

# IDC HPC Market Update

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- HPC Market Trends in 2008
- HPC Market Trends in the First Half of 2009
- IDC's 5-Year Forecast
- Sample Findings from IDC's End-User Studies

# The Top 10 HPC Predictions for 2009

1. The HPC Market Will Dip in 2009 But Will Remain A Bright Spot in the IT Space
2. HPC Storage Will Increasingly Outpace the HPC Server Market
3. The Petaflop Club Will Gain More Members
4. HPC Supply Chain Use Will Become a Metric For Industrial Competitiveness
5. Power and Cooling Will See Lots of Innovation But No Major Breakthroughs
6. Competition Will Heat Up In the Alternative Processor Wars
7. Standard Products Will Grow, But More Codes Will See Retrograde Performance
8. The Highly Parallel Programming Challenge Will Increase
9. Software Licensing Costs Will Become a More Universal Chokepoint
10. Ease-of-Everything Will Gain Ground At the Low End and Beyond

## **The global economy is impacting all HPC segments**

### **HPC declined -3% for 2008 overall**

- 2009 is currently projected to decline -5.4%
  - But could be lower
  - A major change from the 19% yearly growth over the previous 4 years
- We are still forecasting 3% CAGR growth for the next 5 years
  - Growth starting in 2010

### **Major challenges for datacenters:**

- Power, cooling, real estate, system management
- Storage and data management continue to grow in importance

### **Software hurdles will rise to the top for most users**

- Driven heavily by multi-core processors and hybrid systems

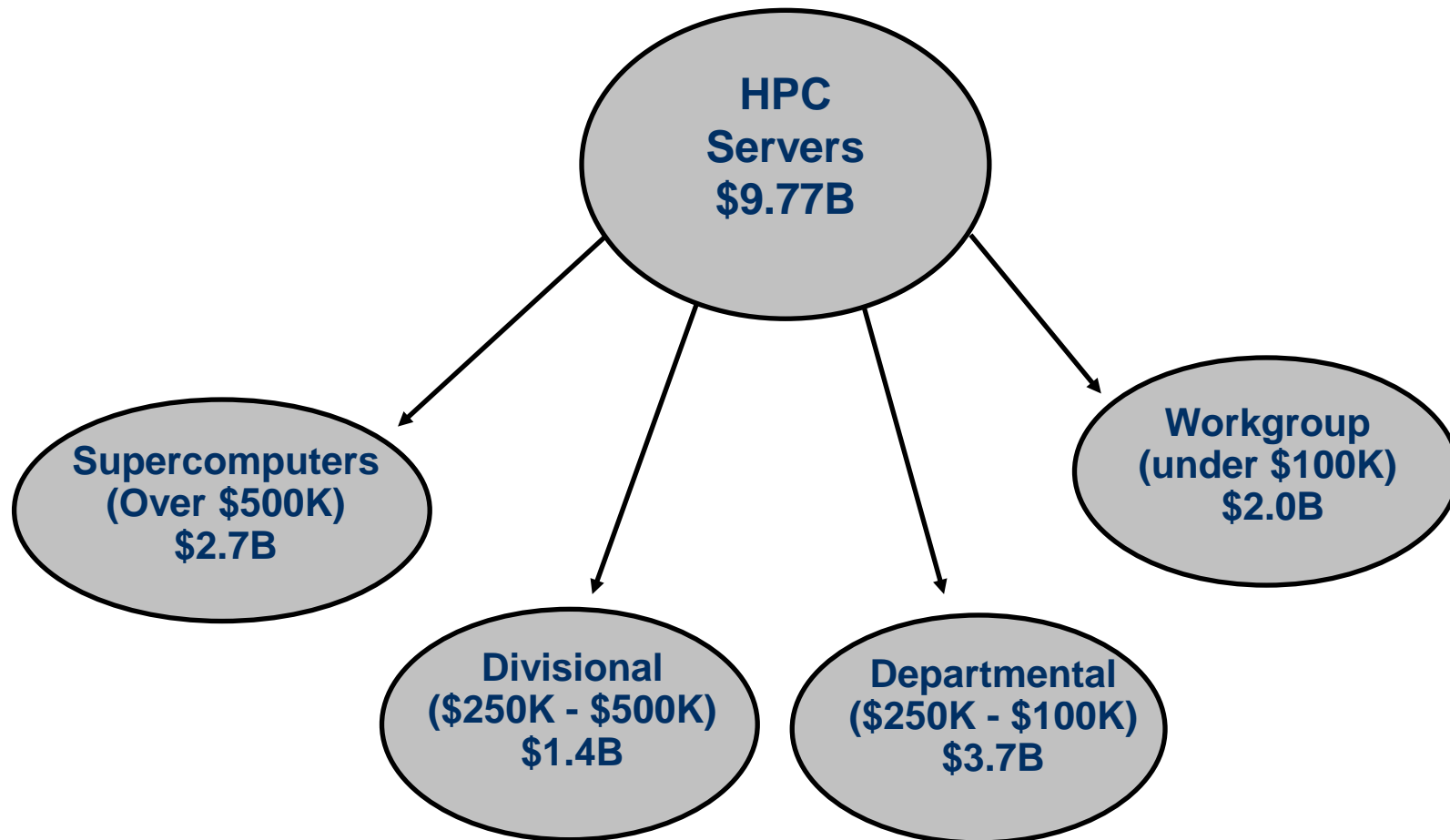
### **SSDs will gain momentum and could redefine storage**

# 2008 HPC Server Market Results

	Q108	Q208	Q308	Q408	Total 2008	2007 vs. 2008
WW Rev (\$K)	2,321,797	2,542,085	2,411,985	2,495,981	9,771,849	-3.0%
Quarter over Quarter change		9%	-5%	3%		
WW Units	48,296	45,485	44,304	36,006	174,091	-24.5%
ASP (\$K)	48.1	55.9	54.4	69.3	56.1	28.4%

