

Quick Take

2022 Year-End Worldwide HPC On-premises Market Closes at \$30.8B, with Servers Representing Half of the Broader Market

Mark Nossokoff, Melissa Riddle, and Earl Joseph
August 2023

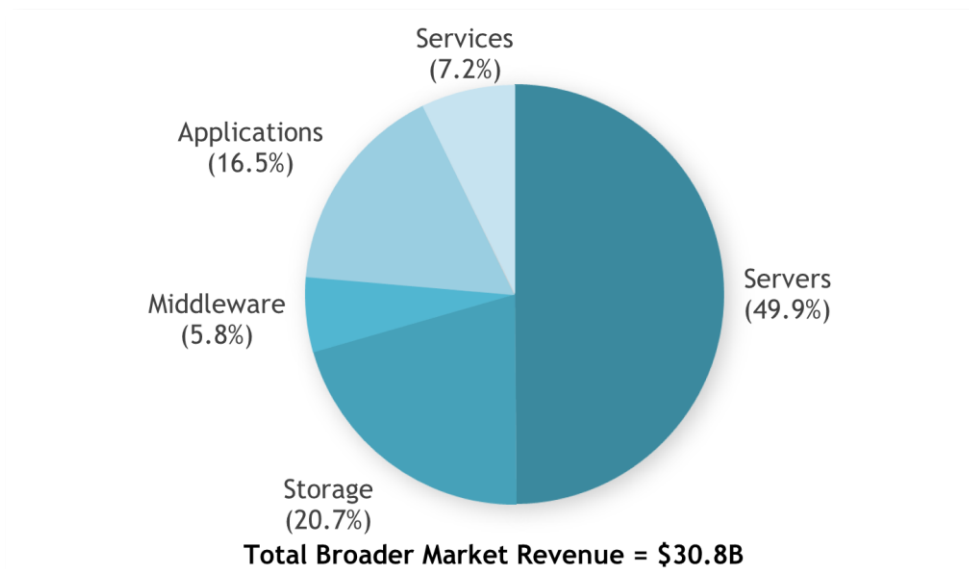
HYPERION RESEARCH OPINION

The global on-premises HPC broader market closed 2022 at \$30.8B. This represents a 3.6% growth rate over 2021 and a 5.1% CAGR from 2017-2022. The modest growth over 2021 is largely a result of 2021 being such a high growth year, along with global economic uncertainties in 2022. The overall market from 2017-2022 experienced some major inconsistencies, such as supply chain issues caused by the covid-19 pandemic on the downside and the acceptance of what are now the two systems atop the current Top500 list, Frontier and Fugaku.

Figure 1 reveals that servers was the largest broader market category in 2022, accounting for about half (49.9%) of all broader market revenues. Storage was the second largest category, making up about a fifth (20.7%) of broader market revenues and exhibiting the largest year-over-year growth of 6.6%.

FIGURE 1

Worldwide HPC Broader Market Revenues, 2022



Source: Hyperion Research, July 2023

WORLDWIDE HPC BROADER MARKET

Several categories are included as part of the Hyperion Research broader market taxonomy:

- **Technical servers:** systems which running computationally and/or data-intensive modeling and simulation applications more than 50% of the time. Systems acquired by cloud service providers for the purpose of hosting cloud workloads are excluded
- **Storage:** Additional storage purchased apart from the original procurement of a server.
- **Middleware:** Software licensing fees for middleware such as compilers and schedulers.
- **Applications:** Licensing fees paid for the use of proprietary application software.
- **Service:** Repair or maintenance services for HPC systems. It does not include general professional services.

Table 1 shows that HPC servers was the largest broader market segment with \$15.4 billion in revenues in 2022. Storage was the next largest with \$6.4 billion and was also the fastest growing with a 7.0% CAGR from 2017 to 2022. Middleware was the next fastest growing with a 5.8% CAGR. Middleware was the smallest broader market category in 2022 but still represented nearly \$2 billion in revenues. Overall, the broader market view represented just over double the HPC server value.

