



MARKET ANALYSIS

Worldwide Technical Computing Server Systems by Industry/Application Area 2015-2019 Forecast

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IDC OPINION

This document presents IDC's forecast for the technical computing systems market by industry/application areas for 2015-2019. The overall technical computing systems market was worth about \$10.22 billion in 2014, a slight decline of less than 1% from 2013. This slow growth was due, in large part, to a slowdown at the very high end of the market and uncertainties over the sale of IBM's x86 server lines to Lenovo. IDC projects that worldwide technical computing systems revenue will grow by about half a billion dollars to \$10.71 billion in 2015. The market will grow from about 133,000 units in 2014 to over 143,000 units in 2015, driven in large part by sales in the high-volume, sub-\$100,000 technical computing systems sector. By 2019, IDC sees total worldwide technical computing systems revenue topping \$15.2 billion and the number of worldwide technical computing systems units exceeding 186,000, representing 2014-2019 CAGRs of 8.2% and 6.9%, respectively. Finally, IDC expects the related average selling prices (ASPs) for the technical computing systems market will show only moderate growth from 2014 to 2019 – from \$77,000 to \$81,000 – with a small 1.2% CAGR. ASPs for the overall market will be tempered by continued unit growth in the high-volume workgroup competitive segment. In addition:

- In 2014, for the total \$10.22 billion worldwide technical computing systems market, the academic sector was the largest industry/application area, worth \$1.99 billion and representing more than 19.5% of the total market, closely followed by the government laboratories and research centers sector at \$1.97 billion. Adding in the defense sector and weather sector – with about \$935 million and \$435 million, respectively, in 2014 – these four public sector application areas make up about 52% of the overall market. Within the remaining 48%, CAE and biosciences – with 2014 markets worth about \$1.18 billion and \$1.0 billion, respectively – are the two largest industry/application areas.
- IDC expects that the overall worldwide technical computing systems market will grow to about \$15.16 billion in 2019, representing an overall 2014-2019 CAGR of 8.2%. IDC projects that some of the fastest-growing sectors in the worldwide technical computing systems market will come from the defense and government laboratory sectors, with 2014-2019 CAGRs of 10.4% and 10.2%, respectively. Within the commercial sectors, IDC sees above-average growth rates for 2014-2019 for the economic/financial (CAGR of 9.5%), EDA/IT/ISV (CAGR of 9.4%), and geosciences (CAGR of 9.1%) sectors. Finally, the sectors slated for the slowest growth rates – in either the public or commercial space – are mechanical design and chemical engineering with 2014-2019 CAGRs of 1.6% and 5.1%, respectively.

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IN THIS STUDY

This IDC study presents a forecast for the technical computing systems market by industry/application area for 2015-2019. Included in this study is a listing of major assumptions that IDC expects to have a significant impact on future developments including a slowdown at the high end of the HPC market, readjustments within the server sector from the recent IBM/Lenovo deal, and increased efforts to develop an HPC leadership role in the EU and China. Additional, but no less important, assumptions that entered into the IDC forecasts include the continuing recovery of the global economy, increased government procurements of systems for a range of increasingly complex and ambitious national economics programs, and significant growth in key commercial industry/application areas including the economic/financial sector. Finally, the study provides detailed data and projections on the worldwide high-performance technical systems total market forecast by revenue, units, and ASP from 2013 to 2019, as well as related industry/application area status and projections to 2019.

Methodology

The data and trend information in this study was compiled through extensive surveys and in-depth interviews with technology, marketing, and product management executives at leading technical computing systems vendors. Secondary sources such as third-party suppliers, resellers, press announcements, trade publications, and other materials in IDC's extensive information base were used to supplement primary research.

Note: All numbers in this document may not be exact due to rounding.

SITUATION OVERVIEW

The overall technical computing systems market was worth about \$10.22 billion in 2014, a slight decline of less than 1% from 2013. This slow growth was due, in large part, to a slow down at the very high end of the market and uncertainties over the sale of IBM's x86 server lines to Lenovo.

FUTURE OUTLOOK

Forecast and Assumptions

IDC used a number of additional key assumptions to help scope its technical computing systems forecast including the recovery of the global economy and its positive impact on overall IT markets, a strong potential for growth in high-performance data analysis (HPDA) within the bioscience sector, and increased investment by the financial sector, especially to support new high-frequency trading algorithms. Table 1 provides the top 3 assumptions and Table 2 provides the key forecast assumptions for this market for 2015-2019.

TABLE 1

Top 3 Assumptions for the Worldwide Technical Computing Systems Market, 2015-2019

Market Force	IDC Assumption	Significance	Changes to This Assumption That Could Affect Current Forecast	Comments
High-end slowdown	The very high end of the high-performance computing (HPC) market has been stalled for almost two years, after a major growth cycle. IDC expects that 2015 will not have any major surprises, and 2015 will be slightly higher than 2014. Growth at the high end in 2015 will depend on the global exascale race and loosening of government HPC budgets in a time of overall slow economic growth. High-end HPC server revenue is also paced by the timing of new generations of base processors (CPUs).	The high end of the technical computing systems market has been the growth driver since 2009, and the impact of the change in the TOP10, or even the TOP5, systems has a major impact on the overall market growth rates. In 2012, the TOP5 HPC sales represented over 10% of HPC server revenue. The gap between users anticipating exascale performance and what most mainstream HPCs users seek may widen, creating a disconnect between the two sectors.	IDC is expecting more softness at the high end for at least six months and possibly another full year.	This is a top driver of the HPC server market growth rate. While the lower 90% of the HPC market is back to a moderate growth rate, the very large sales continue to have a major impact. High-end HPC developers will need to address new application areas — especially high-performance data analysis (HPDA) — to meet the changing demands of both public and private users.