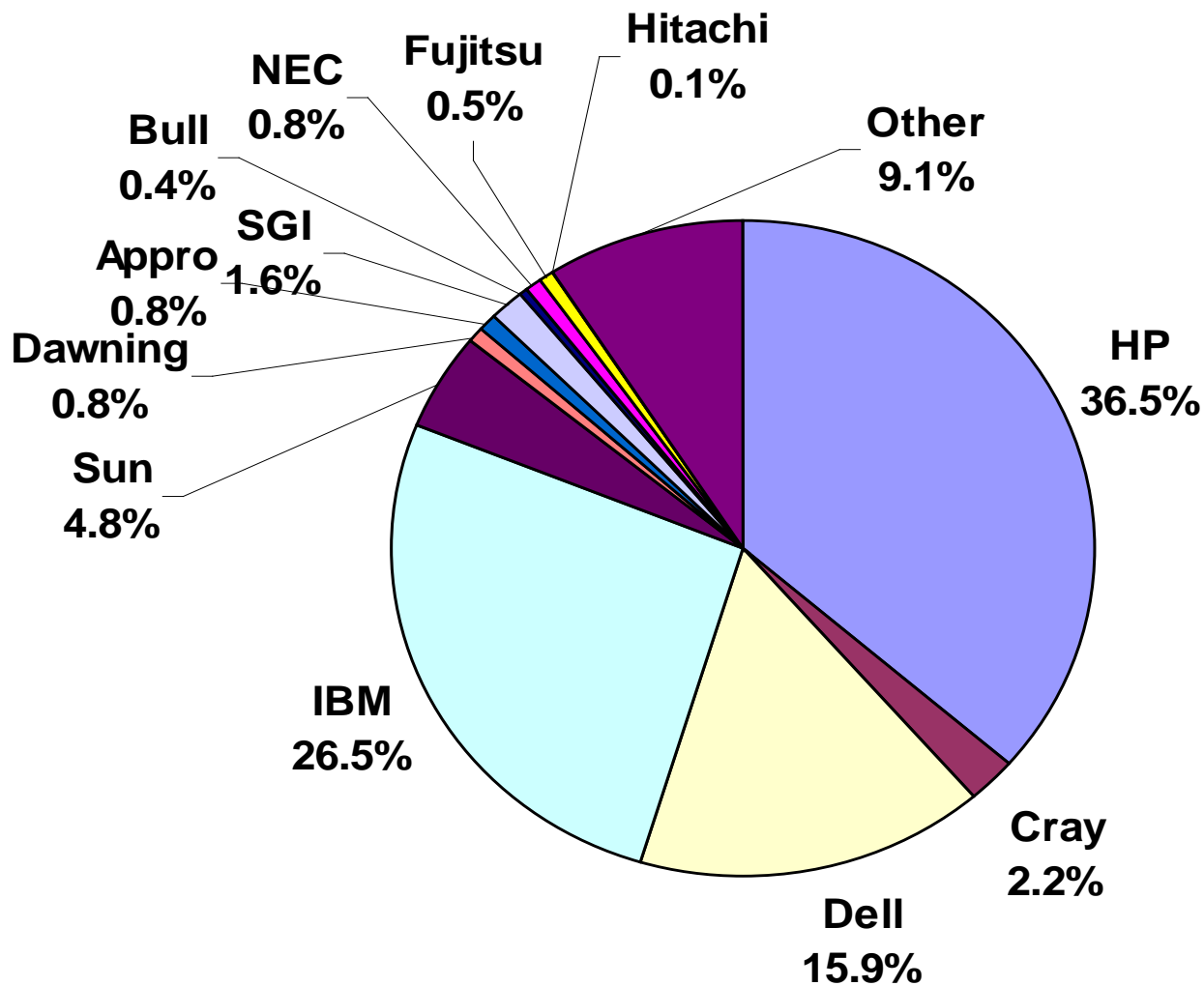
**Source IDC, 2009**

# HPC Server Market Size By Competitive Segments, 2008



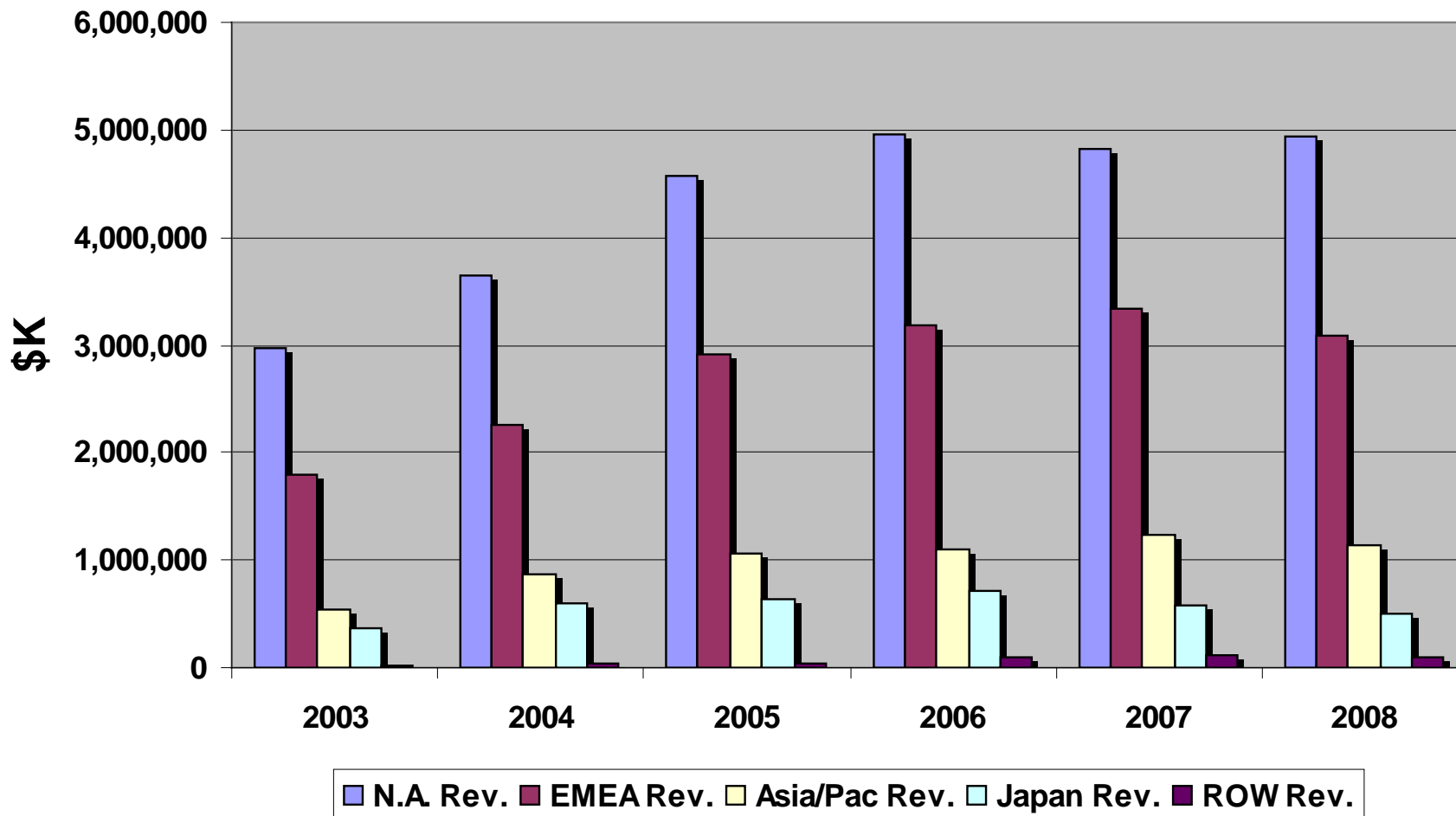
Source IDC, 2009

# Vendor HPC Market Shares In 2008: All HPC Segments



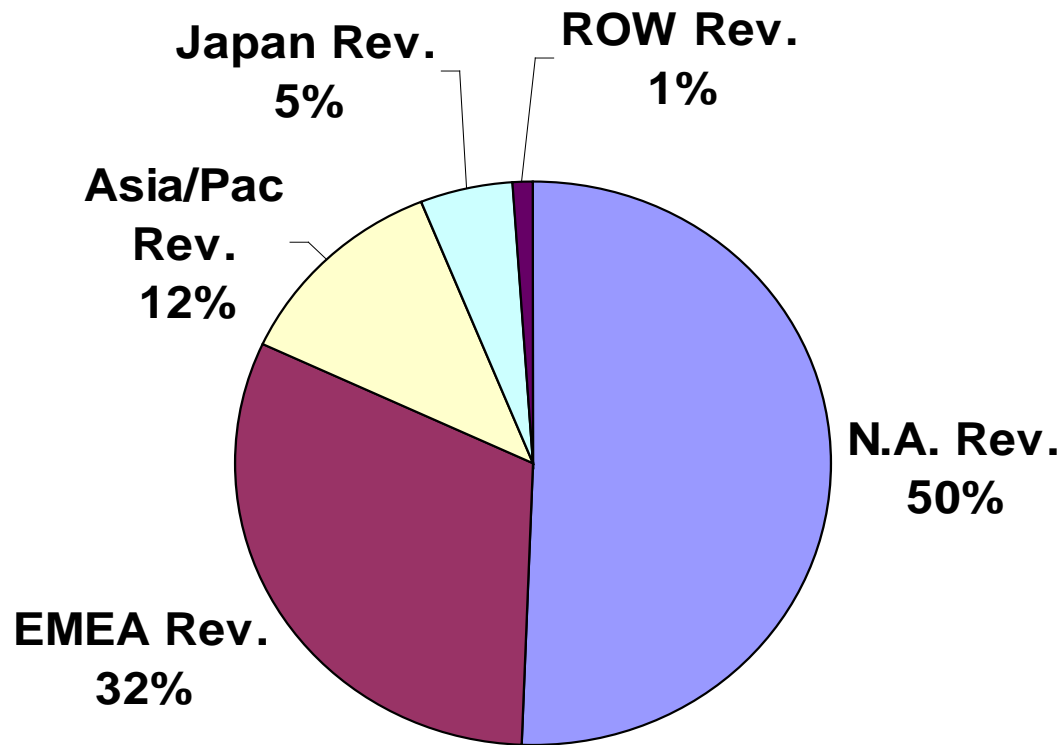
Source IDC, 2009

# HPC Revenue by Region, 2003 - 2008



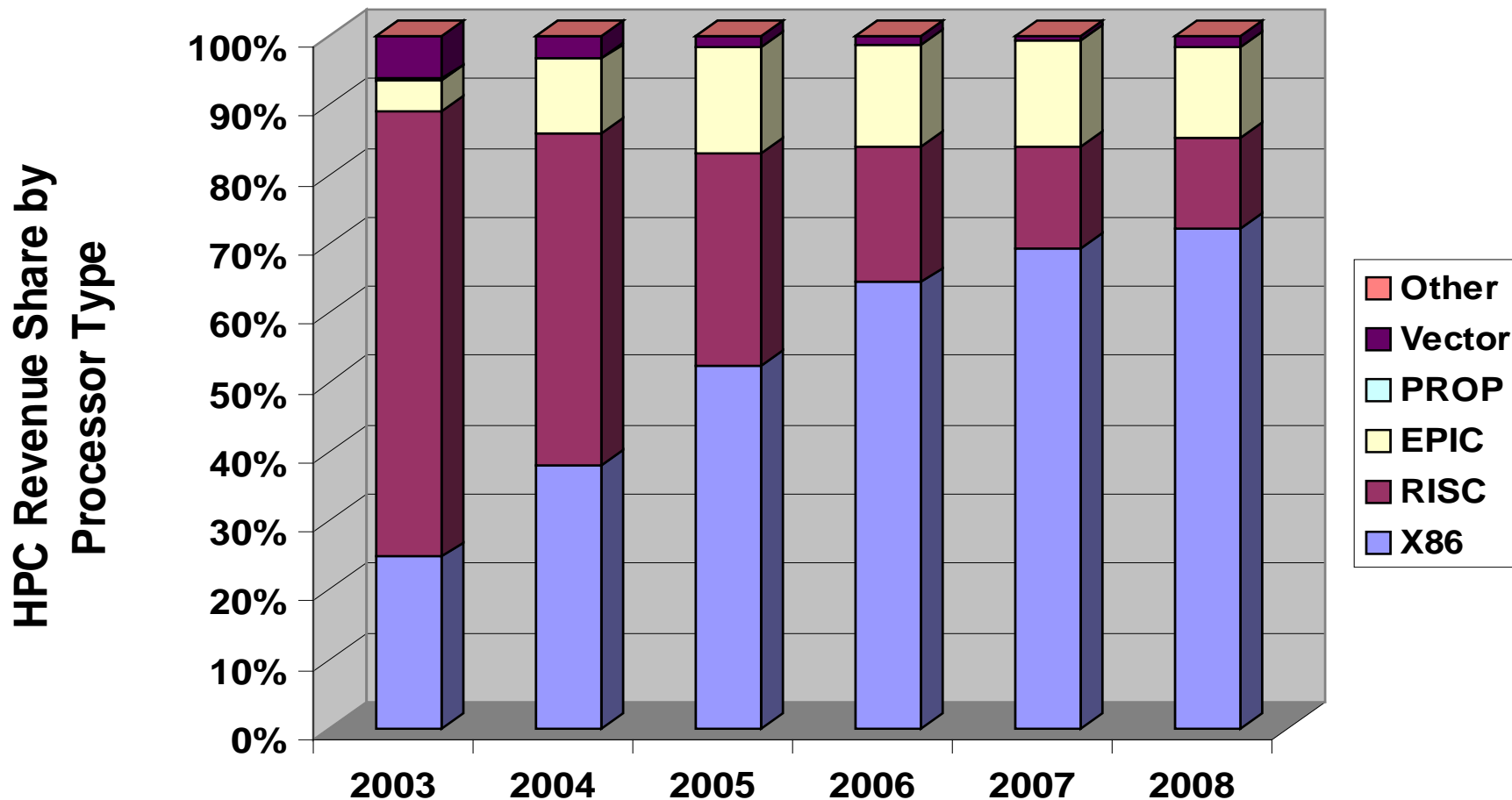
Source IDC, 2009

# HPC Revenue Share by Region, 2008



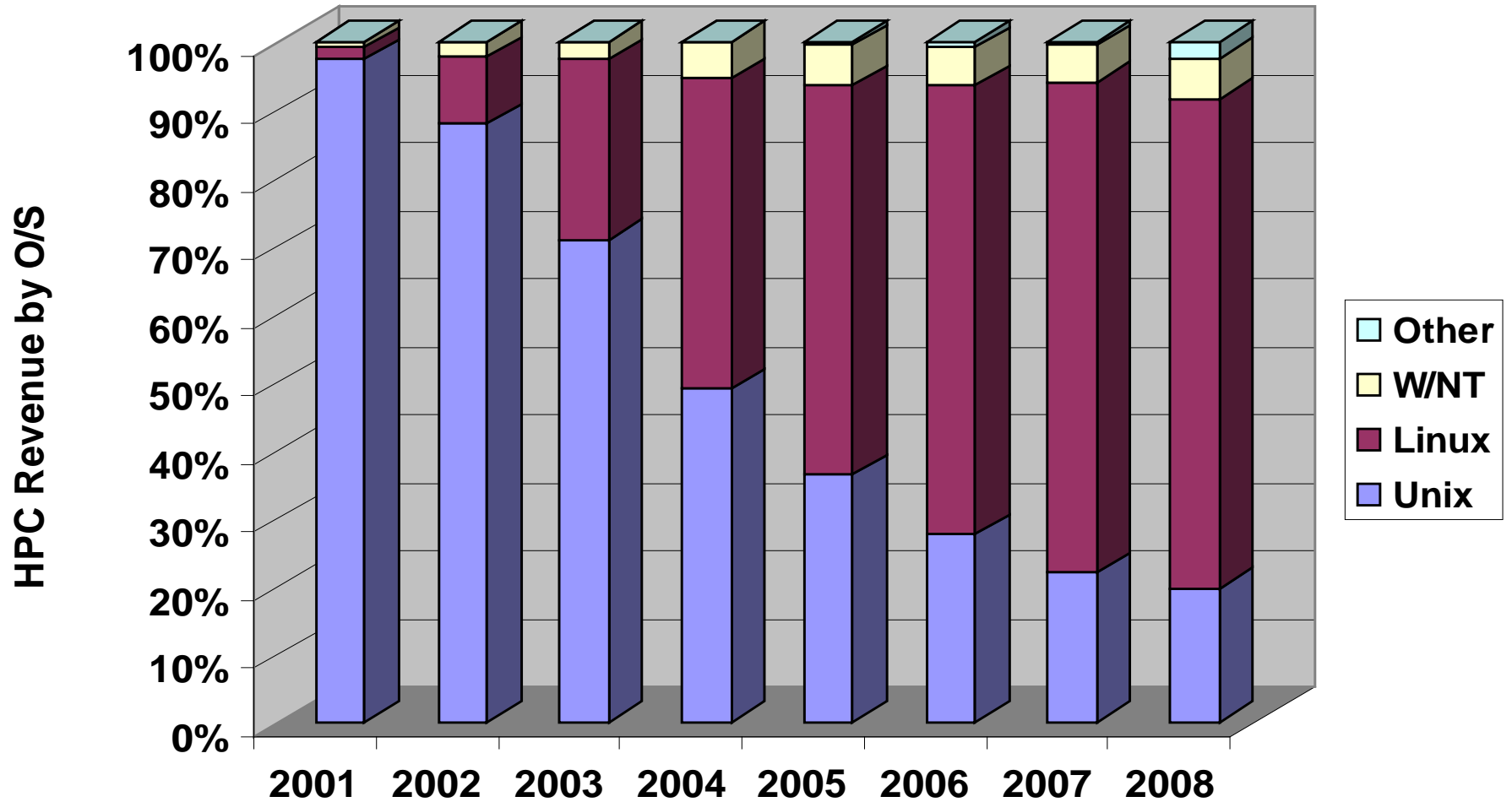
