Special Analysis

2021 End Users Perspectives on Processors, Coprocessors/Accelerators, and HPC Budgets

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HYPERION RESEARCH OPINION

A recent survey revealed that HPC end users are looking to change the way they outfit their next HPCs, with many interested in exploring new types of processors, relying increasingly on GPUs and other accelerators to support computational gains, and preparing to increase their budgets to afford continued acquisition of more powerful HPCs. Insights into the critical factors driving these and other trends are detailed in the 2021 iteration of Hyperion Research's annual MCS end users' study, *Processors, Coprocessors/Accelerators, and HPC budgets*. Key Findings from the report are summarized in this document.

Hyperion Research conducts an annual Multi-Client Study (MCS) to measure and track key trends across the entire spectrum of the HPC market. The latest iteration of the MCS encompassed 141 HPC sites representing 2,006 systems. Reports produced as result of the study include:

- Trends and Forecasts in HPC Storage and Interconnects
- Vertical/Application Workload Areas and Technical Computing System Software and Middleware
- Use of Public/External Clouds for HPC Workloads, Trends, and Drivers
- Processors, Coprocessors/Accelerators, and HPC Budgets
- AI and HPDA Usage and Future Technology Trends

The worldwide revenue for the HPC technical server market stayed relatively constant in 2019 and 2020 at just under $14 billion, following 2018's substantial 18.1% growth. Hyperion Research expects that covid-19 will continue to have an impact, resulting in 2021 being another flat year. Within that environment, the key trends identified from the HPC end-user base survey include:

- Intel x86 remains the preferred processor for respondents' next technical server purchase, but there is growing interest in alternate processor options including AMD, Arm, and anticipated European-designed processors.
- More than 82% of respondents report having GPUs or coprocessors in their largest HPC system, up from two-thirds of respondents (69.4%) in Hyperion Research’s 2020 study.
- Over 48% of survey respondents anticipated budget increases for HPC/AI/HPDA/QC resources in the next year.
- Almost 60% of survey respondents indicated that their future on-premises HPC system procurements would be affected by the availability of external/public clouds.

SELECT KEY FINDINGS

Select key findings in this report include the changing dynamics of next processor purchases, GPU/accelerator usage, HPC and cloud HPC budgets, and the impact of clouds on overall HPC budgets.

Next Processor Purchases, AMD Moving Up on Intel

When respondents were able to supply multiple responses to the processors they would prefer in their next HPC/technical server purchase, x86 options were the clear favorite, but with an increasing emphasis on AMD-supplied components. A majority of both government (56.5%) and academic (52.8%) respondents indicated that AMD processors would be a part of their next major purchase.

Versions of Arm processors, from Fujitsu and other sources, were also selected to be part of a major purchase with a combined respondent rate of over 28%, the single largest non-x86 category. European-designed processors had a small but significant presence despite the relative newness and lack of demonstrated capability of such components, with interest across the industry (8.5%), government (8.7%) and academic (5.6%) sectors.

Wide Use of GPUs or Coprocessors, But Low Overall System Counts

More than 82% of respondents report having GPUs or coprocessors in their largest HPC system, up from two-thirds of respondents (69.4%) in Hyperion Research's 2020 study. However, the response selected most often for the number of coprocessors or accelerators in their largest system was less than 32 (21.1%), with a wide range of respondents (41.3%) using between 32 and 500.

- Only about 20% had more than 500 coprocessors or accelerators in their largest system, and only 1.6% used more than 10,000.

GPUs Used for Limited Set of Applications

When asked about the percentage of all of the applications that use coprocessors/accelerators or other specialized processors used on their largest systems, more than one-third (36.9%) selected less than five percent or none. The next most selected option was 5% to less than 10%, and 5% to less than 10% (both at 20.6%), followed by 10% to less than 25% (17.7%). Only 14.2% of respondents had more than half of their applications using coprocessors/accelerators or other specialized processors.

- The government sector was the heaviest user (13%) of applications with coprocessors/accelerators or other specialized processors for more than 75% of applications, almost twice that of the overall three sector average rate.
- In contrast, the academic sector tended to use coprocessors/accelerators or other specialized processors for less than 10% of their applications about two-thirds of the time.

HPC Budgets for HPC/AI/HPDA/QC Resources

Almost half of all respondents (48.2%) expect an increase in budgets next year for HPC/AI/HPDA/QC resources: 17.7% are looking for an increase of 5% to 10%, 14.9% an increase of 11% to 25% and 8.5% an increase of 25% or more. Only 5.7% of all respondents indicated that they were expecting any decline in budgets for the next year.

- The academia sector had expectations for some of the largest budget increases, with more than half of the respondents (52.8%) expecting increases of 5% and more. However, of all

sectors, academia showed the greatest percentage of sites (13.9%) expecting a decline in budget.

- No government site reported any expectations for budget declines next year.

Cloud Options Are Significantly Altering On-Premises Purchasing Plans

When asked about how plans for using external/public clouds would affect the choice of their next on-premises HPC system, a total of 59.6% indicated that their future on-premises HPC system would be affected. Specifically, 29.8% of respondents indicated that they would buy less on-prem HPC resources and use the extra money in the cloud, 13.5% indicated that they will delay on-prem HPC purchases and use the extra money in the cloud, and 11.3% said they would buy a different on-prem HPC system than previously planned because of cloud usage. Finally, 5% of total respondents indicated that they would stop buying on-prem resources entirely.

- The government (43.5%) and academia (58.3%) sector respondents did not select any of the scenarios offered, suggesting the need to further explore the various options and impacts of HPC cloud migration.
- Industry respondents seemed to have the most aggressive plans to buy less on-premises HPC resources and use the extra money in the cloud (37.8%) as well as delay on-prem HPC purchases and use the extra money in the cloud (19.5%).

FUTURE OUTLOOK

During the past 25 years, the HPC sector has been one of stable growth, rising to the challenges and opportunities of changing user requirements with a steady roll-out of technological innovation that saw the sector nearly quadruple in value from $7.2 billion in 1996 to about $27 billion in 2019, en route to a forecast of $38 billion in 2024. Key factors propelling this growth have been the continued requirements of scientific and engineering researchers for more computing power, the perennial competition among nations to host the fastest supercomputers, and the democratization of HPC brought about by commercial off-the-shelf technologies that have made HPC servers more affordable, even for many SMEs.

In recent years, market growth has been augmented by additional factors, especially the use of HPC resources for leading-edge AI and other high performance data analysis (HPDA) tasks, along with the increasing movement of these resources into enterprise data centers to support business operations. Looking forward, exascale systems, with their high price tags, are expected to fuel strong growth over the next 6 to 7 years.

About Hyperion Research, LLC

Hyperion Research provides data-driven research, analysis and recommendations for technologies, applications, and markets in high performance computing and emerging technology areas to help organizations worldwide make effective decisions and seize growth opportunities. Research includes market sizing and forecasting, share tracking, segmentation, technology, and related trend analysis, and both user & vendor analysis for multi-user technical server technology used for HPC and HPDA (high performance data analysis). Hyperion Research provides hought leadership and practical guidance for users, vendors and other members of the HPC community by focusing on key market and technology trends across government, industry, commerce, and academia.

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