TABLE 1

Top 3 Assumptions for the Worldwide Technical Computing Systems Market, 2015-2019

Market Force	IDC Assumption	Significance	Changes to This Assumption That Could Affect Current Forecast	Comments
Vendor transition	The sale of IBM's x86 server business to Lenovo has caused some IBM clients to delay purchases, while the uncertainty about the ability of government agencies in the United States and a few other nations to purchase high-end x86 servers from Lenovo remains unresolved. In addition, the global competition for the IBM installed base has delayed purchases. These issues should settle down by mid-2015, but by then, multiple vendors will capture some business from IBM and from accounts intended for Lenovo. Another important factor is Intel "moving up the food chain" to compete in the market for interconnect fabrics and perhaps beyond. Intel has already assumed a more prominent role in multiple large HPC system procurements.	The IBM-Lenovo deal caused major purchase delays in 2014, helping to slow the overall HPC server market in 2014. It may cause a sales spike in 1Q15 or 2Q15 as buyers' purchases catch up with the delays. Intel's expanding role is already being felt in the HPC marketplace and is likely to assume high significance during the forecast period.	China's Lenovo and a growing host of Taiwanese and Chinese white-box suppliers could create significant turmoil in the overall server market (not just HPC) by driving down margins for the established, primarily U.S., server supplier base, ultimately restricting the U.S. suppliers' ability to offer servers designed to compete at the highest level of performance.	IDC expects that the global HPC server market landscape will be transformed over the next three to five years with notable gains coming from both foreign-branded and white-box vendors, as well as a shuffling of market share within the U.S. vendor pool.
HPC leadership	The European Commission adopted an ambitious plan to double HPC funding through 2020, but the extent to which the plan is realized remains to be seen. China is becoming a much larger player in both having a top HPC	Competition in the global high-end HPC market continues to heat up, especially as the race moves away from primarily hardware capabilities to innovative system design and associated software for a growing	A top high-end HPC system can cost well over \$100 million and in one case more than \$500 million. The deployment or nondeployment of one or two of these systems can	We expect that more countries will enter the race for HPC leadership, and this could create a number of new players at the very high end of the HPC market. It is unclear if this will drive additional growth in

TABLE 1

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	<p>vendor and becoming a major purchaser of large HPC servers. Lenovo could capture a significant share of the HPC market in China in the next few years, bolstering China's efforts to become a commercial HPC powerhouse. The United States is still the largest market for HPC servers, but its high-end plans are uncertain. Russia and India announced plans for increasing funding for HPC, but they may be too strapped for cash to realize the vision. The wild card is how the United States will respond to this increased competition.</p>	<p>HPC and HPDA application base. The supercomputer segment took a step back in 2013 after the major growth spurt in preceding years. In 2013, supercomputers accounted for slightly less than half of all HPC server revenue.</p>	<p>significantly impact the yearly market. However, leadership at the highest end of HPC does not necessarily transfer to the HPC sector writ large.</p>	<p>the high end or simply present the same size pie to a growing number of suppliers. Ultimately, the race to exascale and beyond will be determined as much by the ability and willingness of competing nations to spend money as by technology advances. This in turn will depend on how vital nations see HPC for their scientific and economic standing.</p>

Source: IDC, 2015

TABLE 2

Key Forecast Assumptions for the Worldwide Technical Computing Systems Market, 2015-2019

Market Force	IDC Assumption	Impact	Accelerator/ Inhibitor/ Neutral	Certainty of Assumption
Top 3 assumptions				

TABLE 2

Key Forecast Assumptions for the Worldwide Technical Computing Systems Market, 2015-2019

Market Force	IDC Assumption	Impact	Accelerator/ Inhibitor/ Neutral	Certainty of Assumption
High-end slowdown	The very high end of the high-performance computing (HPC) market has been stalled for almost two years, after a major growth cycle. IDC expects that 2015 will not have any major surprises, and 2015 will be slightly higher than 2014. Growth at the high end in 2015 will depend on the global exascale race and loosening of government HPC budgets in a time of overall slow economic growth. High-end HPC server revenue is also paced by the timing of new generations of base processors (CPUs).	High. The high end of the technical server market has been the growth driver since 2009, and the impact of the change in the TOP10, or even the TOP5, systems has a major impact on the overall market growth rates. In 2012, the TOP5 HPC sales represented over 10% of HPC server revenue. The gap between users anticipating exascale performance and what most mainstream HPCs users seek may widen, creating a disconnect between the two sectors.	↓	★★★★☆

TABLE 2

Key Forecast Assumptions for the Worldwide Technical Computing Systems Market, 2015-2019