Source IDC, 2009

# Total HPC Revenue by Processor Type



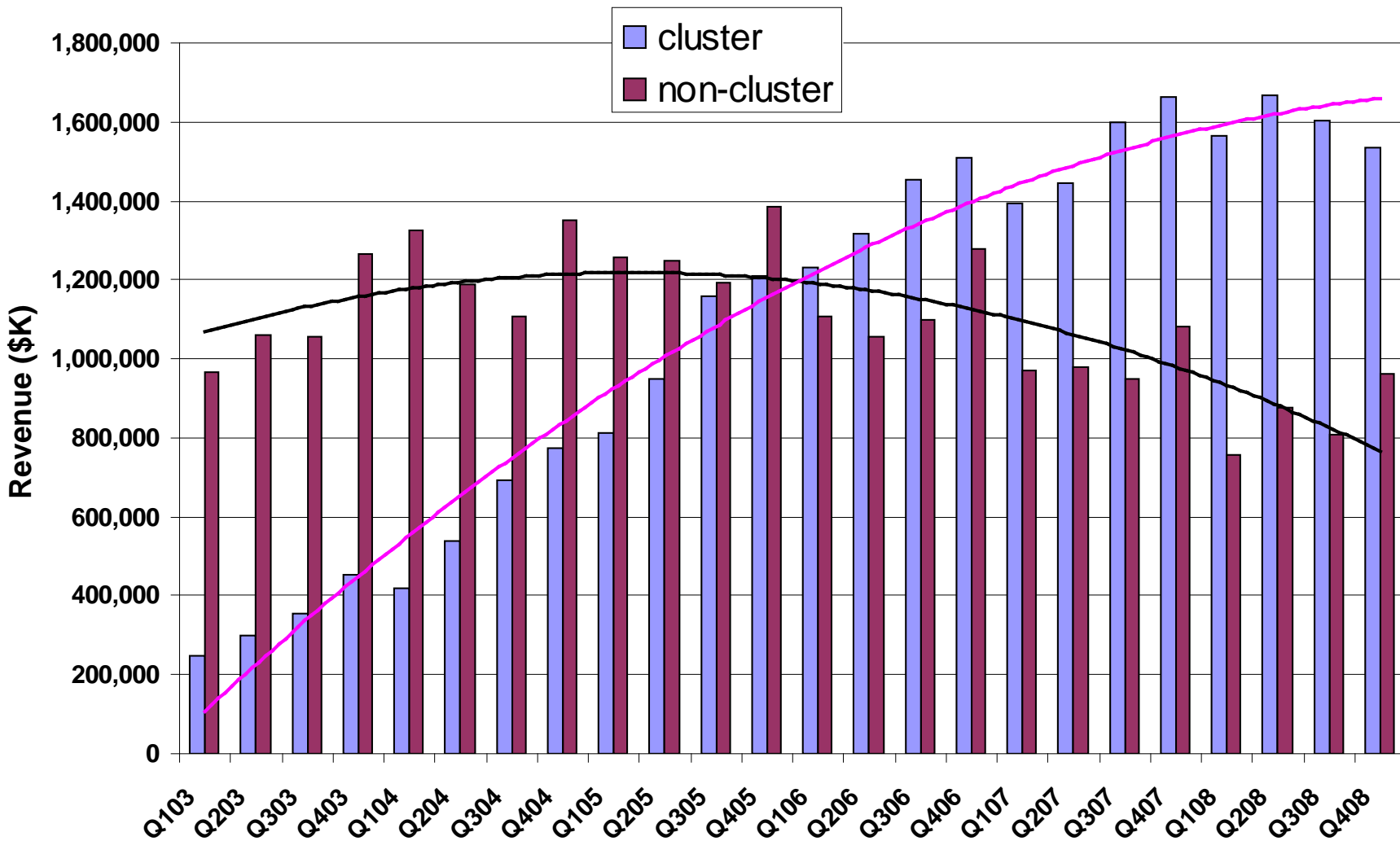
Source IDC, 2009

# Total HPC Revenue by OS



Source IDC, 2009

# Growth In HPC Clusters



Source IDC, 2009

# Why is Commodity Hot? .. Price!

	<b>ASP (\$K)</b>	<b>Ave.CPUs / System</b>	<b>\$K / CPU</b>	<b>CPUs / \$M</b>
<b>x86</b>	<b>50.7</b>	<b>21</b>	<b>2.4</b>	<b>419</b>
<b>RISC</b>	<b>98.3</b>	<b>10</b>	<b>9.5</b>	<b>105</b>
<b>EPIC</b>	<b>55.9</b>	<b>7</b>	<b>7.6</b>	<b>131</b>