TABLE 1

Worldwide HPC On-Premises Broader Market

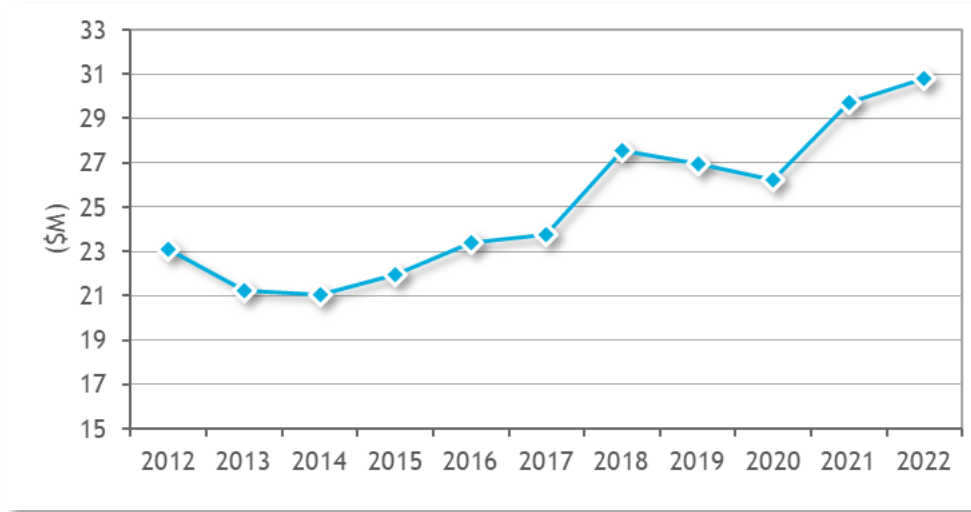
	2022 Revenue (\$M)	Five-Year CAGR 2017-2022
Servers	\$15,369	5.1%
Storage	\$6,380	7.0%
Middleware	\$1,781	5.8%
Applications	\$5,069	5.5%
Services	\$2,214	2.2%
Total HPC On-Premises Broader Market	\$30,813	5.3%

Source: Hyperion Research, July 2023

Figure 2 provides a more historical perspective and highlights the cyclical nature of the HPC market. Larger growth years are typically associated with the introduction and acceptance of new generations of leadership-class machines, while lower growth years reflect more incremental system investments and several periods of economic challenges.

FIGURE 2

Worldwide HPC Broader Market Revenues, 2017-2022 (\$M)



Source: Hyperion Research, July 2023

FUTURE OUTLOOK

While there was muted growth in 2022, growth rates are expected to rise over the next forecast period. The global economic downturn is projected to at least subside, if not experience a full reversal. The installation and acceptance of numerous pre-exascale and exascale systems worldwide are anticipated to boost HPC server revenues and HPC storage revenue growth is foreseen to accelerate due increased adoption of AI, including application of large language models, and the data required to produce quality and large-scale training and inferencing.

METHODOLOGY

Each quarter, Hyperion Research analysts conduct interviews with HPC users and major hardware original equipment manufacturers (OEMs) in the technical computing space to gather information on each vendor's quarterly sales. Specifically, Hyperion Research collects data on the number of HPC systems sold, system revenue, system average selling price (ASP), the competitive segment that a system falls into, architecture of the system, average number of processors per system, average number of nodes for each system, system revenue by geographical regions, and system revenue by operating systems.

Hyperion Research records all of the above-mentioned information each quarter and merges it into a master database, which contains over 50 data fields. Additional data fields are calculated or modeled. Hyperion Research then creates a pivot table. Data tables with different views of the technical computing market can then be created from this pivot table. Hyperion Research refers to this data structure as the "HPC QView" due to its quarterly nature. In addition to the HPC QView, Hyperion Research maintains other HPC technical computing data structures, for example:

- HPC server and processor sales and forecast by country database.
- HPC end-user demand-side data structure.
- HPC application/industry segmentation data structure.
- HPC application software data structure.

Note: Numbers in this document may not be exact due to rounding. Monetary values given in USD.