Market Force	IDC Assumption	Impact	Accelerator/ Inhibitor/ Neutral	Certainty of Assumption
Vendor transition	<p>The sale of IBM's x86 server business to Lenovo has caused some IBM clients to delay purchases, while the uncertainty about the ability of government agencies in the United States and a few other nations to purchase high-end x86 servers from Lenovo remains unresolved. In addition, the global competition for the IBM installed base has delayed purchases. These issues should settle down by mid-2015, but by then, multiple vendors will capture some business from IBM and from accounts intended for Lenovo. Another important factor is Intel "moving up the food chain" to compete in the market for interconnect fabrics and perhaps beyond. Intel has already assumed a more prominent role in multiple large HPC system procurements.</p>	<p>High. The IBM-Lenovo deal caused major purchase delays in 2014, helping to slow the overall HPC server market in 2014. It may cause a sales spike in 1Q15 or 2Q15 as buyers' purchases catch up with the delays. Intel's expanding role is already being felt in the HPC marketplace and is likely to assume high significance during the forecast period.</p>	<p>↔</p>	<p>★★★★☆</p>

TABLE 2

Key Forecast Assumptions for the Worldwide Technical Computing Systems Market, 2015-2019

Market Force	IDC Assumption	Impact	Accelerator/ Inhibitor/ Neutral	Certainty of Assumption
HPC leadership	The European Commission adopted an ambitious plan to double HPC funding through 2020, but the extent to which the plan is realized remains to be seen. China is becoming a much larger player in both having a top HPC vendor and becoming a major purchaser of large HPC servers. Lenovo could capture a significant share of the HPC market in China in the next few years, bolstering China's efforts to become a commercial HPC powerhouse. The United States is still the largest market for HPC servers, but its high-end plans are uncertain. Russia and India announced plans for increasing funding for HPC, but they may be too strapped for cash to realize the vision. The wild card is how the United States will respond to this increased competition.	High. Competition in the global high-end HPC market continues to heat up, especially as the race moves away from primarily hardware capabilities to innovative system design and associated software for a growing HPC and high-performance data analysis (HPDA) application base. The supercomputer segment took a step back in 2013 after the major growth spurt in preceding years. In 2013, supercomputers accounted for slightly less than half of all HPC server revenue.	↑	★★★★☆
Overall HPC market trends				
Economic impacts on HPC	The recovery of the global economy will continue to have a positive impact on overall IT markets, IT server spending, and HPC server spending.	High. HPC server sales will continue to grow following the decline in 2013, after the positive momentum in 2010, 2011, and 2012. Pent-up demand at the low end should fuel growth as the global economy rebounds. IDC forecasts growth through 2019 for all HPC competitive segments.	↑	★★★★☆
High-end HPC supercomputer	Funding will likely increase for large-scale HPC procurements in 2016–2019. 2012 was an	Moderate. This "lumpy" segment will remain subject to major swings on a quarter-to-	↑	★★★★☆

TABLE 2

Key Forecast Assumptions for the Worldwide Technical Computing Systems Market, 2015-2019

Market Force	IDC Assumption	Impact	Accelerator/ Inhibitor/ Neutral	Certainty of Assumption
sector	exceptionally strong year for the supercomputer sector, but year-over-year growth of nearly 30% is unsustainable, as shown by the recent slowdown. We believe the supercomputer segment will continue to grow at a robust, more moderate rate.	quarter basis due to the relatively small number of large transactions that occur in this segment. Annual swings can also happen, especially if one or more anticipated fourth-quarter large sales slip into the following year or conversely if one or more large sales accept in the fourth quarter instead of the following first quarter.		
Mainstream midrange HPC market	The midrange HPC market revenue profile will see healthy growth in the forecast period as macroeconomic conditions improve.	High. 1Q13 showed the first sign of strong recovery with a healthy increase in HPC server spending. Both 2013 and 2014 results increased our belief that midrange HPC is back on a growth track.	↑	★★★★☆
Mainstream low-end HPC market	The low-end HPC market resumed revenue growth in 2013. During the forecast period, as macroeconomic conditions improve, discretionary budgets will slowly come back and the low-end market will expand again at a healthy rate.	High. We expect CAGR during the forecast period to be near 10% as the improving economy taps demand pent up during the most difficult period of the recession.	↑	★★★★☆

TABLE 2

Key Forecast Assumptions for the Worldwide Technical Computing Systems Market, 2015-2019

Market Force	IDC Assumption	Impact	Accelerator/ Inhibitor/ Neutral	Certainty of Assumption
HPC buyer segment trends				
HPC sales in government and academic sectors	Government and university HPC purchasing will likely remain a bright spot during the recovery period, although there is uncertainty in funding levels for HPC in many areas of the world as governments evaluate trade-offs with other national priorities.	Moderate. Government and university HPC purchases have longer sales cycles, and budgets change more slowly, so the impact will not be consistent from quarter to quarter. One or two very large system sales can affect revenue for a given year (e.g., the \$550 million for RIKEN in 2012 made the year exceptionally strong at the high end).	↑	★★★★☆
National security and homeland defense	National security and homeland defense operations will continue to develop additional requirements for HPC systems, especially in HPDA applications. New applications areas for HPDA may be based on database and pattern matching requirements.	Moderate. Requirements will lead to increased demand through the forecast period.	↑	★★★★☆