<b>Vector</b>	<b>873.4</b>	<b>12</b>	<b>73.6</b>	<b>14</b>

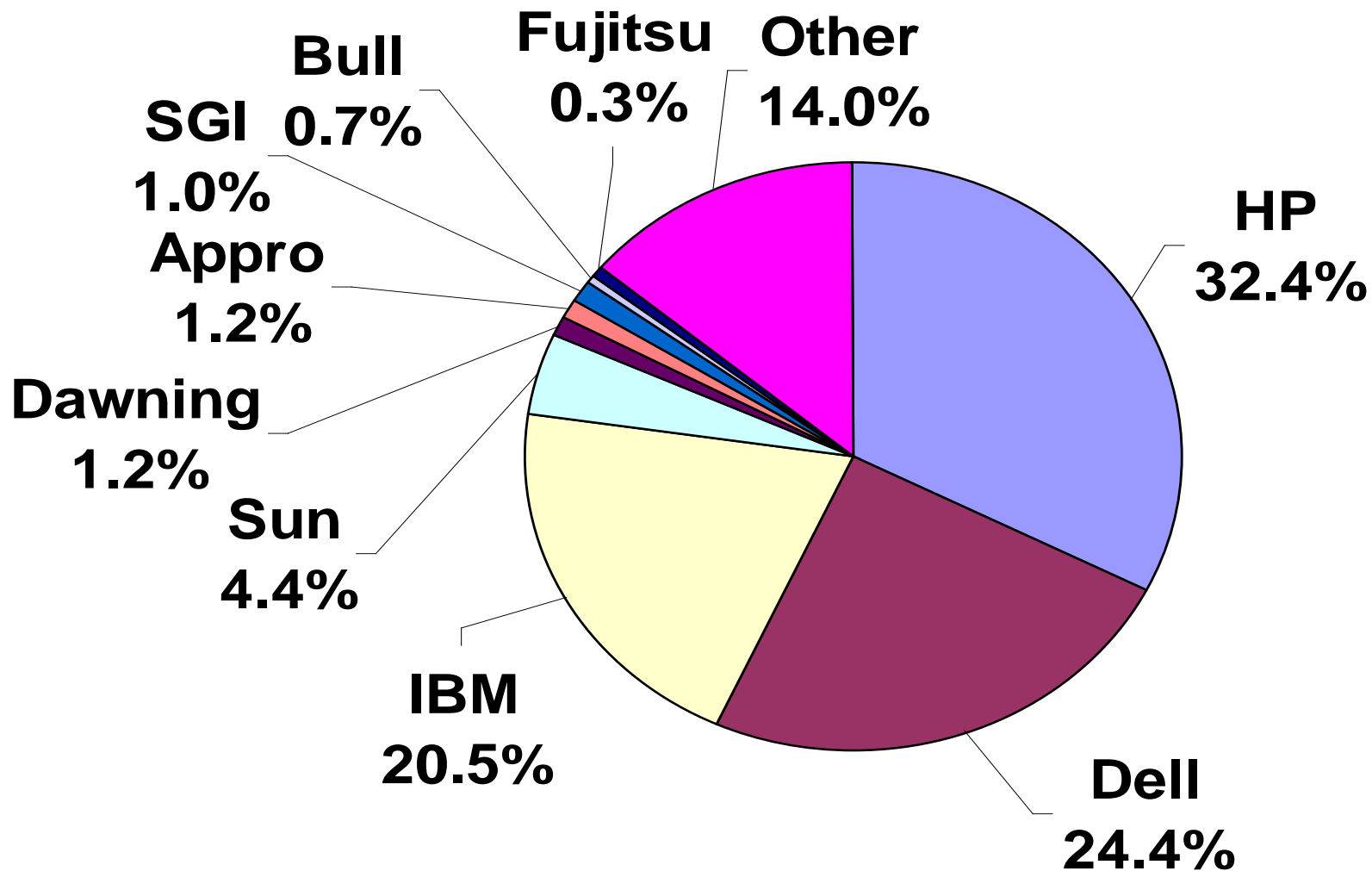
Source IDC, 2009

# Why is Commodity Hot? .. Price! (cont'd)

	<b>ASP (\$K)</b>	<b>Ave.Cores / System</b>	<b>\$K / Core</b>	<b>Cores / \$M</b>
<b>x86</b>	<b>50.7</b>	<b>61</b>	<b>0.8</b>	<b>1309</b>
<b>RISC</b>	<b>98.3</b>	<b>24</b>	<b>4.0</b>	<b>252</b>
<b>EPIC</b>	<b>55.9</b>	<b>9</b>	<b>6.1</b>	<b>163</b>
<b>Vector</b>	<b>873.4</b>	<b>12</b>	<b>73.6</b>	<b>14</b>

