

Grid for Financial Services

OpenGridForum, Cambridge, Massachusetts USA
27 February, 2008

Lee Fisher

HP Worldwide FSI-HPC
Solutions & Alliances



"Time is Money" ad in WSJ:

THE WALL STREET JOURNAL.

♦ ♦ ♦ ♦

Saturday/Sunday, February 23 - 24, 2008

When milliseconds matter, two seconds are worth a fortune.

On Feb. 7 at 12:00 GMT, the Bank of England reduced its key interest rate to 5.25% from 5.5%, a decision which sent the FTSE 100 Index down 25 points within seconds of the announcement. The news caused Sterling to rise, while Short Sterling and Gilts fell. The FTSE fell 128 points, or 2.2%, within 90 minutes.

Dow Jones customers received the news two seconds ahead of Reuters and four seconds ahead of Bloomberg.

To traders – especially algorithmic traders – that time differential was a huge competitive advantage.

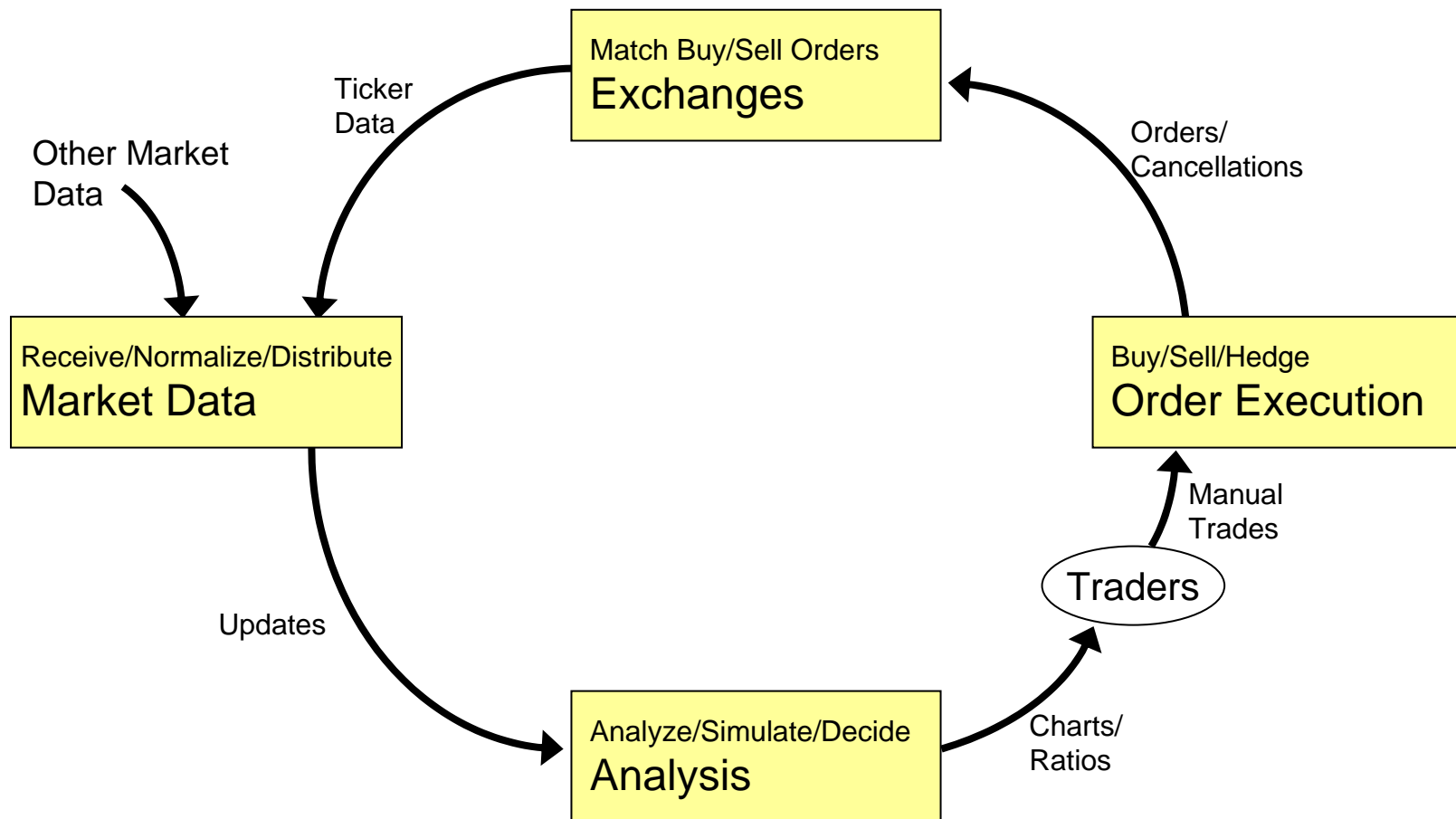
Put speed and flexibility on your side. To discuss the benefits your organization can gain with the Dow Jones suite of algorithmic trading products, call 877-339-0352 or email us now at algo@dowjones.com.