TABLE 2

Key Forecast Assumptions for the Worldwide Technical Computing Systems Market, 2015-2019

Market Force	IDC Assumption	Impact	Accelerator/ Inhibitor/ Neutral	Certainty of Assumption
Energy sectors	We are in an unusual period when energy demand and supply (e.g., fracking) are both increasing. In the United States, gasoline prices have dropped for the moment but it is difficult to predict how the interactions of growing supply and growing demand will affect the bottom lines of oil and gas (O&G) companies in the long run. As long as energy prices don't go into a sustained depression, IDC expects O&G majors to continue their current competition to acquire the world's largest private sector supercomputers for seismic analysis and reservoir modeling, along with HPC systems for alternative energy research.	High. R&D for alternative energy sources, nuclear, coal, and oil and gas are expected to be strong growth segments, as long as energy prices remain reasonably strong.	↑	★★★★☆
Bio-life sciences	Perhaps no field has stronger potential for benefiting from HPDA than bioscience. HPDA applications already in motion in this varied field range from advanced research — notably in genomics, proteomics, epidemiology, and systems biology — to commercial initiatives to develop new drugs and medical treatments, agricultural pesticides, and other bio-products.	High. IDC expects global initiatives to improve healthcare quality while controlling costs to drive strong growth in this sector.	↑	★★★★☆

TABLE 2

Key Forecast Assumptions for the Worldwide Technical Computing Systems Market, 2015-2019

Market Force	IDC Assumption	Impact	Accelerator/ Inhibitor/ Neutral	Certainty of Assumption
Gaming, digital content, and entertainment sectors	The use of HPC to create better large-scale games, digital content, animation, and more interesting videos/movies is expected to grow at a healthy rate. Not long ago, U.S. companies in this sector used HPC as a way to compete against nations with lower labor costs. Increasingly, HPC has become a great equalizer as companies in more nations have learned to exploit it in this sector.	Moderate. This will lead to an increase in demand for technical servers.	↑	★★★★☆☆
Automotive segment	The crisis in the auto industry put some HPC procurements on hold starting in early 2008. Because of the auto industry recovery in 2012 and 2013, we are seeing renewed momentum as automakers strive to compete globally for renewed consumer demand.	Moderate. The automotive industry is creating strategies for employing HPC to a greater extent during the continuing recovery.	↑	★★★★☆☆
Worldwide finance segment	IDC foresees increased investment in HPC, especially to support new high-frequency trading (HFT) algorithms. HPDA applications will cause strong growth.	High. Many new HPC procurements will be used for running new algorithms faster and more accurately.	↑	★★★★☆☆

TABLE 2

Key Forecast Assumptions for the Worldwide Technical Computing Systems Market, 2015-2019

Market Force	IDC Assumption	Impact	Accelerator/ Inhibitor/ Neutral	Certainty of Assumption
High-performance data analysis (big data needing HPC)	Data-intensive computing has long been a part of HPC, but newer analytical methods using Hadoop and other tools (e.g., graph analytics) will grow the big data market in HPC (i.e., the HPDA market). In addition, the data explosion in HPC will drive larger system and storage purchases. In the long term, HPDA will shift HPC architectures away from their current extreme compute centrism. There is uncertainty as to how many of these new applications will be run in cloud-based datacenters.	High. We expect most buyers to purchase the same systems for traditional HPC and newer big data uses, but the new methods will increase average system sizes. However, a new wave of commercial firms are adopting HPC to tackle fraud and other daunting analytics challenges. Over a longer period, HPC in the cloud could significantly alter the trajectory of this sector should it prove technically capable and economically justifiable.	↑	★★★★☆

Legend: ★☆☆☆☆ very low, ★★☆☆☆ low, ★★★☆☆ moderate, ★★★★☆ high, ★★★★★ very high

Source: IDC, 2015

Worldwide Technical Computing Systems Market Forecast

The overall technical computing systems market was worth about \$10.22 billion in 2014, a slight decline of less than 1% from 2013. This slow growth was due, in large part, to a slowdown at the very high end of the market and uncertainties over the sale of IBM's x86 server lines to Lenovo. For 2015, IDC projects about 5% growth over 2014 and is projecting a strong 2014-2019 CAGR of 8.2%.

- IDC projects that worldwide technical computing systems revenue will grow by about half a billion dollars to about \$10.71 billion in 2015. Meanwhile, worldwide technical computing systems server units will grow from about 133,000 in 2014 to over 143,000 in 2015, as sales in the high-volume, sub-\$100,000 technical computing systems workgroup server segment continue to grow.
- By 2019, IDC sees worldwide technical computing systems revenue topping \$15.2 billion and the number of worldwide technical computing systems server units exceeding 186,000, representing 2014-2019 CAGRs of 8.2% and 6.9%, respectively. Finally, IDC expects the ASP for the technical computing systems market will show only moderate growth from 2014 to 2019 – from \$77,000 to \$81,000 – with a small 1.2% CAGR.

Optimistic estimates for future technical computing systems growth for at least the next three years are driven by the potential for new users entering the HPC sector that include new commercial and government sites increasing their capabilities in HPDA, sites with large IT infrastructures that are increasingly turning to HPC to improve internal management complexities, the profusion of Internet of Things (IoT) applications and the necessary compute power needed to collect and analyze large IoT-driven data sets, and a projected upswing from SMBs looking to boost competitive advantage through the use of high-performance technical systems.

