

# HPC Market Update

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## DICE Alliance Meeting

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## Software is becoming 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”

# Existing data Resource Example: Third-party Application Software Often Cannot Fully Exploit Today's HPC Systems



The image shows the cover of a white paper. At the top left is the IDC logo with the tagline 'Analyze the Future'. Below the logo, the text 'WHITE PAPER' is centered. The main title is 'Study of ISVs Serving the High Performance Computing Market: The Need For Better Application Software'. Below the title, it says 'Sponsored by: Defense Advanced Research Projects Agency, Council on Competitiveness'. A list of authors follows: Earl Joseph, Ph. D., Addison Snell, Christopher G. Willard, Ph.D., Suzy Tichenor, Dolores Shaffer, and Steve Conway. The date 'July 2005' is at the bottom left. The central graphic features a large, stylized star with various images inside it, including a DNA helix, a person, a car, and a computer screen. The word 'outcompute' is written at the bottom of the graphic. On the left side of the cover, there is vertical text: 'Global Headquarters: 5 Speen Street, Framingham, MA 01701 USA, P:508.872.8200 F:508.935.4015 www.idc.com'.

This worldwide study found that:

- ***“ISV applications are important for improving and maintaining business competitiveness, but they can exploit only a fraction of the available problem-solving power of today’s high-performance computers.”***
- ***“The business model for HPC-specific application software has all but evaporated...”***

## **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

# From the Vision and Roadmap Workshop on Routing Telecom and Data Centers Toward Efficient Energy Use, May 2009

- *What Community Needs (see page B-3):*
- *“An Agreed-upon, trustworthy, vendor-neutral testing body for validating vendor energy performance claims”*

## Vision and Roadmap

# Routing Telecom and Data Centers Toward Efficient Energy Use

Sponsored by

Emerson Network Power  
Silicon Valley Leadership Group  
Telecommunications  
Industry Association  
Yahoo! Inc.

In cooperation with the  
U.S. Department of Energy

May 13, 2009

# From IDC/Avetec/DICE Power And Cooling Studies

On the use of an independent testing source:

Q: How likely would your organization use it to validate new and emerging product performance capabilities?

	Percentages
Very Likely	25.0%
Somewhat Likely	62.5%
Unsure	12.5%
Not Likely	0.0%

*Source: IDC 2009*

# Software Problems Are Costly For Both Vendors And Users

- **Finding and fixing a software problem after delivery is often more expensive than finding and fixing it during the design phase**
- **Current software projects spend a major percentage of their effort and time on rework**
- **The majority of system downtime is now from software**

## **Ask yourself:**

**What is the cost of & logistics of correcting a defect after deployment, in terms of:**

- **Efficiency?**
- **Lost productivity?**
- **Financial resources?**
- **Other consequences?**
- **Lost customers?**

## The increase in CPUs and server units is creating significant IT challenges in:

- Managing complexity
  - How to best manage a complex cluster
  - How to install/setup a new cluster without having to buy a large number of separate pieces
- Power/cooling and Space
- Application scaling and hardware utilization
  - How to deliver strong performance to users on their applications
  - How to make optimal use of new processor and system designs

# Questions?

Please email:  
[hpc@idc.com](mailto:hpc@idc.com)

Or check out:  
[www.hpcuserforum.com](http://www.hpcuserforum.com)



# Research Example: Power and Cooling As A Crucial HPC Issue

## SURVEY

### Special Study Of Power And Cooling Practices and Planning at HPC Data Centers Sponsored by Avetec

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## IDC OPINION

Power and cooling has become one of the top concerns among HPC data centers. The rapid growth in HPC system sizes has pushed up site energy requirements, such that today's largest HPC data centers already consume as much electricity as a small city and their multi-petascale successor-systems promise to use even more. At the same time, energy prices have risen substantially above historic levels, although prices have moderated from their 2008 highs. The third element in this "perfect storm" is the challenge of making HPC processors more energy-efficient without overly compromising performance – the holy grail of HPC. Finally, these HPC data center power and cooling developments are occurring at a time of increased sensitivity toward carbon footprints and global climate change.

IDC's HPC group (sponsored by Avetec's HPC Research Division, the Data Intensive Computing Environment [DICE]) surveyed over 40 HPC data center managers and HPC vendors about their current power and cooling practices, their plans to address future power and cooling requirements, and their predicted solutions for the next three to five years. This study confirmed that HPC sites have ambitious plans for expanding their computing resources. Meeting new-system power and cooling requirements are among the biggest impediments to these plans as the infrastructure at current facilities is in many cases inadequate. Continued data center expansion through build-outs and new facilities seems inevitable, given the mismatch between HPC users' insatiable appetite for more performance and system vendor's inability to provide equivalent additional performance per watt and per square foot.

Technological breakthroughs may make HPC processors much more energy efficient; recent improvements in on-die management of idle power consumption are a notable example. About one-third of the users and nearly half of the vendors

Power and cooling large HPC systems has become one of the top issues in HPC

This worldwide study found that:

- ***“Power and cooling infrastructure limitations were the biggest barriers to increasing HPC resources”***