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DOWJONES

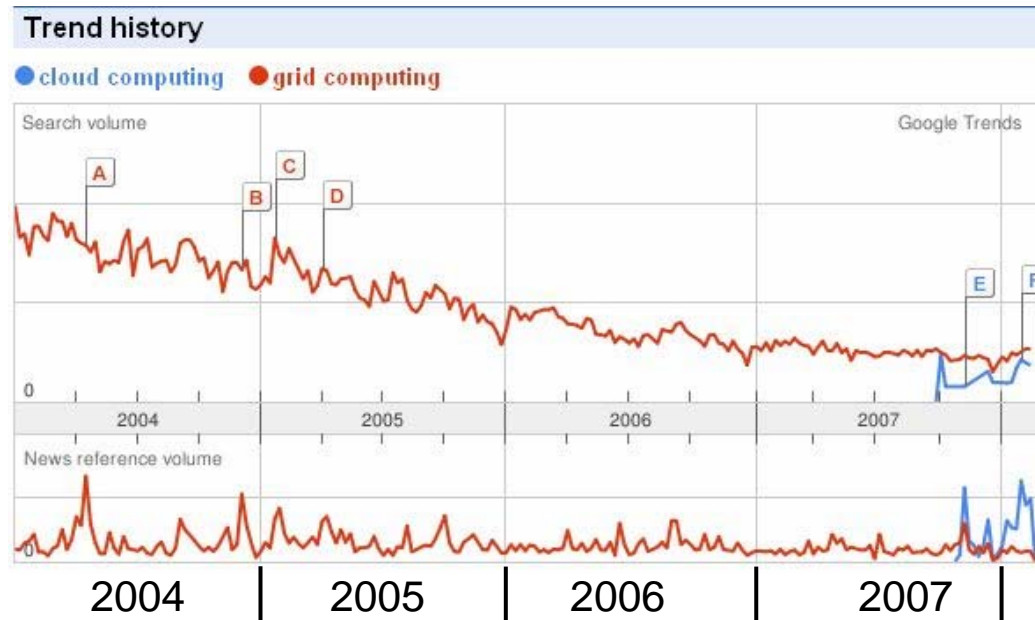
FSI-HPC Challenge in Capital Markets – faster is never fast enough!



HP's Grid Strategy

- **Develop mission critical HPC platforms for customer grids**
 - c-Class BladeSystem for improved power, cooling, management
 - Engineered Systems for ideal configuration & faster deployment
 - HP middleware (e.g. CMU) for efficient provisioning & monitoring
- **Work best w/ Independent Software & Hardware Partners**
 - Test/validate Grid middleware on HP – Platform, DataSynapse
 - Choice of accelerators certified on HP for speed boost
- **Drive technology through HP Labs and HPC Engineering**
 - Build expertise around low-latency InfiniBand and 10GbE
 - Data center smart cooling, Converged fabrics, Services delivery
- **Offer Flexible Compute Service**
 - Capacity on demand with flexible pricing to match business need

New words; same challenges



What is the business model, the delivery model, the security model?