Table 3 and Figures 1 and 2 provide the forecast for the worldwide technical computing systems market by revenue, units, and ASP through to 2019.

TABLE 3

Worldwide Technical Computing Systems Revenue, Shipment, and Average Selling Price, 2013-2019

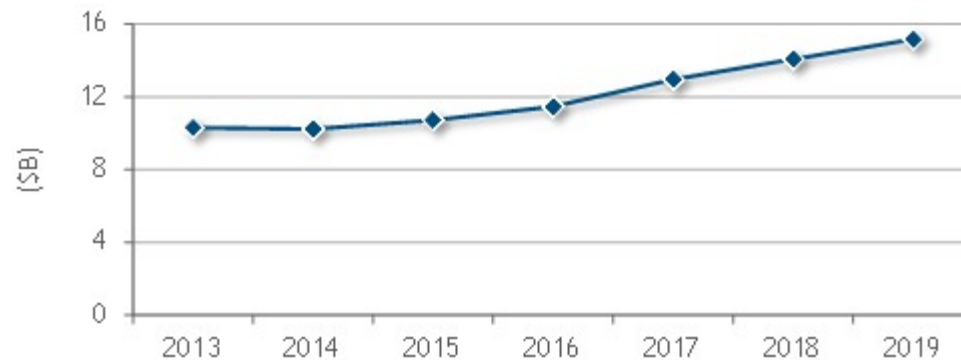
	2013	2014	2015	2016	2017	2018	2019	2013–2014 Growth (%)	2014–2019 CAGR (%)
Revenue (\$M)	10,299.0	10,222.0	10,718.0	11,467.0	12,958.0	14,073.0	15,165.0	-0.7	8.2
Shipments	123,982	133,392	143,643	153,483	165,498	176,385	186,418	7.6	6.9
ASP (\$000)	83	77	75	75	78	80	81	-7.7	1.2

Note: See Table 1 for top 3 assumptions and Table 2 for key forecast assumptions.

Source: IDC, 2015

FIGURE 1

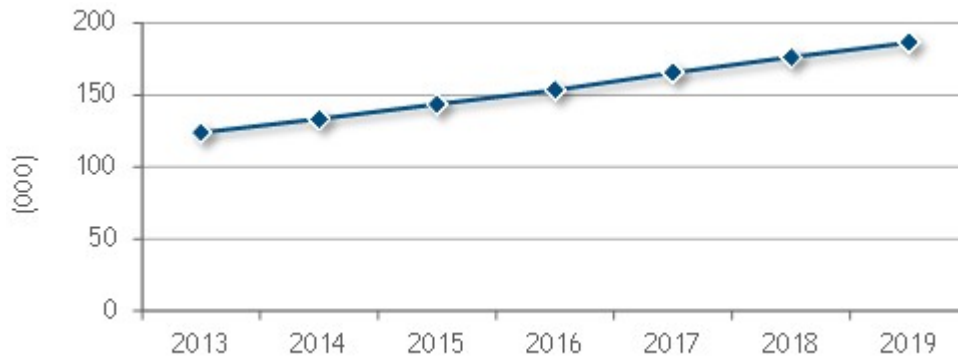
Worldwide Technical Computing Systems Revenue, 2013-2019



Source: IDC, 2015

FIGURE 2

Worldwide Technical Computing Systems Shipments, 2013-2019



Source: IDC, 2015

Worldwide Technical Computing Systems Industry/Application Areas Forecast

In 2014, for the total \$10.22 billion worldwide technical computing systems market, the academic sector was the largest industry/application area, worth \$1.99 billion and representing more than 19.5% of the total market, closely followed by the government laboratories and research centers at \$1.97 billion. This is a change from 2013 when the government laboratory sector was the largest single sector in IDC coverage and is a result of both declining government purchases and increasing academic purchases. Adding in the defense sector and weather sector – with about \$935 million and \$435 million, respectively, in 2014 – these four public sector industry/application areas make up about 52% of the overall market. Within the remaining 48%, CAE and biosciences – with 2014 markets worth about \$1.18 billion and \$1.0 billion, respectively – are the two largest sectors.

IDC expects by 2019 that the overall worldwide technical computing systems market will grow to about \$15.16 billion, representing an overall 2014-2019 CAGR of 8.2%. Government labs will once again be the single-largest industry/application area in the worldwide market, with overall revenue projected to be worth about \$3.21 billion – about 21% of the overall projected market. Further:

- IDC projects that some of the fastest growth in the worldwide technical computing systems market will come from the defense and government laboratory sectors with 2014-2019 CAGRs of 10.4% and 10.2%, respectively.
- By 2019, IDC expects that noncommercial industry/application areas – comprised of the academic, government, defense, and weather sectors – will still represent about 52% of the overall worldwide technical computing systems market. Within the commercial sector, IDC sees better-than-average growth rates for key sectors in 2014-2019 that include economic/financial (CAGR of 9.5%), EDA/IT/ISV (CAGR of 9.4%), and geosciences (CAGR of 9.1%) (refer to Table 5 for detailed explanations of industry/application areas definitions). Finally, the sectors slated for the slowest growth rates are mechanical design and chemical engineering with 2014-2019 CAGRs of 1.6% and 5.1%, respectively.

