Quick Take

HPC Supplants Smart Phones as Key Business Driver at World's Largest Chip Foundry

Steve Conway, Bob Sorensen, Alex Norton, and Earl Joseph
January 2018

HYPERION RESEARCH OPINION

Taiwan-based TSMC, the world's largest chip foundry, recently announced (https://www.eetimes.com/document.asp?doc_id=1332869) that high performance computing (HPC) has supplanted smart phones as the most important driver of its business, although presumably not yet the largest financially.

This is the latest proof that HPC's robust growth, from about $7 billion in 1996 to $22.4 billion in 2016 (en route to about $30 billion in 2021), has turned this once-modest market into an alluring, mission-critical target for many of the world's largest technology firms. Adding to the attraction is HPC's pivotal role at the forefront of R&D in multiple high performance data analysis (HPDA) markets with great economic promise: precision medicine, automated/networked driving systems, cyber security, the Internet of Things, and other use cases for artificial intelligence (i.e., machine learning and deep learning), along with cloud computing and, later, production-grade quantum computing.

The good news for HPC buyers and users is that HPC market growth will entice more vendors of all sizes to compete for your business, accelerating technology innovation and slowing price increases in the process. For HPC vendors, the opportunities—with attendant challenges—are to step up innovation cost-effectively and, more important still, to adopt a smart, realistic strategy for pursuing promising new areas of HPDA business.

SITUATION OVERVIEW

Mega-vendors. The recent TSMC announcement that HPC has replaced smart phones as the key business driver of the world's largest chip foundry is eye-opening but not entirely surprising. During the past two decades, as the worldwide HPC market tripled in size, a growing contingent of technology mega-firms have elevated HPC from a passive revenue source to an active target for serious revenue growth. Once HPC crossed the symbolic $10 billion line, more mega-vendors painted a bullseye on this market. A partial list of these giants includes Intel, NVIDIA, AMD, Amazon, Microsoft, Lenovo, Alibaba, Baidu, EMC, Dell, Atos, Huawei and others, with TSMC now joining their ranks alongside HPC stalwarts such as Cray, Fujitsu, HPE IBM and NEC.

In full-year 2016, HPC server system revenue alone amounted to a record $11.2 billion. That represented 20-25% of all server revenue, depending whose figures were used for all server revenue. Equally important, during the past 15 years, the revenue growth rate (CAGR) of HPC servers has handily outpaced enterprise server growth, which has been dampened by the success of server consolidation and virtualization. And now, HPC gear is being integrated into more and more enterprise

data centers to address data-intensive business tasks that enterprise servers can't handle well alone. (A fair number of HPC vendors attempting this leap have failed to recognize it as an integration challenge that can be very different from their customary mode of delivering monolithic solutions.)

SMEs. Robust market growth of the kind HPC has experienced also attracts innovative SMEs on both the vendor and user sides, and scores of SME vendors have entered the HPC-HPDA market in recent years. On the user side, hundreds of SMEs are getting first-time HPC experience around the world at publicly supported sites ranging from America's DOE and NSF labs to European centers such as EPCC, HLRS and TERATEC, to Asian standouts such as the Shanghai Supercomputer Center and the Singapore's National Supercomputer Center (NSCC).

In a 2017 worldwide study we conducted for NCSA with NSF support, on partnerships between publicly supported HPC centers and industrial users, only half (48%) of the industrial users had HPC systems of their own at the start of their collaborations with the centers. By the time the industrial partners were interviewed for the study, the figure for those (mostly SMEs) planning to acquire their first HPC system or expand an existing HPC system had risen to 71%. Typically, familiarity with HPC strongly encourages adoption.

New Markets. Nearly all the HPC market's impressive revenue expansion during the past two decades has been driven by the organic growth of traditional modeling and simulation (M&S). Hyperion expects the M&S portion of the market to continue growing at a healthy rate, propelled by the need to run larger versions of existing problems and more iterations, as well as by the continuing entry into the market of new adopters, especially SMEs. TSMC applies a fairly broad definition to the term HPC; most of the uses their definition covers are ones we'd also include (bitcoin is not one of those).

We expect the HPDA portion of the HPC server market to ramp up at an even faster rate to reach $4.0 billion, 27% of the entire $14.8 billion HPC server market, in 2021. $1.1 billion of the HPDA total, we forecast, will come from emerging new markets and use cases for HPC servers, especially fraud and anomaly detection, affinity marketing, business intelligence and precision medicine. These new markets will make heavy use of artificial intelligence methodologies such as machine and deep learning.

Here are a few of many recent quotes illustrating that HPC has become more important and is expanding beyond its historic boundaries:

- ***"Supercomputers are the engines to power the digital economy."*** (European Commission Vice President for the Digital Single Market Andrus Ansip)
- ***"HPC is at the forefront of R&D in AI."*** (Andrew Ng, former chief scientist, Baidu)
- ***"We are experiencing continued strength in high performance compute."*** (HPE CEO Meg Whitman in September 2017 quarterly earnings call)
- ***"Microsoft and Cray are working together…to run HPC and AI applications alongside their other cloud workloads directly on the Azure network."*** (Jason Zander, Corporate Vice President, Microsoft Azure Team)

FUTURE OUTLOOK

We remember that during the 1990s there was real concern within the HPC community that the supercomputer market might die out. Instead, during the decade of the 2000s the rise of clusters caused the HPC market to grow even faster than the markets for online gaming and flat-panel

televisions. Today, the HPC market is poised for further growth on both the M&S and HPDA sides, with new markets and use cases as important drivers.

Hyperion Research forecasts that the global market for HPC servers, storage and interconnects, application and system software, and support service will reach $30 billion in 2021. As noted above, the good news for HPC buyers and users is that HPC market growth will entice more vendors of all sizes to compete for your business, accelerating technology innovation and slowing price increases in the process. For HPC vendors, the opportunities—with attendant challenges—are to step up innovation cost-effectively and, more important still, to adopt a smart, realistic strategy for pursuing promising new areas of HPDA business.

About Hyperion Research Holdings, 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). 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.hyperionresearch.com and www.hpcuserforum.com
