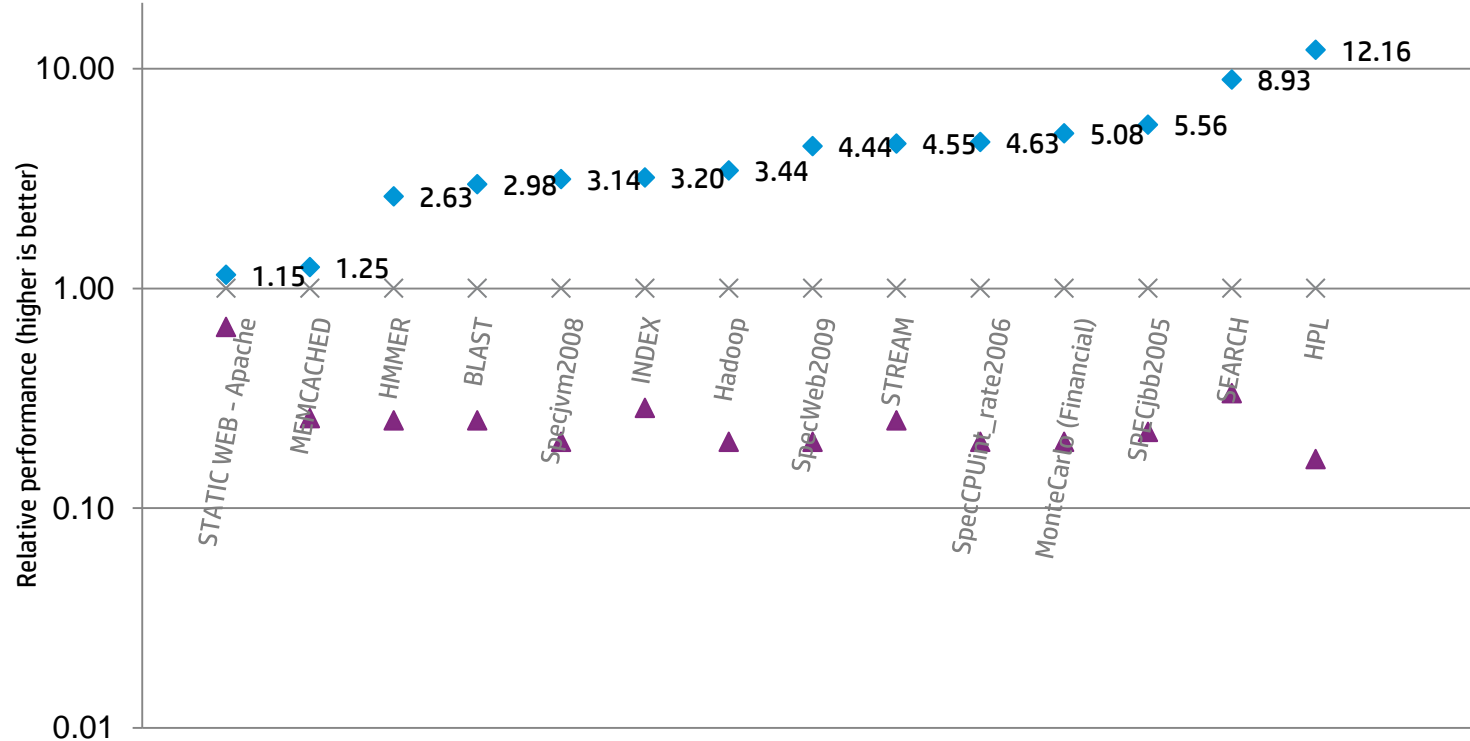
- **60 5-watt mobile processors = $300/year power**