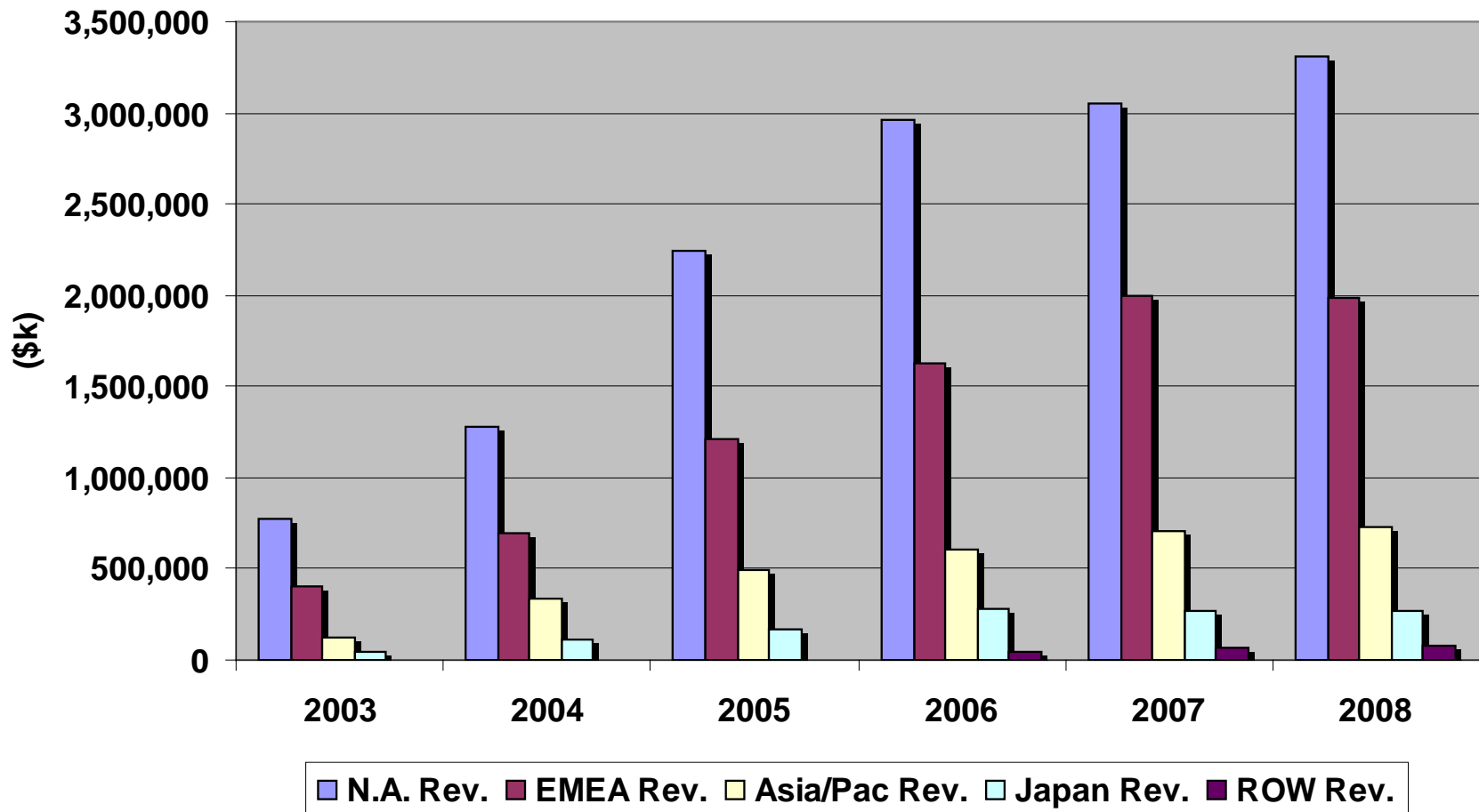
Source IDC, 2009

# Cluster Vendor Market Shares, 2008



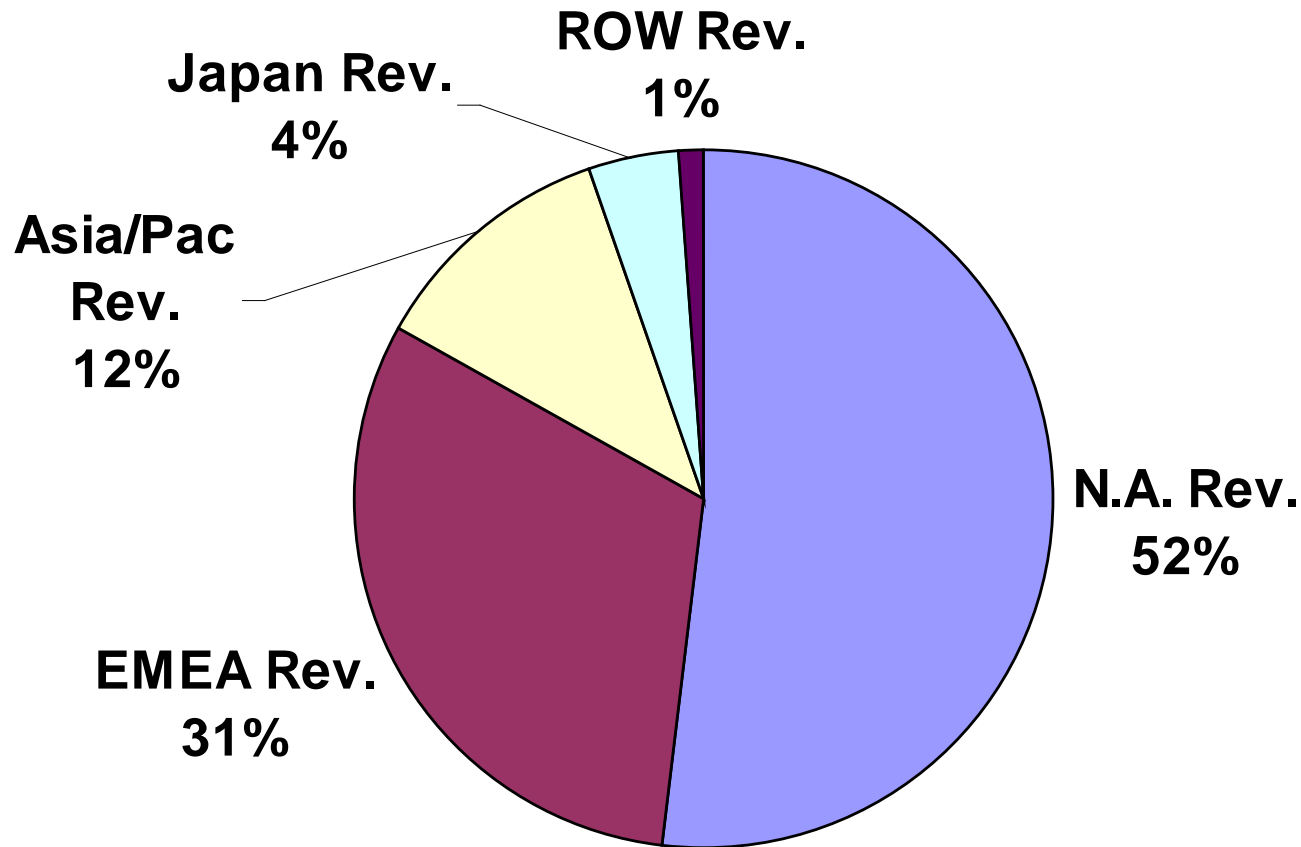
Source IDC, 2009

# Cluster Revenue by Region, 2003 - 2008



Source IDC, 2009

# Cluster Revenue Share by Region, 2008

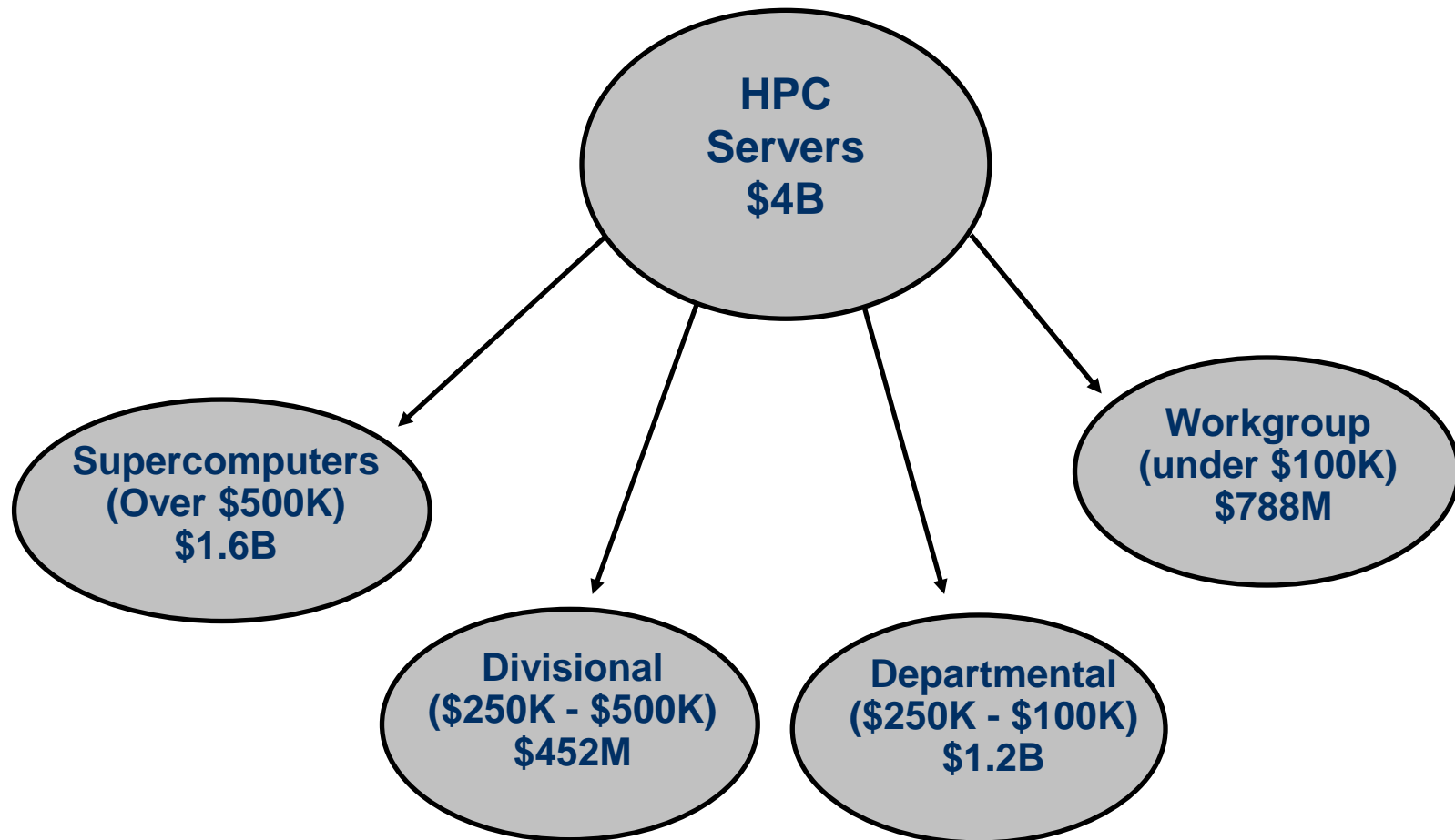


Source IDC, 2009