Table 4 and Figure 3 provide additional details on worldwide technical computing systems by industry/application area status and projections for 2013-2019.

TABLE 4**Worldwide Technical Computing Systems Revenue by Industry/Application Area, 2013-2019 (\$M)**

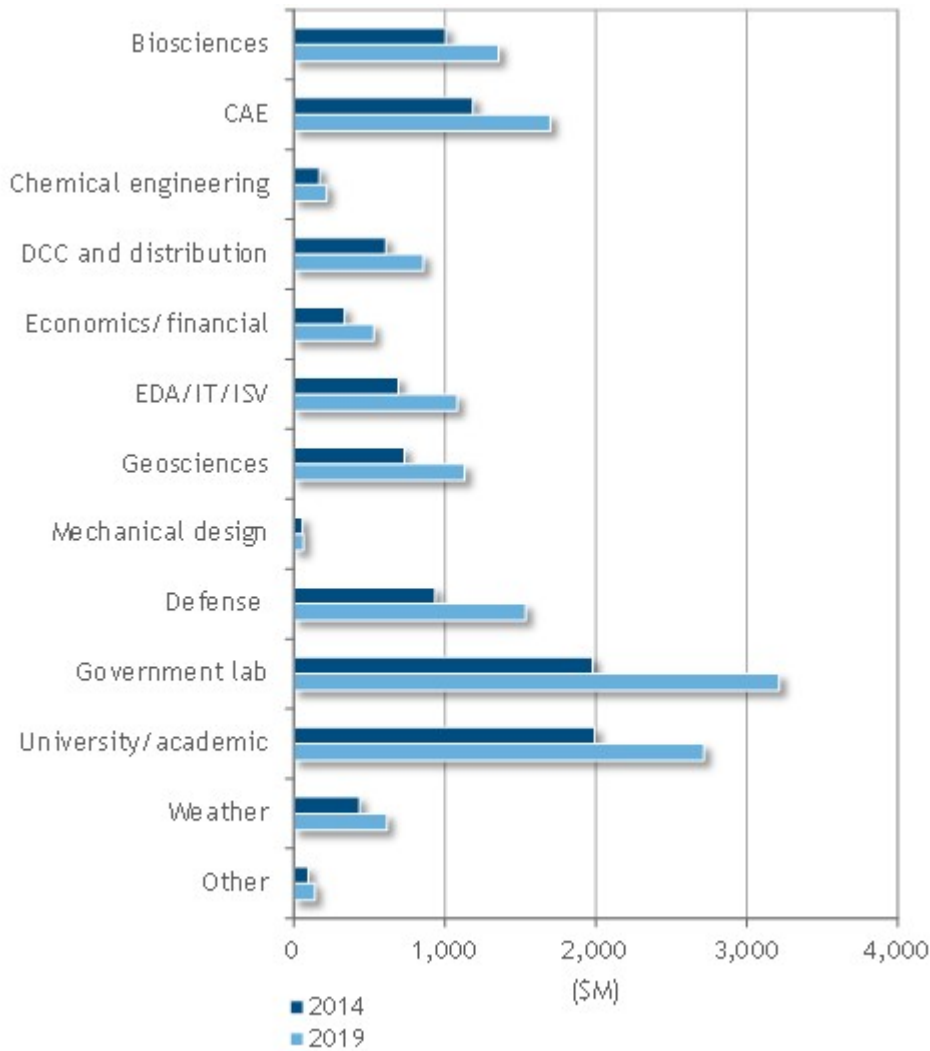
	2013	2014	2015	2016	2017	2018	2019	2013–2014 Growth (%)	2014–2019 CAGR (%)
Biosciences	1,069.9	1,004.8	1,028.8	1,074.4	1,177.8	1,253.7	1,356.5	-6.1	6.2
CAE	1,152.0	1,186.3	1,225.6	1,280.3	1,438.7	1,570.4	1,699.3	3.0	7.5
Chemical engineering	177.2	169.6	177.2	187.2	194.6	200.8	217.3	-4.3	5.1
DCC and distribution	598.7	608.5	664.9	708.3	737.6	793.1	858.2	1.6	7.1
Economics/ financial	336.1	335.8	366.1	403.6	445.7	488.9	529.1	-0.1	9.5
EDA/IT/ISV	665.0	690.9	761.4	842.3	931.1	1,001.2	1,083.3	3.9	9.4
Geosciences	749.4	731.8	790.6	863.7	972.8	1,046.0	1,131.9	-2.4	9.1
Mechanical design	60.3	58.4	57.6	58.5	59.7	58.3	63.1	-3.1	1.6
Defense	1,007.8	934.6	1,075.8	1,152.1	1,326.5	1,419.1	1,535.6	-7.3	10.4
Government lab	2,048.2	1,977.6	2,087.6	2,268.3	2,733.9	3,031.6	3,216.4	-3.4	10.2
University/ academic	1,894.4	1,993.4	1,927.4	2,024.9	2,288.3	2,510.1	2,716.1	5.2	6.4
Weather	444.1	435.1	465.7	502.0	530.0	569.9	616.7	-2.0	7.2
Other	96.0	95.3	89.3	101.4	121.2	129.8	141.4	-0.3	8.1
Total	10,299.0	10,222.0	10,718.0	11,467.0	12,958.0	14,073.0	15,165.0	-15.3	97.8

Note: See Table 1 for top 3 assumptions and Table 2 for key forecast assumptions.

