

## Market Forecast

# 2020 HPC Cloud Forecast

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### HYPERION RESEARCH OPINION

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Running HPC workloads in the cloud has undergone a fundamental shift over the past few years as CSPs have made a concerted effort to address the needs of HPC users, both for traditional HPC workloads as well as AI applications. Cloud adoption continues to rapidly increase for both current and new users, leading to a projection of end user HPC cloud spending to reach almost \$9 billion by 2024. The spending for cloud resources by HPC end users primarily augments their spending for on-premise servers, as most users employ the cloud to complement, rather than replace, on-premise resources. There is much higher cloud adoption by workgroup users, suggesting that workgroup users are shifting some of their on-premise workloads to the cloud.

#### *Covid-19 Impact on Cloud*

This forecast includes impacts due to the economic downturn caused by the covid-19 pandemic. For many users, especially in the lower end of the market, the value proposition of the cloud versus an on-premise procurement has increased. Budget considerations and reductions increase the value of the elasticity and flexibility that the cloud offers. Users can look at cloud platforms as offering a solution that can be turned on, increased, and turned off on a moment's notice as a reaction to changing situations. Currently, it is difficult to assess the ultimate impact that the economic downturn will have on the HPC cloud market looking forward, but HPC cloud usage is expected to be a bright spot in the HPC market, growing at a high rate.

### DEFINITIONS FOR THIS FORECAST

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This forecast covers HPC end user spending on third-party cloud resources and does not include spending on HPC systems by cloud services providers (CSPs). In addition, this forecast includes only HPC end users who also have (or had) on-premise HPC systems. It does not include HPC end users who only run workloads in the cloud.

Although the "cloud born" or "cloud only" group of end users may be significant and impacts the market size, these users are not included in our forecast numbers for two reasons:

- Many of these users may not know that they are running HPC jobs in the cloud because of their unfamiliarity with what constitutes as HPC workloads, based on the definitions Hyperion Research uses to categorize workloads and users.
- They are difficult to identify because CSPs do not track information about specific workloads running on their platform, making it hard to find all of these HPC users.

Hyperion Research is working to quantify this group of end users to include in future forecasts.

*Key data note: this forecast covers only spending on third-party (CSP) cloud resources for public, private and hybrid cloud configurations and does not include on-premises private clouds.*

## HPC CLOUD FORECAST 2020

In 2019, Hyperion Research declared a tipping-point year in cloud adoption, supported by multiple studies and many interviews that indicated the average portion of an HPC user's workload portfolio run in the cloud had surpassed 20%. The CSPs have been responsive and dedicated to increasing their technical capabilities to address the needs of HPC users, as HPC has been identified as a key market growth area. The impact HPC has on the forefront of research and development for artificial intelligence, combined with the volume and importance of traditional HPC applications, positions HPC as a key target for the CSPs.

As can be seen in the two tables below, the updated forecast shows a five-year CAGR of 17.6% from 2019 to 2024. Although this CAGR is smaller than the 2018-2023 CAGR, the market is growing at a steady rate. The reason for the decrease in the CAGR is due to the start and end points, and that 2019 was a major growth year. Thus, the CAGR starting before that will be higher, as the yearly revenues in 2018 and 2023 had a larger difference than 2019 and 2024.

**TABLE 1**

### HPC Cloud Forecast 2018-2024 (\$M)

	2018	2019	2020	2021	2022	2023	2024	CAGR '19-'24
NEW 2020 HPC Cloud Forecast	2,466	3,910	4,300	5,300	6,400	7,600	8,800	17.6%
PRE-VIRUS HPC Cloud Forecast (November 2019)	2,466	3,910	4,262	5,135	6,182	7,418	-	24.6%

Note: CAGR for 2019 HPC Cloud Forecast is for time period: 2018-2023

Source: Hyperion Research, 2020

HPC in the cloud is growing at a significantly higher rate than the on-premise server market, as well as the overall broader on-premise market. The on-premise market was impacted by covid-19 more than the cloud market due to decreased on-premise budgets and delays in procurements and deployments of on-premise data centers. In looking at the entire HPC market, including on-premise broader market revenues and HPC cloud spend, the total HPC market, in 2024, is forecast to exceed \$46 billion dollars.