# **HPC Market Results**

## **First Half of 2009**

# HPC Revenue, First Half of 2009



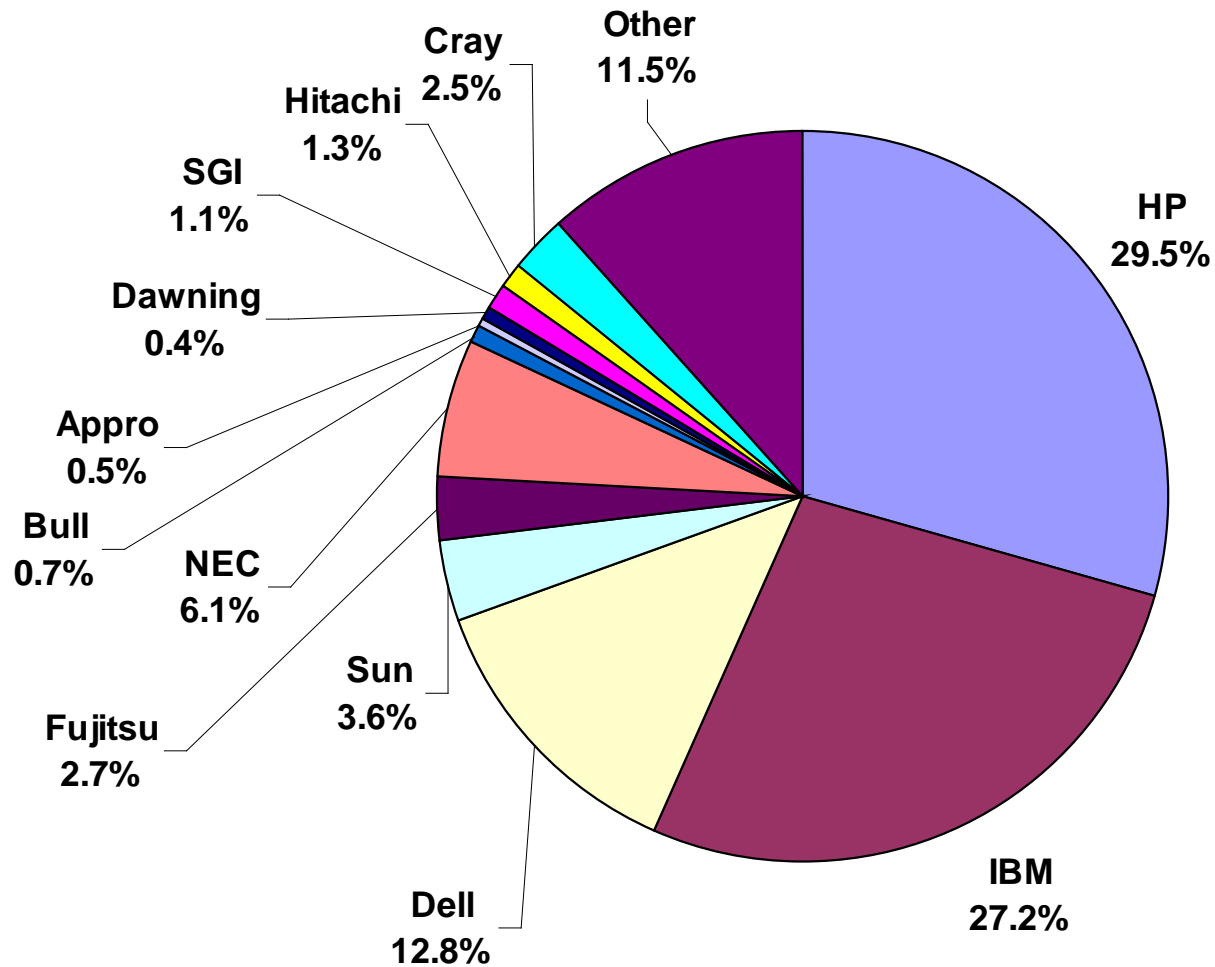
Source IDC, Oct, 2009

# HPC Revenue, Shipment and ASP, Q109 vs. Q209

	Q109	Q209	Q209/Q109
<b>WW Rev (\$K)</b>	<b>2,133,605</b>	<b>1,935,485</b>	<b>-9.3%</b>
<b>WW Units</b>	<b>22,643</b>	<b>22,258</b>	<b>-1.7%</b>
<b>ASP (\$K)</b>	<b>94</b>	<b>87</b>	<b>-7.7%</b>