Source: IDC, 2015

FIGURE 3

Worldwide Technical Computing Systems Revenue by Industry/Application Area, 2014 and 2019



Source: IDC, 2015

ESSENTIAL GUIDANCE

This document presents IDC's forecast for the worldwide technical computing systems market by industry/application areas for 2015-2019. There are a number of overarching trends with the technical server sector writ large that must be taken into account by any supplier or user of technical servers across the entire industry/application area space. These trends include:

- IDC projects that the high-performance data analytics market will grow and continue to diversify. Specific projections call for HPDA servers to grow at a CAGR of 23.5% from 2013 to

2018 to reach \$2.6 billion. Meanwhile, at the same time, HPDA storage is projected to grow at an even faster rate of 26.5% CAGR, with a market worth about \$1.5 billion by 2018. IDC research showed that 67% of all worldwide technical computing system sites were using some form of HPDA in 2014. Application developers and users in a wide range of industry/application areas should be on the lookout for new HPDA functionality, offering new opportunities within existing industry/application areas – most notably the finance and bioinformatics sectors – as well as potentially creating new industry/application areas, such as deep learning and technical server-based transactional analysis.

- IDC expects that, within the base processor sector, x86-based systems will continue to capture over 80% of all technical computing server revenue. However, the OpenPOWER Foundation presents a new alternative to Intel's counterpart products, and many server suppliers looking to differentiate their products are looking to offer ARM-based options. Industry/application areas suppliers may see growing opportunities to offer new or existing application capability on some of these new hardware platforms as a way to stand out in the market space and perhaps even catch a growing trend early on. IDC expects that gains will be small at first, and future viability will depend heavily on the development of a heretofore limited HPC software ecosystem for these non-x86 chip offerings.
- IDC projects that cloud computing will show steady growth and influence in the technical computing market, noting that the proportion of sites exploiting cloud computing for some technical computing workloads rose from 13.8% in 2011 to 23.5% in 2013 and 34.1% in 2015. Currently, cloud use is equally divided between public and private platforms, but IDC expects to see hybrid clouds quickly gaining ground as cloud users increasingly seek to balance in-house versus contract cloud computer resources with an eye toward better performance, lower cost, ease of provisioning, and better response time to varying user demands. Developers across a wide range of industry/application areas will increasingly need to consider their ability to develop and support key applications seamlessly across the span of growing technical computing systems hosting options, from 100% in-house developments to complete migration to cloud-based solutions – and the myriad hybrid options in between. Likewise, users will need to carefully consider their current and future plans for fulfilling their computational needs and plan for an effective hardware and software complement that supports that vision.
- Ultimately, IDC believes that the technical server sector is an era of rich technical innovation, driven by a vibrant mix of contributions from large and small companies, as well as government and academia. Several factors will combine to sustain rich innovation:
 - Strong technical server market growth makes it increasingly attractive for vendors.
 - The technical server market is exploiting more commercial baseline technologies, driving down costs, but offering more opportunities for unique architectures and related systems configurations.
 - Exascale funding will induce vendors to tackle the large and diverse set of exascale challenges, ensuring a spate of new ideas needed to continue the technical server sector's impressive and decades-long delivery of ever-increasing performance.
 - Innovation for exascale systems will invariably flow down, benefiting smaller technical servers suppliers and perhaps creating whole new classes of technical computing systems application spaces.

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- *China Eyes 10,000-Fold Data Reduction for Internet of Things* (IDC #lcUS24392513, October 2013)
- *High-Performance Data Analysis in the Life Sciences: HPC User Forum, September 2013, Boston, Massachusetts* (IDC #243774, October 2013)
- *Worldwide High-Performance Data Analysis 2013-2017 Forecast* (IDC #241315, June 2013)

Definitions

Table 5 provides IDC's definitions for categorizing and tracking industry/application areas.