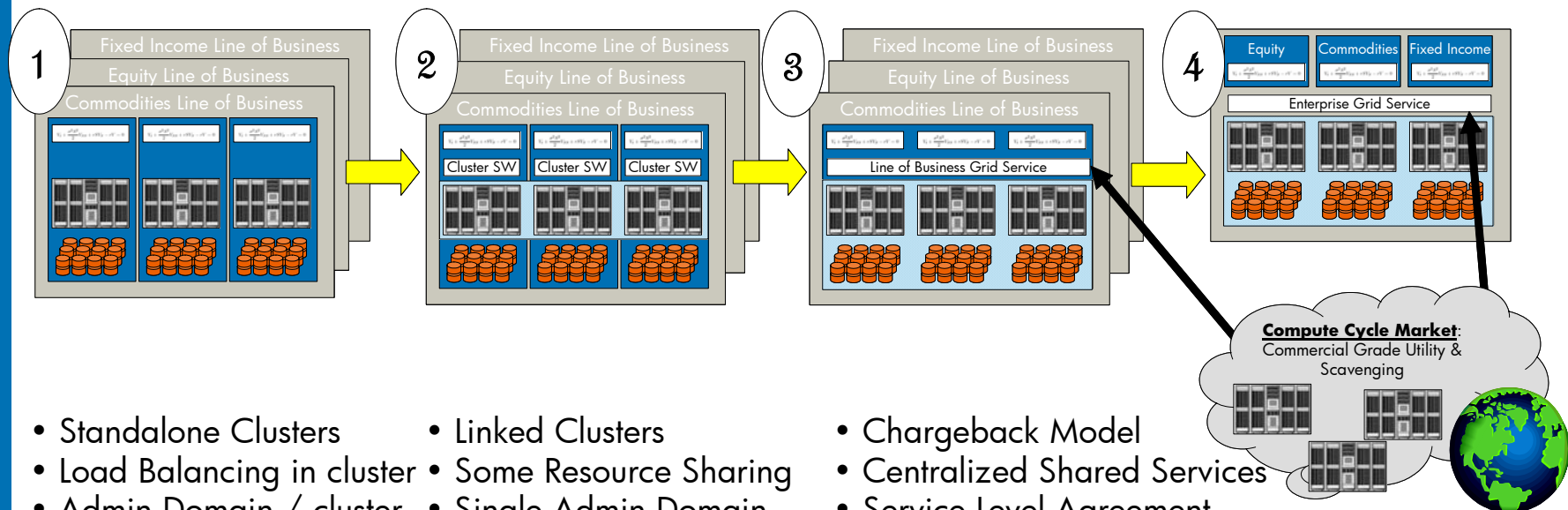
What is the performance impact?

What are the people and process issues?

Grid/HPC for Financial Services


1. Develop mission critical HPC platforms for customer grids
2. Work best with Independent Software & Hardware Partners
3. Drive technology through HP Labs and HPC Engineering
4. Offer Flexible Compute Service

Grid evolves towards Next Generation Data Center



- Standalone Clusters
- Load Balancing in cluster
- Admin Domain / cluster
- Security domain / cluster
- Fault Tolerant
- Disaster Recovery
- Linked Clusters
- Some Resource Sharing
- Single Admin Domain
- Multiple security domains
- Chargeback Model
- Centralized Shared Services
- Service Level Agreement
- Federated Security
- Meta-Scheduler
- Time Zones
- Administrative Hierarchy
- Security Policy

Power, Space & Cooling

- C-class blades 
 - HP Thermal Logic
 - Parallel Redundant Scaleable Cooling Architecture
- HP Modular Cooling System
- Dynamic Smart Cooling Service
 - Up to 40% power savings
 - Liebert & STULZ

From rack-mount to blade



Example configuration:
256-node cluster
w/ InfiniBand

BladeSystem Advantage

| | |
|------------------------|-------------------------|
| <u>Power:</u> | 32% saving |
| <u>Floor space:</u> | from 8 racks to 5 racks |
| <u>Network cables:</u> | up to 78% less |

And excellent manageability!