*Note: For future iterations of the Hyperion Research Broader HPC Market forecast, the public cloud spend will be included as a line item to be factored into the overall market spend. It will accompany the segments of the broader market already tracked today: servers, add-on storage, middleware, applications and services.*

**TABLE 2****UPDATED HPC Cloud Forecast 2018-2024 (\$M)**

	2018	2019	2020	2021	2022	2023	2024	CAGR '19-'24
NEW 2020 HPC Cloud Forecast	2,466	3,910	4,300	5,300	6,400	7,600	8,800	17.6%
2019 HPC Cloud Forecast	2,466	3,910	4,262	5,135	6,182	7,418	-	24.6%
NEW HPC On-Premise Server Forecast	13,683	13,713	10,860	12,313	14,793	16,810	18,262	5.9%
On-Premise Broader Market Forecast	27,746	27,885	22,160	25,097	30,344	34,571	37,658	6.2%

Note: CAGR for 2019 HPC Cloud Forecast is for time period: 2018-2023

Source: Hyperion Research, 2020

**HPC Cloud Vertical Forecast**

Much of the growth for HPC cloud has come from a handful of verticals that exhibited not only early adoption, but aggressive increases in usage. Bio-sciences, one of the earliest segments to adopt HPC in the cloud, continues to increase their share of the HPC cloud market and are projected to be more than a quarter of the market in 2024. As a point of reference, in 2019 they represented 31%. Thus, although the Bio-sciences portion of the market is anticipated to drop a few points as other verticals increase their cloud adoption, they will continue to be the dominant group of users of HPC in the cloud.

Another key vertical is oil and gas (O&G). O&G companies are adopting cloud resources as a way to allow for elastic expansion of compute resources during peaks in workload demand, as well as to access a prime platform for running highly parallelized jobs. In interviews with major users and CSPs, O&G was referenced as one of the highest growing verticals today for their cloud resources.

Although academic users today are slow to adopt cloud resources, Hyperion Research anticipates academic adoption of cloud platforms to increase greatly over the next four or five years as the value proposition of the cloud becomes more attractive to them.

**TABLE 3****HPC Cloud Forecast by Vertical UPDATED 2020 (\$M)**

	2018	2019	2020	2021	2022	2023	2024	CAGR '19-'24	% of 2024 Cloud Market
Bio-Sciences	778	1,230	1,345	1,649	1,923	2,194	2,427	14.6%	27.6%

**TABLE 3****HPC Cloud Forecast by Vertical UPDATED 2020 (\$M)**

	2018	2019	2020	2021	2022	2023	2024	CAGR '19-'24	% of 2024 Cloud Market
CAE	469	733	795	967	1,151	1,349	1,540	16.0%	17.5%
Chemical Engineering	62	98	108	133	160	190	211	16.6%	2.4%
DCC & Distribution	141	222	244	300	361	428	519	18.5%	5.9%
Economics/Financial	123	195	213	262	315	373	430	17.2%	4.9%
EDA	178	285	316	394	481	578	677	18.9%	7.7%
Geosciences	148	240	269	339	419	508	616	20.8%	7.0%
Mechanical Design	12	20	21	26	32	38	44	17.5%	0.5%
Defense	185	296	330	411	501	602	705	18.9%	8.0%
Government Lab	173	274	304	378	462	554	625	17.9%	7.1%
University/Academic	123	197	219	272	332	397	528	21.8%	6.0%
Weather	26	42	47	59	128	228	290	47.0%	3.3%
Other	49	79	88	110	134	161	188	18.9%	2.1%
<b>Total</b>	<b>2,466</b>	<b>3,910</b>	<b>4,300</b>	<b>5,300</b>	<b>6,400</b>	<b>7,600</b>	<b>8,800</b>	<b>17.6%</b>	<b>100.0%</b>

Source: Hyperion Research, 2020

**FUTURE OUTLOOK**

Cloud usage for HPC, HPDA, and AI workloads is expected to continue to grow as users become more comfortable and familiar with the cloud and recognize it as a useful tool to economically and efficiently deliver science and line-of-business results. CSPs will help drive the growth in user cloud spend by providing not only better infrastructure to satisfy users' price/performance requirements but also the domain expertise to assist users in leveraging the cloud in the most useful way. Users will largely continue to use the cloud to complement their on-premise workloads as their business needs fluctuate. The workgroup segment is leading the way in shifting their on-prem HPC spending to the cloud. Users should thoughtfully consider how to best leverage the cloud based on technical and business metrics to achieve faster time to high-quality results. They should also judiciously consider their choice of CSP based on which option can best support a seamless on-prem integration and apply cloud-related expertise to their specific HPC domain area and codes.

## 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). 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.

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