TABLE 5

IDC's Worldwide Industry/Application Area Category Definitions

Industry/Application Area	Category Definition
Biological sciences	This workload centers on applications such as genomics, proteomics, pharmaceutical research, bioinformatics, drug discovery, bioanalytic portals, ASP-type service providers, and agricultural research. Computational techniques include database searching and management, molecular modeling, and computational chemistry. These workloads appear in commercial, academic, and institutional research environments. Systems that are specifically targeted for these workloads should be included; systems purchased for more general scientific and R&D environments should be counted in the university and academic, national laboratory and research center, or national defense segments.
Chemical engineering	This workload centers on applications such as molecular modeling, computational chemistry, process design, and chemical analysis. It includes all chemistry applications that are not directly related to biosciences research and development. These workloads appear in commercial, academic, and institutional research environments.
Computer-aided design (CAD) and drafting	This workload centers on applications such as mechanical computer-aided design; 2D, 2.5D, and 3D design and drafting; 3D wire frame; and civil engineering design. Design and drafting applications require graphics capability but are less compute intensive than design engineering and analysis applications. CAD tasks are typically done by designers and drafters. Users are found primarily in discrete manufacturing industries such as automotive, aerospace, heavy machinery, and consumer goods.
Computer-aided engineering (CAE) and mechanical design and analysis	This workload centers on applications such as finite element modeling and analysis, mechanical computer-aided engineering, civil engineering, structural analysis, computation fluid dynamics (CFD), crash, NVH, and solid modeling. Like CAD applications, these CAE tasks are used to design automobiles, aircraft, running shoes, ski equipment, sail boards, beer bottles, and other everyday items. Workloads include those tasks generally accomplished by engineers, not drafters.
Digital content creation and distribution (DCC&D)	This workload category centers on applications such as 2D and 3D animation, film and video editing and production, and multimedia authoring for both CD and Web pages that utilize sophisticated graphics content. This category also includes servers used for image rendering, content management, and distribution of finished products for areas such as film, TV, commercial animation, advertising, product styling, and industrial design, as well as servers used for large-scale games. These workloads are developed in large part in concert with scientific visualization research and technologies. In addition, the creation of special effects and animation for motion pictures requires significant amounts of computational capacity.

TABLE 5

IDC's Worldwide Industry/Application Area Category Definitions

Industry/Application Area	Category Definition
Economic and financial modeling	This workload centers on applications such as econometric modeling, portfolio management, stock market and economic forecasting, and financial analysis. The segment includes both trader and computationally intensive nontrader tasks. In this case, we placed this workload in technical computing because of the numerically intensive applications of most applications and their association with economic modeling and simulation-based research.
Electronic design and analysis/IT (EDA/IT/ISV)	This workload area covers all electrical/electronic tasks, including schematic capture, logic synthesis, circuit simulation, PCB routing, and system modeling. It also includes the use of technical servers within IT manufactures for R&D, system development and testing, application development, software development, and other product design and testing.
Geosciences and geoen지니어ing	This workload includes earth resources–related applications such as seismic analysis, oil services, and reservoir modeling. These applications are used in both institutional research and commercial enterprises. Geoscience can also include areas such as mining, natural resource management, geographic information systems (GIS), and mapping.
Government laboratories and research centers	This workload centers on government-funded research and development institutions. These organizations are generally funded at a national or multinational level and may combine purely scientific research with research in areas of national priority (e.g., cancer research) and/or research for defense-related programs. These users are less bound by strict economic constraints than those performing applications in product development environments. These centers don't normally offer degree programs for students.
National defense	This workload centers around applications such as surveillance and signal processing; encryption; command, control, communications, and intelligence (C3I); geospatial image management and analysis; defense research; weapons design; and other national security applications. In addition, we believe that national security organizations are fielding applications that work to identify and track potential security threats through database-oriented pattern-matching applications. Although these applications may not always be numerically intensive, they will be developed and used by organizations that are firmly rooted in technical computing markets. In addition, we believe that these applications will be run in conjunction with traditional security applications such as cryptography and image analysis.
University and academic	This workload centers on scientific research and engineering R&D efforts conducted at public or private institutes of higher education and includes systems sold for both research and educational activities. Privately funded and/or nonprofit research institutes that have a strong academic mission (i.e., work to extend the bounds of public knowledge) are also included in this segment. Applications are typically compute or data intensive and often require high-performance graphics. These users are less bound by strict economic constraints than those performing applications in product development environments. This segment includes NSF sites that are located at universities.
Weather forecasting and climate modeling	This workload centers on applications such as atmospheric modeling, meteorology, weather forecasting, and climate modeling. This segment includes systems dedicated to these tasks primarily in the government and defense segments.
Other	This segment includes any technical computing workloads not otherwise specified by the

TABLE 5

IDC's Worldwide Industry/Application Area Category Definitions

Industry/Application Area	Category Definition
	previous definitions.
Coming soon	A set of high-performance data analysis (HPDA) workload segments will be coming soon.

Source: IDC, 2015

Synopsis

This IDC study presents a forecast for the technical computing systems market by industry/application areas for 2015-2019.

"IDC projects that worldwide technical computing systems revenue will grow by about half a billion dollars to over \$10.71 billion in 2015. IDC sees total worldwide technical computing systems revenue topping \$15.16 billion by 2019, and the number of worldwide technical computing systems server units exceeding 186,000, representing CAGRs from 2014 to 2019 of 8.2% and 6.9%, respectively. In 2014, the academic sector was the largest industry/application area, worth \$1.99 billion – representing more than 19.5% of the total market, closely followed by the government laboratories and research centers sector at \$1.97 billion. Within the commercial industry/application areas, CAE and biosciences – with 2014 markets worth about \$1.18 billion and \$1.07 billion, respectively – are the two largest sectors. IDC projects that some of the fastest-growing sectors will come from the defense and government laboratory industry/application areas with 2014-2019 CAGRs of 10.4% and 10.2%, respectively. Within the commercial sector, IDC sees above-average growth rates for 2014-2019 for sectors that include economic/financial (CAGR of 9.5%), EDA/IT/ISV (CAGR of 9.4%), and geosciences (CAGR of 9.1%)."

– Earl C. Joseph, program vice president, Technical Computing

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