16 September
2007

5



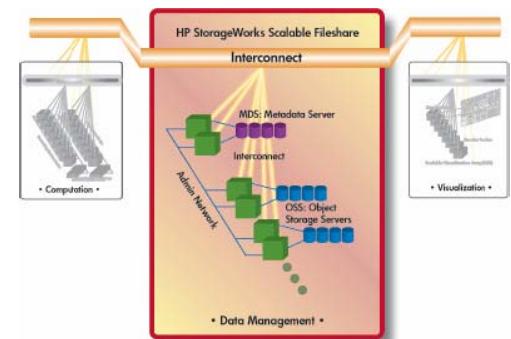
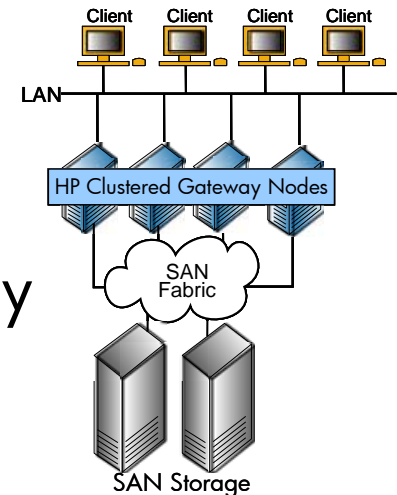
New metric for IT procurement: messages/watt

HP Grid Infrastructure Management

- BladeSystems management tools
 - On-Board Administrator for enclosure management
 - Insight Control to provision, manage, recover blades
- HP's CMU Cluster Management Utility
 - Scalable cluster management for Linux
- Standard operating system & open source tools
- Emerging option: WindowsCCS

Scaleable Data Management

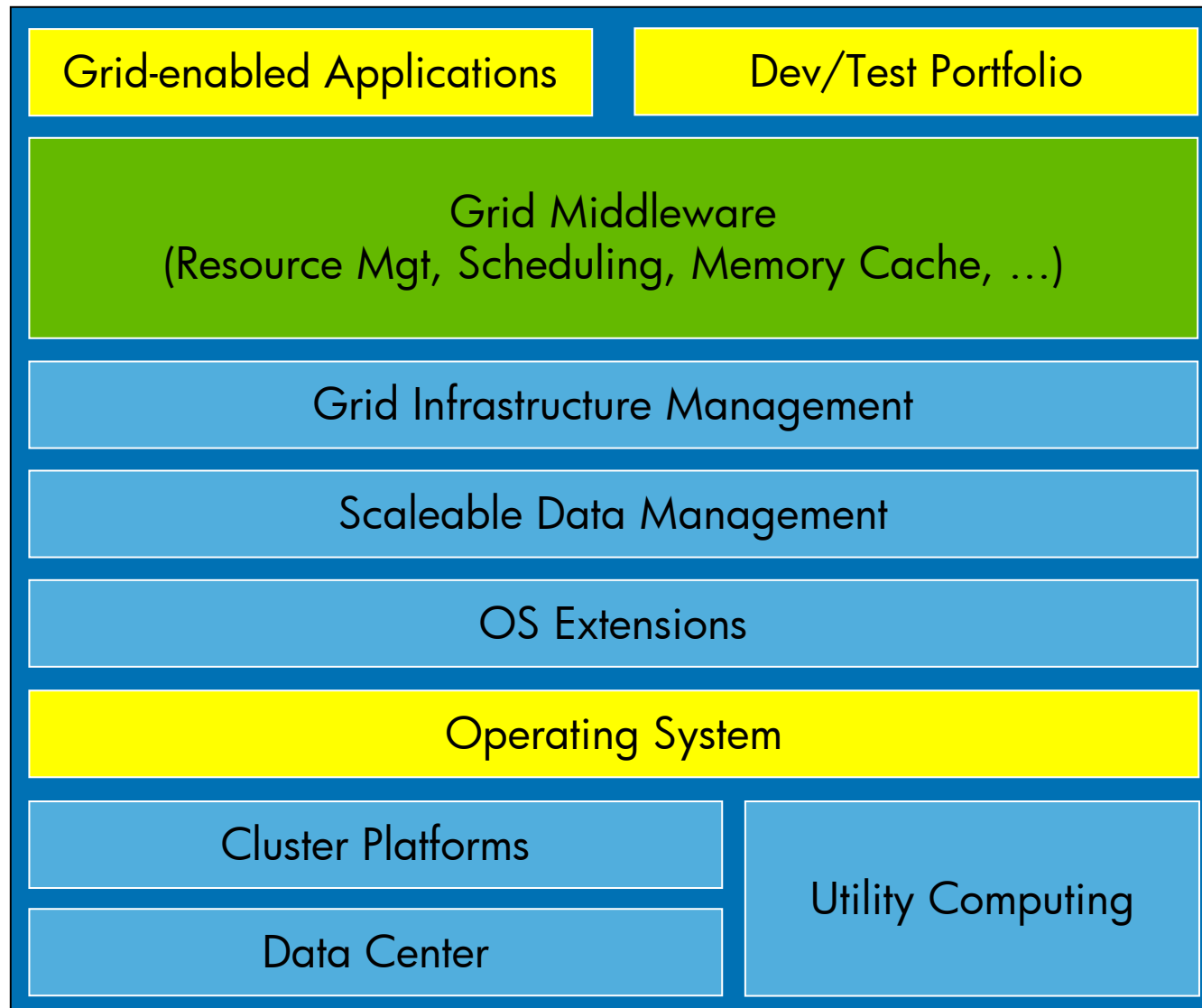
- High Speed File Systems
 - Scalable File Share (Lustre)
 - Enterprise File Services - Clustered Gateway
- Shared Cache Products
 - Tangosol
 - Gemstone
 - Gigaspace
- High performance File System cache
 - HP Labs