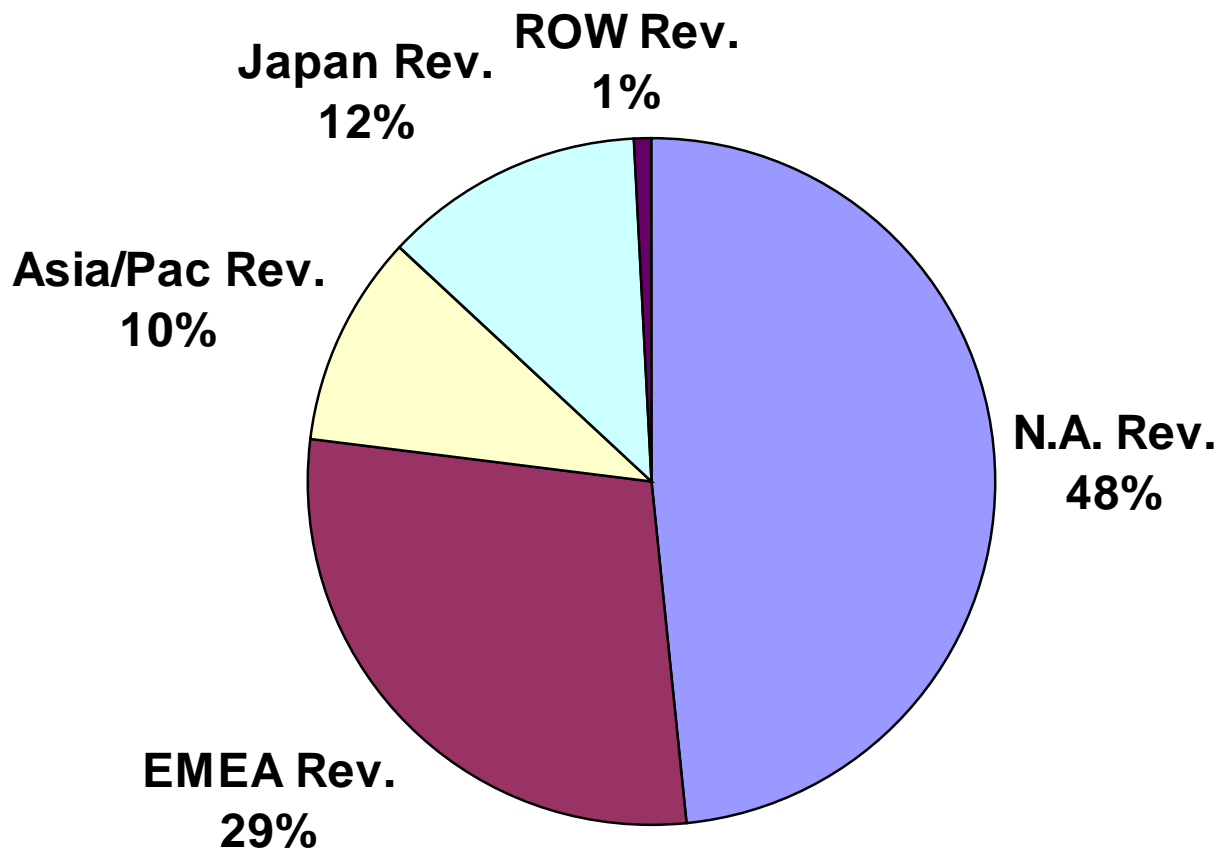
Source: IDC, Oct, 2009

# Vendor Revenue Share, First Half of 2009



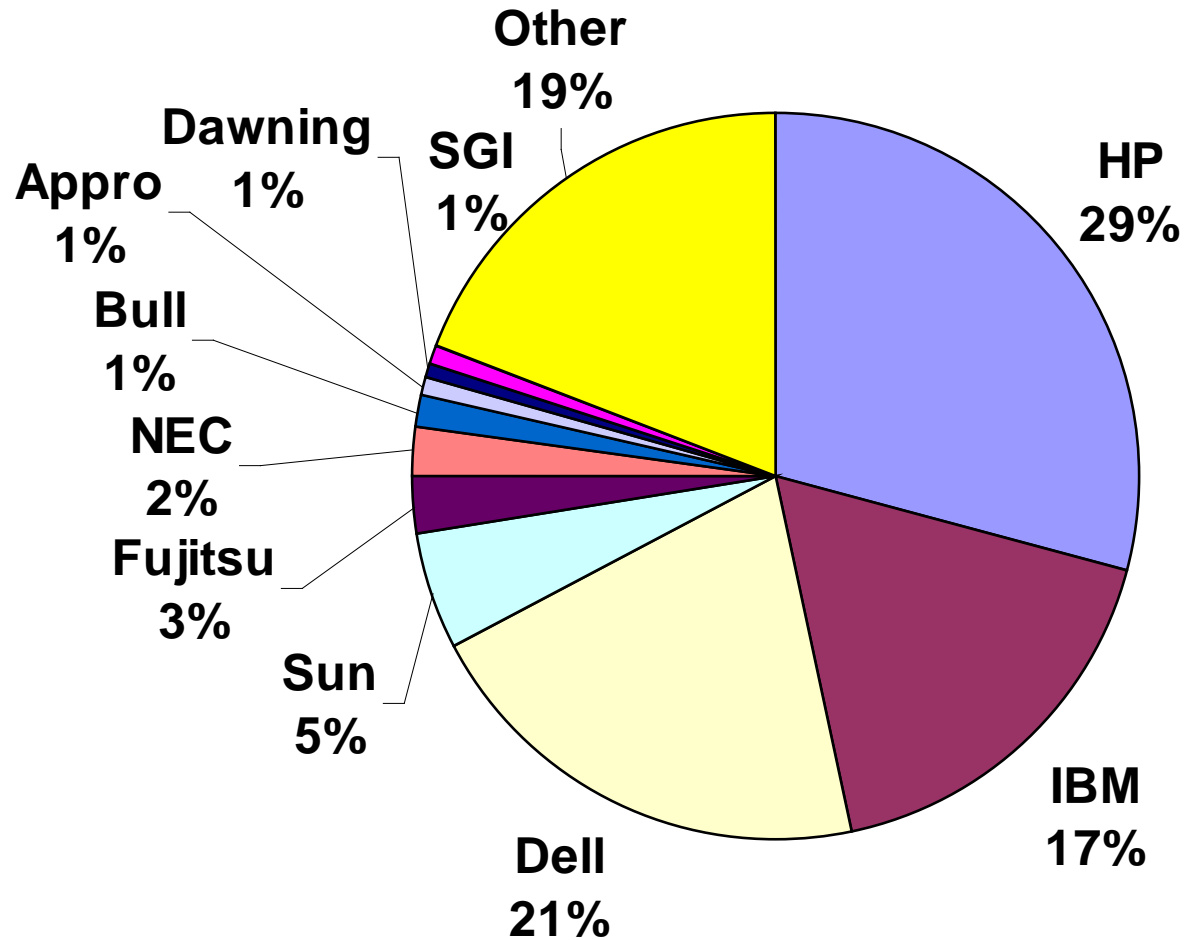
Source: IDC, Oct, 2009

# HPC Revenue Share by Region, First Half of 2009



**Source: IDC, Oct, 2009**

# Cluster Vendor Share, First Half of 2009



Source: IDC, Oct, 2009

# **IDC HPC**

# **Market Forecasts**

- **Macroeconomic turmoil will slow the global economy, reducing overall IT and HPC server spending**
- **HPC server sales will show a significant decline extending through mid-to-late 2009, but not as severe as the overall server market**
  - **High-end of the market will be more resilient to the general economic condition than other segments**
  - **Mid-to-low end of the market will still lag the enterprise profile, but will follow it more closely than before**
- **Clusters will continue its penetration into HPC**

- **We expect to see different impacts in different industries**
  - **Automotive and Financial sectors will hurt the most in the near term, expect rebound in 2010**
  - **Energy sector will see stronger spending in search for alternative resources**
  - **Bio-life science will show flat to moderate growth**
  - **Gaming/movie sector will spend at healthy rate**
  - **Government, Defense and Universities will present flat to moderate growth**
- **Green IT will slowly have more impact on procurement decisions**
- **Petascale initiatives around the world will drive up sales in high-end of the market**