Relative Performance
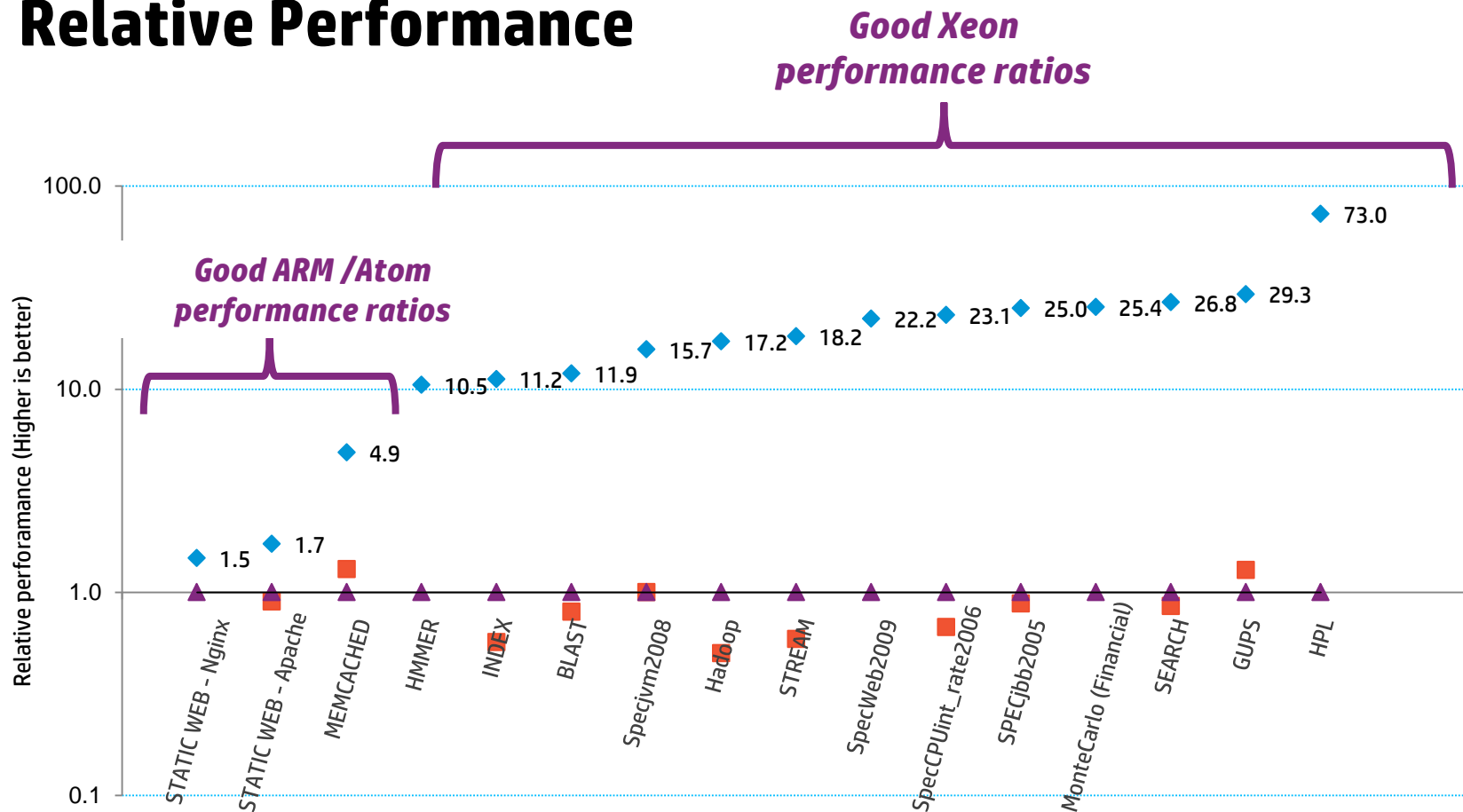
Relative Performance per Watt

Relative performance/watt (higher is better)

Good ARM /Atom performance/ watt ratios

- 100.00
- 10.00
- 1.00
- 0.10

29.92

12.00

4.39

3.20

2.50

1.02

0.66

0.70

0.43

0.16

STATIC WEB – Apache
MEMCACHED
HMMER
BLAST
Hadoop
MonteCarlo (Financial)
SEARCH
HPL
SPECpower_ssj2008
INDEX

2H'13 HP Projections: big leap in mobile performance

Relative performance (higher is better)