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Grid Technology Stack for Financial Services



4.2 Management Host Installation

The install procedure for the management host is the same as for the master host (see [Section 4.1](#)). A host with a management role should be set up as a management host and will need access to a shared directory, which contains system files. These files should be accessible to all management hosts. When setting up a management host more setup steps are required, as described in the Install Management Host section in *Installing a Single-Host Cluster on Linux* [6] and *Planning and Installing Your Cluster on Linux* [7].

If multiple management hosts are not needed and no shared directory is required a host can be defined to be a management host by editing the

`/opt/ego/kernel/conf/ego.cluster.HPC`

Before making typhon16 a manager

Begin Host

HOSTNAME model type rlm mem swp RESOURCES #Keywords

typhon16 ! ! - - - (linux)

3.5 1 2 (linux)

3.5 1 2 (nt)

Example: HP QuickStart Guide
for Platform/Symphony

g typhon16 a management host:

Begin Host

HOSTNAME model type rlm mem swp RESOURCES #Keywords

typhon16 ! ! - - - (linux mgghost)

#lemon PC200 LINUX86 3.5 1 2 (linux)

#plum ! NTX86 3.5 1 2 (nt)

End Host

Example Financial Service Partners using Grid Technology

- **Algorithmics**: provider of enterprise risk management software
- **Calypso Technology Inc.**: integrated processing solutions for financial institutions
- **Reuters** (Kondor Risk Management)
- **Murex**
- **Microsoft** (Excel)
- **MathWorks** (MATLAB)
- **Interactive SuperComputing** (Star-P)
- **Sierra** (GL Trade/FNX)
- **Misys** (Summit)
- **MoSes** (Tillinghast)
- **Adaptiv** (Sungard)
- **Profit** (Sungard)
- Many batch components can be scheduled using grid software with minimal or no change