# New HPC Forecast on Revenue, Units, ASP, 2007 – 2013

**TABLE 3**

Worldwide High-Performance Technical Systems Market Forecast by Revenue, Units and ASP, 2007 - 2013

	2007	2008	2009	2010	2011	2012	2013	CAGR (07-13)
New Base Forecast								
Revenue \$M	\$10,076	\$9,772	\$9,244	\$9,965	\$10,818	\$11,860	\$12,788	4.1%
Year-over-year Change		-3.0%	-5.4%	7.8%	8.6%	9.6%	7.8%	
Units	230,724	174,091	159,491	182,045	214,447	248,306	274,413	2.9%
ASP \$000	\$43.7	\$56.1	\$58.0	\$54.7	\$50.4	\$47.8	\$46.6	1.1%

Source: IDC, 2009

# New HPC Revenue (\$M) Base Case Forecasts, 2007 – 2013, By Competitive Segment

Competitive Segment	2007	2008	2009	2010	2011	2012	2013	CAGR (07-13)
Workgroup	\$2,400	\$1,961	\$1,731	\$1,871	\$2,038	\$2,461	\$2,682	1.9%
Departmental	\$3,384	\$3,710	\$3,618	\$3,960	\$4,419	\$4,713	\$5,099	7.1%
Divisional	\$1,610	\$1,415	\$1,318	\$1,378	\$1,503	\$1,640	\$1,775	1.6%
Supercomputer	\$2,682	\$2,686	\$2,577	\$2,757	\$2,858	\$3,046	\$3,233	3.2%
<b>Total</b>	<b>\$10,076</b>	<b>\$9,772</b>	<b>\$9,244</b>	<b>\$9,965</b>	<b>\$10,818</b>	<b>\$11,860</b>	<b>\$12,788</b>	<b>4.1%</b>

Source: IDC, 2009

# NEW HPC Application/Industry Forecasts, 2007 - 2013

<b>Application Segment</b>	<b>2007</b>	<b>2013</b>	<b>CAGR(07-13)</b>
<b>Bio-Sciences</b>	<b>\$1,530,197</b>	<b>\$1,781,031</b>	<b>2.6%</b>
<b>CAE</b>	<b>\$1,225,638</b>	<b>\$1,562,311</b>	<b>4.1%</b>
<b>Chemical Engineering</b>	<b>\$256,033</b>	<b>\$260,900</b>	<b>0.3%</b>
<b>DCC &amp; Distribution</b>	<b>\$575,608</b>	<b>\$835,046</b>	<b>6.4%</b>
<b>Economics/Financial</b>	<b>\$305,032</b>	<b>\$421,115</b>	<b>5.5%</b>
<b>EDA</b>	<b>\$741,054</b>	<b>\$948,920</b>	<b>4.2%</b>
<b>Geosciences and Geo-engineering</b>	<b>\$587,074</b>	<b>\$807,039</b>	<b>5.4%</b>
<b>Mechanical Design and Drafting</b>	<b>\$125,891</b>	<b>\$98,205</b>	<b>-4.1%</b>
<b>Defense</b>	<b>\$919,574</b>	<b>\$1,186,212</b>	<b>4.3%</b>
<b>Government Lab</b>	<b>\$1,440,837</b>	<b>\$1,863,896</b>	<b>4.4%</b>
<b>University/Academic</b>	<b>\$1,867,560</b>	<b>\$2,337,419</b>	<b>3.8%</b>
<b>Weather</b>	<b>\$393,261</b>	<b>\$545,329</b>	<b>5.6%</b>
<b>Other</b>	<b>\$108,663</b>	<b>\$140,644</b>	<b>4.4%</b>
<b>Total Revenue</b>	<b>\$10,076,423</b>	<b>\$12,788,066</b>	<b>4.1%</b>

Source: IDC, 2009

# **Sample Findings**

## **From Our**

# **HPC End User Study**

**TABLE 10**

System Architecture Counts For The Largest System On Site

Architecture	Count	%
Cluster	64	64%
SMP	18	18%
MPP	12	12%
Vector	2	2%
Hybrid	2	2%
Other	2	2%
Total	100	100%

Source: IDC, 2009

# Study Result: Count of Interconnect in use

Count of interconnect type in use

interconnect type	count	%
Infiniband	52	30%
1-Gigabit Ethernet	47	27%
10-Gigabit Ethernet	24	14%
SMP-only	14	8%
other types	34	20%
Total	171	100%

Source: IDC, Nov 2008

# Do You Have Applications That Are Constrained by I/O?

	Yes %
Overall	92
I/O bandwidth: currently	77
Within the next three years	88
I/O latency: currently	84
Within the next three years	88
Total file size: currently	48
Within the next three years	60

# Study Result: O/S in use today

## Count of OS used on the system

<b>O/S</b>	<b>Count</b>	<b>%</b>
<b>Linux</b>	<b>93</b>	<b>65%</b>
<b>Solaris</b>	<b>13</b>	<b>9%</b>
<b>Windows</b>	<b>13</b>	<b>9%</b>
<b>Mac and Others</b>	<b>13</b>	<b>9%</b>
<b>AIX</b>	<b>11</b>	<b>8%</b>
<b>Free BSD</b>	<b>1</b>	<b>1%</b>
<b>Total</b>	<b>144</b>	<b>100%</b>

**Source: IDC Nov, 2008**

# Study Result: O/S plan in 18 months

## O/S plan in the next 18 months

<b>OS plan to use</b>	<b>Count</b>	<b>%</b>
<b>Windows</b>	<b>9</b>	<b>50%</b>
<b>CentOS</b>	<b>3</b>	<b>17%</b>
<b>SUSE</b>	<b>2</b>	<b>11%</b>
<b>Fedora, Ubuntu</b>	<b>1</b>	<b>6%</b>
<b>Linux</b>	<b>1</b>	<b>6%</b>
<b>Solaris</b>	<b>1</b>	<b>6%</b>
<b>Yellow Dog</b>	<b>1</b>	<b>6%</b>
<b>Grand Total</b>	<b>18</b>	<b>100%</b>

Source: IDC Nov, 2008

# Study Result: Job Scheduling tools used today

## Job scheduling and queing tools used on the most recent system

Job queueing and scheduling tool on most recent system	count	%
PBS Pro	13	19%
Torque	12	18%
LSF	10	15%
Moab	7	10%
SLURM	6	9%
Load Leveler	4	6%
Open PBS	3	4%
SGE	3	4%
Other	9	13%
Grand Total	67	100%

Source: IDC Nov, 2008

# Summary

## #1 Dealing With The New Economic Realities

### **Clusters are still hard to use and manage**

- System management & growing cluster complexity
- Power, cooling and floor space are major issues
- Third party software costs
- Weak interconnect performance at all levels
- Applications & programming — Hard to scale beyond a node
- RAS is a growing issue
- Storage and data management are becoming new bottle necks
- Lack of support for heterogeneous environment and accelerators

# Software Scaling Limitations

**TABLE 20**

Typical Number of Processors the ISV Applications Use for Single Jobs

CPU Range	Number of Applications	Percent
1	19	24.4%
2-8	25	32.1%
9-32	20	25.6%
33-128	9	11.5%
129-1024	4	5.1%
Unlimited	1	1.3%
Total:	78	100.0%

## Software has become the #1 roadblock

- Better management software is needed
  - HPC clusters are hard to setup and operate
  - New buyers – require “ease-of-everything”
- Parallel software is lacking for most users
  - Many applications will need a major redesign
  - Multi-core will cause many issues to “hit-the-wall”

- **Quarterly HPC Forecast Updates**
  - Until the world economy recovers
- **New HPC End-user Based Reports:**
  - Clusters, processors, accelerators, storage, interconnects, system software, and applications
  - The evolution of government HPC budgets
  - China and Russia HPC trends
- **Power and Cooling Research**
- **Developing a Market Model For Middleware and Management Software**
- **Extreme Computing**
- **Data Center Assessment and Benchmarking**
- **Tracking Petascale and Exascale Initiatives**

# Questions?

Please email:  
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Or check out:  
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