- STATIC WEB – Apache: 1.15
- MEMCACHED: 1.25
- HMMER: 2.63
- BLAST: 2.98
- SPECjvm2008: 3.14
- INDEX: 3.20
- Hadoop: 3.44
- SpecWeb2009: 4.44
- STREAM: 4.55
- SpecCPUint_rate2006: 4.63
- MonteCarlo (Financial): 5.08
- SPECjbb2005: 5.56
- SEARCH: 8.93
- HPL: 12.16

HP Project Moonshot

Project Moonshot: A new era of extreme scale computing

Redefining server infrastructure for rapid application optimization

Application-driven designs

Space

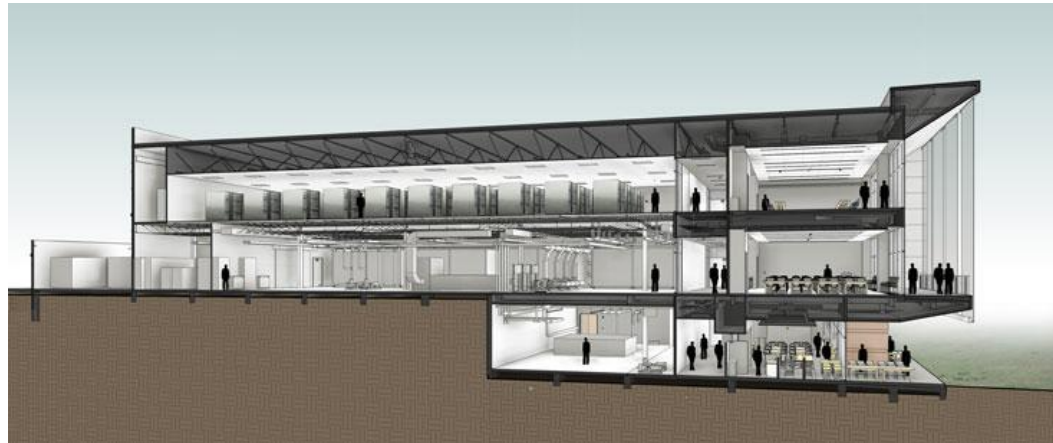**Energy**

Costs
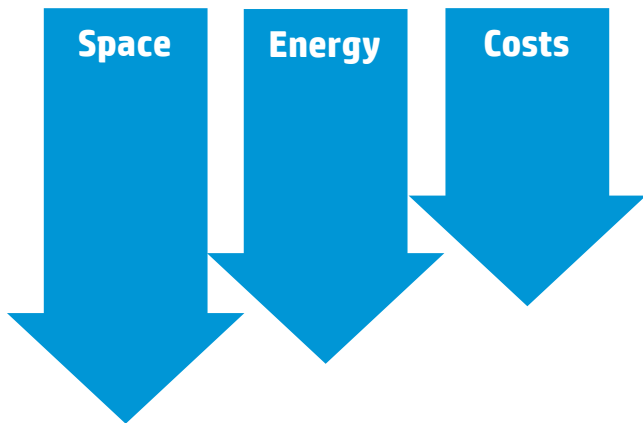
Project Moonshot

- **1,000s of servers per rack**
- Workload - tuned servers
- **Federated infrastructure** scales seamlessly with additional servers

Device agnostic architecture scales from extreme low energy CPUs to high performance GPGPUs

Supercomputers That Reuse Energy?

DOE's National Renewable Energy Lab purchases $10M HP Supercomputer

- **New ProLiant server platform will delivery 1 Pflop of Intel IvyBridge and Xeon Phi**
- **http://www.nrel.gov/news/press/2012/1985.html**
- **Power and warm water cooling system co-designed to work with NREL's new $100M Energy Systems Integration Facility (pictured below)**
- **Waste heat used to heat office space & melt snow in winter**

National Renewable Energy Lab

200 TF Linpack – Feb 27, 2013

Expanding the purpose-built portfolio for big data

High-end nodes

ProLiant SL Core

Customer specific

SL270 SL250 SL230

Accelerators

Big Data

High-efficiency computing

SL2500

Solutions

Thank you