HP Hardware Accelerator Program

- GPGPUs, FPGAs & acceleration cards promise tremendous speed & density at low power consumption
- The reality is more complicated
 - Programming them is hard
 - Best for selected calculations
 - A niche, not a panacea
- HP strategy: enable accelerator choices in standard servers
 - Test goals – power/cooling? BIOS? Software? Validate claims
 - We expect accelerators to be adopted in niche applications
 - general purpose computers to do most of the work for the foreseeable future

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HP Leadership in Latency Benchmarking

See HP Reports at:
www.STACresearch.com/hp

HP Contact:

Anne Ambrose

WW Director Brokerage
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HP SPONSORS INNOVATION AT STAC LAB

Wednesday, 31 October 2007

Company joins STAC Benchmark Council, leverages lab for latency mitigation program

NEW YORK - 31 October 2007 - The Securities Technology Analysis Center (STAC) today announced that HP has become the first official Innovation Sponsor for the Manhattan-based STAC Lab.

The STAC Lab is a research facility where end-user firms can try out new technologies under simulated trading conditions. It contains advanced load-generation mechanisms, precise timing equipment, market data, and test tools pre-integrated with many of the products to be tested.

As an Innovation Sponsor, HP has provided the lab with its latest BladeSystem c-Class servers, InfiniBand and Gigabit Ethernet networking, and HP StorageWorks technology. HP will, in turn, use the lab as the cornerstone of its own Latency Mitigation Program for market data, analytics, and execution.

HP's multi-year commitment to the STAC Lab will enable customers and partners to design high-performance solutions using HP products and to test those solutions using official STAC Benchmarks. STAC has added the c-Class servers and other HP products to its "Racked-and-STAC'd" list, the inventory of hardware and software products with which STAC has optimization experience and which are ready for customer projects.

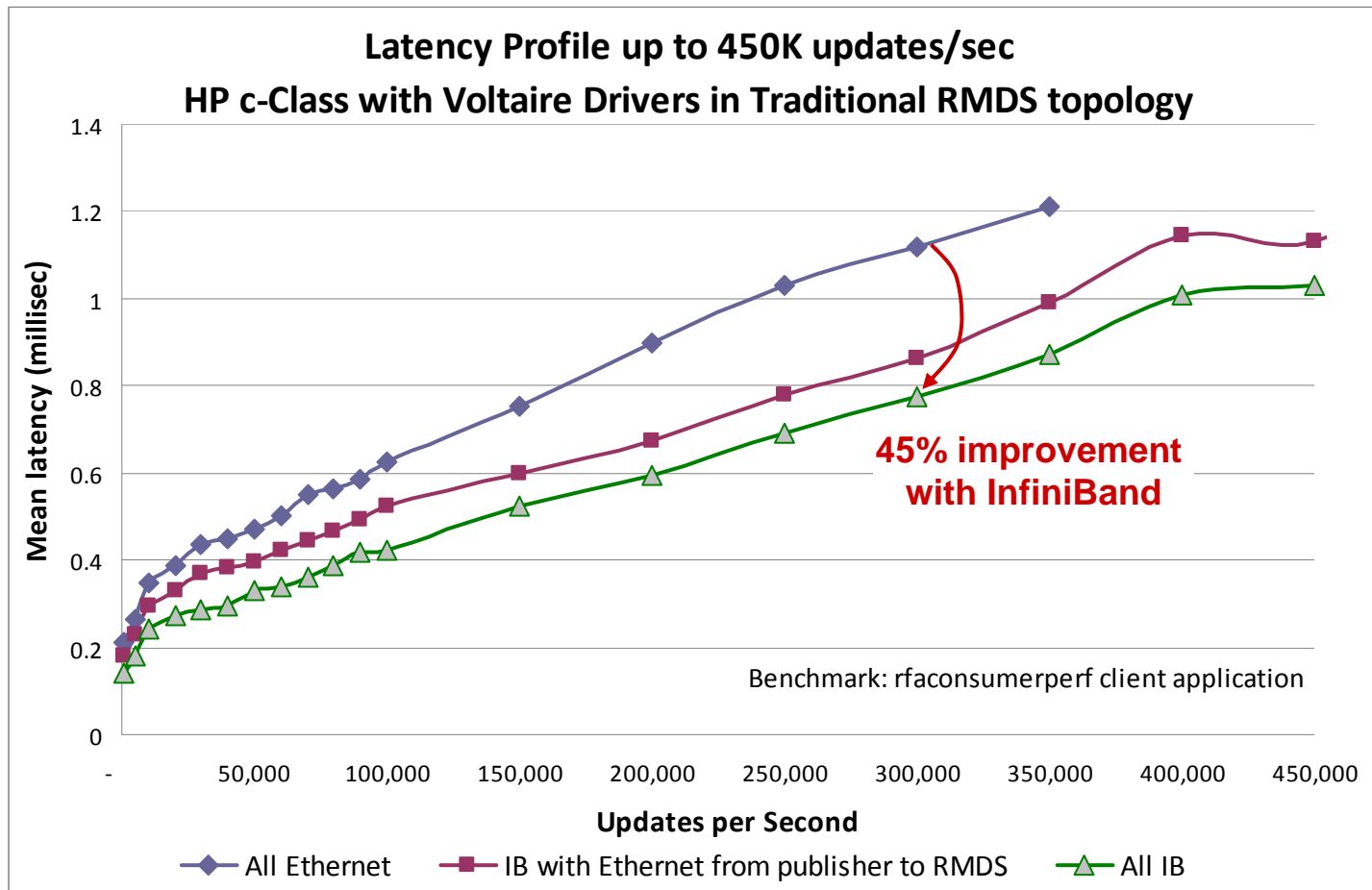
HP has also joined the STAC Benchmark Council and will contribute to specifications under consideration by its participating trading firms. The Council is a group of trading firms and vendors who are defining industry-standard ways of measuring latency, capacity, power efficiency, and other key performance attributes of solutions used in the trading process. Announced on Sept. 17, 2007, the Council includes a number of global trading firms such as Citigroup, JP Morgan Chase, and HSBC as well as vendors such as Intel.