DEFINITIONS

Technical Computing (HPC)

Hyperion Research uses the terms *technical computing* and *high-performance computing (HPC)* to encompass the entire market for computer servers used by scientists, engineers, analysts, and other groups using computationally and/or data-intensive modeling and simulation applications. An on-premises system primarily used for HPC workloads (at least 50%) can be referred to as an HPC system, or simply an HPC. Systems acquired by cloud service providers for the purpose of hosting cloud workloads are excluded, as Hyperion Research separately tracks spending for HPC usage in cloud environments.

Technical servers range from small servers costing less than \$10,000 to the large-capability machines valued in hundreds of millions of dollars. In addition to scientific and engineering applications, technical computing includes related markets/applications areas such as economic analysis, financial analysis, animation, server-based gaming, digital content creation and management, business intelligence modeling, and homeland security database applications. These areas are included in the technical computing market based on a combination of historical development, applications type, computational intensity, and associations with traditional technical markets.

Initial System Shipment

Initial system shipment (ISS) characterizes the first sale of a system (previously referred to as a "new footprint") or major upgrades to existing systems. An ISS unit consists of processors, memory, embedded disk storage, cluster interconnect hardware/software, any bundled operating system(s), compiler(s), math/statistical library, parallel computing, database, and networking software that would

typically be configured when it leaves the OEM's factory floor. Note that separately acquired software is not included, e.g., often the database software is purchased separately as is most ISV application software. It is recognized as a shipment only when the complete system or cluster is installed and accepted. In addition, major upgrades that include processors are treated as an ISS in the quarter that it is accepted.

External user storage and all paid services are excluded from the ISS revenue value. If a system is paid for over multiple quarters, for example, via service or R&D contracts, Hyperion Research determines a value for the whole system when it is finally accepted by the buyer.

Accounting for Exascale and Pre-Exascale Systems

Exascale and pre-exascale systems typically have high costs and often involve a large portion of non-recurring engineering (NRE) in the server contract. As with other HPC servers, Hyperion Research recognizes the entire cost of the server contract as server revenue.

Hyperion Research's accounting rules record these server revenues as a lump sum at the time of system acceptance (as indicated by the purchaser), regardless of when actual payments may have been made. This large dollar amount accepted all at once may give the appearance of extraordinary growth or decline in a single quarter or year. Whenever an exceptionally costly system is accepted in a particular period, this will be clearly noted.

When necessary (such as when multiple exascale systems are accepted in the same period), these exceptionally large systems may be pulled out as a separate line item within the supercomputer segment to preserve forecasting of the general HPC market.

Competitive Segments

Based on input from HPC vendors and end users, Hyperion Research created four competitive segments to reflect the trends in the HPC technical server market. These competitive segments are based on average selling prices and defined as follows:

- **Supercomputers:** Technical servers that sell for \$500,000 or more.
- **Divisional servers:** Technical servers that sell for \$250,000-\$499,999.
- **Departmental servers:** Technical servers that sell for \$100,000-\$249,999.
- **Workgroup servers:** Technical servers that sell for less than \$100,000.

Broader Market Segments

Hyperion Research's quarterly tracking and related data structures are focused on servers. The broader HPC market is also tracked and forecasted by the following categories:

- **Storage:** Additional storage purchased apart from the original procurement of a server.
- **Middleware:** Software licensing fees for middleware such as compilers and schedulers.
- **Applications:** Licensing fees paid for the use of proprietary application software.
- **Service:** Repair or maintenance services for HPC systems. It does not include general professional services.

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 and vendor analysis for multi-user technical server technology used for HPC and HPDA (high performance data analysis). We provide thought 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.

Headquarters

365 Summit Avenue
St. Paul, MN 55102
USA
612.812.5798

www.hpcuserforum.com and www.HyperionResearch.com

Copyright Notice

Copyright 2023 Hyperion Research LLC. Reproduction is forbidden unless authorized. All rights reserved. Visit www.hpcuserforum.com or www.HyperionResearch.com to learn more. Please contact 612.812.5798 and/or email info@hyperionres.com for information on reprints, additional copies, web rights, or quoting permission.