Grid 2.0 : Entering the new age of Grid in Financial Services

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Time is Money!
The Computation

- Portfolio valuation
- Parallel task distribution
- Instrument 1
- Instrument (n)

Homegrown Applications
ISV Applications

Result
Grid 1.0: the Results

Elaborated Time

- Normal Application Execution
- Symphony Execution
• **Beat the Competition**
  – Financial institutions are creating more complex products and increasing volumes

• **Manage Risk**
  – Address new regulatory requirements and be able to respond in real-time to global volatility

• **Be Cost Effective**
  – IT decisions are scrutinized for the business value they add, the potential ROI to the enterprise, and the Total Cost of Ownership
Successful Grid Deployments

Front Office
Trading
Investment Mgmt
Exchange Pricing

Middle Office
Risk/End of day report
Market Research
Financial Accounting

Back Office
Clearance & Settlement
Batch Reporting
Batch processing

Capital Market
Asset Management
Exotic Derivative
Exchanges
Hedge Funds
Model Calibration

Vanilla Flow
Risk Analysis
Basket Product
• Enabling breakthrough business strategies:
  – Pricing – re-price & re-assess rapidly in fluid markets
  – Modeling, back-testing & optimization – intra-day / on demand
  – Real-time risk – run risk algorithms in near real-time, assess exposures “tick-by-tick”
  – Algorithmic trading – robo-trades / first mover advantage
  – Statistical Arbitrage – reduce risk / maximize returns
• Strategic investment to optimize trade results
  – Significantly reduce calculation time to improve trade effectiveness
  – Pre-trade risk analysis, backtesting, and other processes typically done post-trade

• Calculation profiles require low latency workload distribution
  – For complex products, < 2ms runtime per calculation
A Back-testing Example

- Real-time back-testing …
- EQD Pre-Trade …
- Low latency innovative pattern

Overnight

Backtest

Selection

Execution

Daily

B1  S1  E1  Bn  Sn  En
Grid 1.0: Utilization Still Too Low

Unpredictable Demand

Un-scalable!

Un-shareable Resources ("Silos")

Underutilized Resources

Desksops/Workstations

DR Sites and Spares

UAT Servers
IT Challenges

Required Resources: CPU, Memory, and Overhead

Environment 3
Finance, Payroll

Environment 2
Development

Environment 1
Website

Service levels and required resources

Time of Day

7am 8am 9am 10am 11am 12pm 1pm 2pm 3pm 4pm 5pm 6pm 7pm 8pm

Multiple domains, departments & technologies
Automate to Reduce Costs

Required Resources: CPU, Memory, and Overhead

Adjusted Resources: VMs, CPU, Memory, and Overhead with Automation

$ savings

Service levels and required resources

VM Orchestrator

Multiple domains, departments & technologies

Time of Day

Website

Development

Finance, Payroll
Cluster partition usage over the last week

Report period: from 11-19 00:00 to 11-26 00:00

Cores

- Risk Analysis
- P&L Paris
- P&L NY
- VaR
- Exotics Pricing

12 am to 12 pm
12 pm to 12 am
Move to shared resource environment in a controlled manner

End State: all resources are shared with grid scheduling and policies ensuring SLA’s are met
Making Grid 2.0 a Reality
Architectural Approach Required

- **Batch Workload Manager**
  - Application SLA Monitoring
  - Workload Scheduling (Fine-grain)
  - Workload Execution/Monitoring
  - App Developer APIs/CLIs

- **Parallel SOA Workload Manager**
  - Resource Monitoring
  - Resource Allocation (Coarse-Grain)
  - Process Execution
  - System Provisioning

- **J2EE Workload Manager**
  - Resource Monitoring
  - Resource Allocation (Coarse-Grain)
  - Process Execution
  - System Provisioning

- **Home grown / OSS Middleware Manager**
  - Application SLA Monitoring
  - Workload Scheduling (Fine-grain)
  - Workload Execution/Monitoring
  - App Developer APIs/CLIs

**Resource Management (Physical and Virtual)**

**Device Managers**
- Node Operating System
- Node Hardware

**Grid Devices**
- Node Operating System
- Node Hardware
The Platform Solution

**PLATFORM ACCELERATE**
- Platform Symphony
  - LSF License Scheduler
  - LSF Process Manager
  - LSF Multi-Cluster
  - LSF Session Scheduler

**PLATFORM MANAGE**
- Platform Analytics
- Platform RTM
- Platform Manager

**Platform Enterprise Grid Orchestrator (EGO)**
- Platform VM Orchestrator
- Platform Management Console
EGO Resource Allocation

1 – Consumers (requests) → EGO → 2 - Resources

3 – Policy

4 – Activities

5 – Report & Bill

(EQD gets 20% of resource from 9-5)

If response on Algo trading > 7 sec, then…

REAL TIME APPLICATIONS

BATCH PROCESSING

ISV APPLICATION

ETL/BI REPORTING

SCHEDULER

VIRTUAL MACHINES
To make it easy for developers to interact with their peers and share their expertise, Platform Symphony 4 has launched an online community at hpcccommunity.org
<table>
<thead>
<tr>
<th>Performance Metric</th>
<th>值</th>
</tr>
</thead>
<tbody>
<tr>
<td>Single Task Round Trip</td>
<td>1.6 ms</td>
</tr>
<tr>
<td>CPU Utilization</td>
<td>98%</td>
</tr>
<tr>
<td>Scalability</td>
<td>20,000+ CPU’s simulated on 1,000 physical CPUs in one cluster</td>
</tr>
</tbody>
</table>
The Data

- Provides a reliable data tier with a single, consistent view of data
- Enables dynamic data capacity including fault tolerance and load balancing
- Ensures that data capacity scales with processing capacity
Platform Symphony 4 Unique Benefits

• **Speed**
  – The lowest-latency HPC service-oriented middleware
  – 5 x 10 times faster than alternative environments

• **Openness**
  – Easy for developers to build and deploy their HPC service-oriented applications
  – Download, install and run an application in under an hour
  – Free to download with no time or node-count restrictions

• **Cost Savings**
  – Cut your silo server farms in half
  – The only true utility computing model
Enabling Infrastructure Partners

- Dell
- HP
- IBM
- Intel
- Microsoft
- Red Hat
- SAS

Platform

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Questions?

Contact email: cjarvis@platform.com
Contact tel: +44 782 5122509
www.platform.com
**Challenge:** Meet business growth objectives and reduce computing costs
- Make better use of underutilized computing resources
- Provide additional processing power required to improve performance of key business applications

**Solution:**
- Built a utility grid, combining 15+ major intra and end of day pricing and risk applications

Result:
- Utilization went from 20% to over 80%
- Infrastructure management is simplified
- A global utility-computing platform is in place – providing on-demand processing power at significantly reduced cost
• **Challenge:** Expanding compute capacity while reducing costs
  – Dedicated SMP hardware – expensive, not scalable, provisioned for peak
  – Seven Major Trading and Risk Systems – expensive to maintain, difficult to scale

• **Solution:**
  – Built a grid infrastructure combining 7 major trading and risk systems

Michael Ashworth  
CIO, JPMC

“...a grid infrastructure reduces operational risk, for instance when an isolated server fails, you have the ability to respond much more flexibly.”

• Several million dollars of savings
• A new credit trading application was built in just 10 weeks instead of the 5 months
• $0.56 /CPU hr
Platform is a pioneer and the global leader in High Performance Computing infrastructure software, delivering integrated software solutions that enable organizations to improve time-to-results and reduce computing costs.

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