Peter Lankford, Director of STAC, said: "Trading firms around the world use HP products extensively for the most demanding workloads. We are delighted that HP is supporting the STAC movement as an Innovation Sponsor, and we look forward to helping the industry take advantage of HP products to reduce latency."

"HP is pleased to engage with STAC to make the latest technologies such as HP BladeSystem c-Class servers available for securities industry customers to reduce latency in the trading environment," said Simon Freeman, worldwide director of financial markets, Financial Services Industries, HP. "HP is a leader in technology innovation for trading and market data, and we support industry efforts to establish standards for measuring the speed and performance of market data, analytics, and execution."

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Benchmarked: IB delivers on the low-latency capability of RMDS v6



Source: www.STACresearch.com/hp
November, 2007
Message size: 74 bytes (RWF)

At 300K updates, IB for RMDS reduces latency by 30%
and an all-IB infrastructure reduces latency by 45%

High-Performance Ethernet-Based Communications for Future Multi-Core Processors

Michael Schlansker, Erwin Oertli[†], Richard J. Carter , Jayaram Mudigonda,
Nathan Binkert, Norman Jouppi

Hewlett-Packard Labs - Advanced Architecture Lab

Nagabhushan Chitlur, Paul M. Stillwell Jr, Linda Rankin, Dennis Bradford
Intel Corporation - Corporate Technology Group

([†] currently with VmWare)



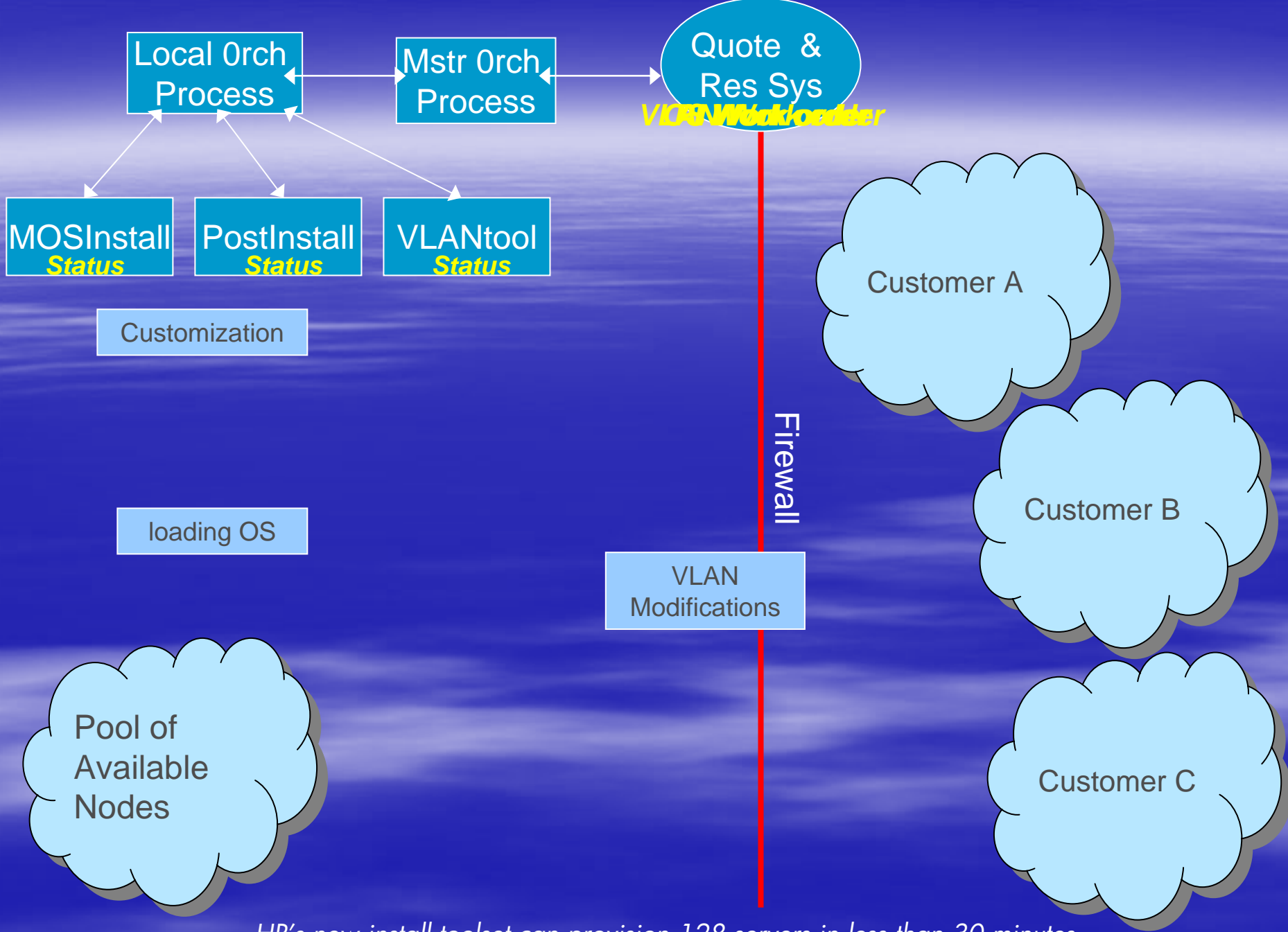
Presented at Supercomputing 2007 (11/07 Reno)

JNIC: A Research Vision for In-Data-Center Communications

- JNIC (Joint Network Interface Controller)
 - Joint HP/Intel research project
- Low-cost NIC for high-performance networks
 - On-chip & small die area for compact glueless scaleout
- Hardware and Software for:
 - Future chip multi-processor
 - Converged fabric Ethernet
- Ethernet - the future killer fabric
 - Close-attached NICs within future commodity systems
 - Performance approaches expensive fabrics
 - Exploit commodity advances: switches, cables, optics

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“Grids are built, not bought”

