New Trends on Using Cloud for HPC Workloads

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www.HyperionResearch.com
www.hpcuserforum.com

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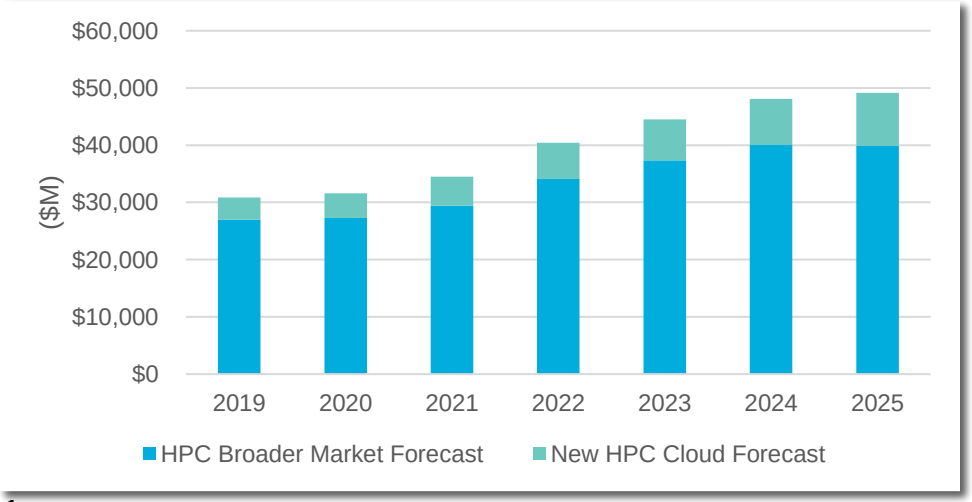
HPC Cloud Forecast

HPC cloud market forecast to surpass $9B 2025

($M)	2019	2020	2021	2022	2023	2024	2025	CAGR '20-'25
HPC Cloud Forecast	$3,910	$4,300	$5,100	$6,300	$7,150	$8,100	$9,300	16.7%
HPC Broader Market Forecast	$26,979	$27,283	$29,383	$34,121	$37,378	$40,015	$39,867	7.9%

Source: Hyperion Research, 2021



Source: Hyperion Research, 2021

HPC Cloud Vertical Forecast

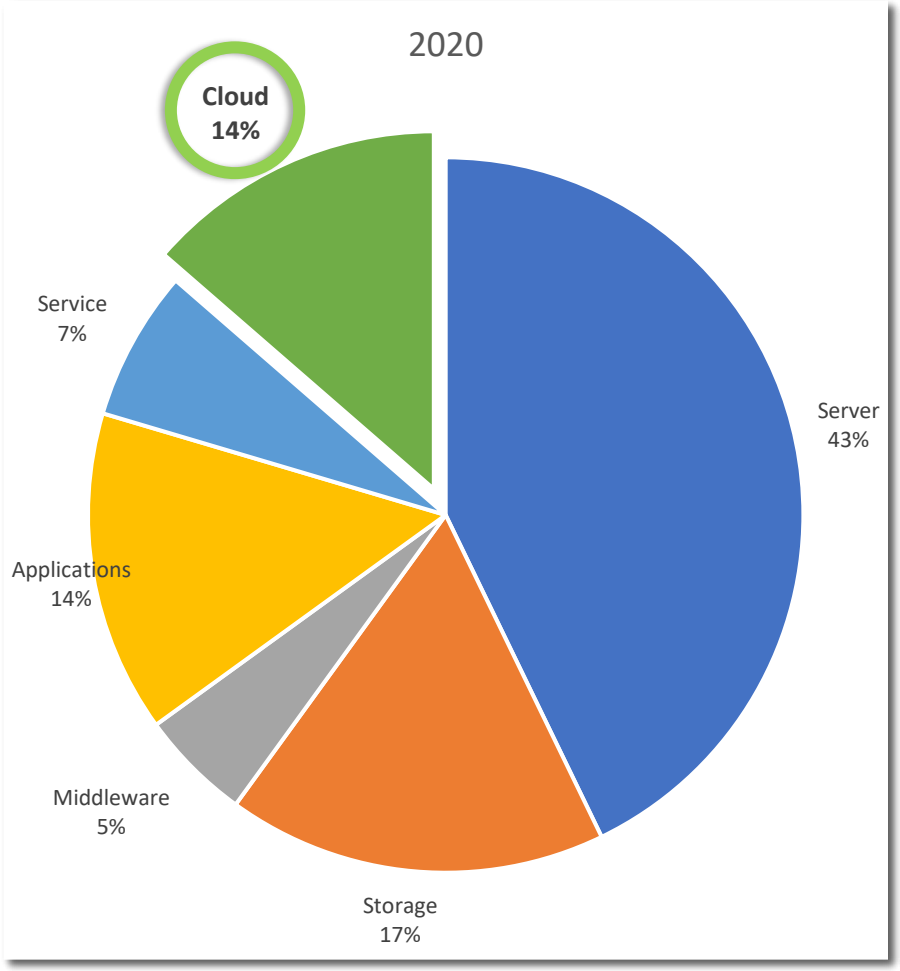
Bio-sciences and CAE the early adopting verticals; weather, geosciences and academia show highest growth

($M)	2019	2020	2025	2020-2025 CAGR
Bio-Sciences	$1,221	$1,297	$2,331	12.4%
CAE	$733	$795	$1,798	17.7%
Chemical Engineering	$98	$108	$223	15.7%
DCC & Distribution	$222	$244	$549	17.6%
Economics/Financial	$205	$248	$699	23.0%
EDA	$285	$316	$723	18.0%
Geosciences	$240	$269	$622	18.2%
Mechanical Design	$20	$21	$36	10.8%
Defense	$296	$330	$753	18.0%
Government Lab	$274	$304	$594	14.3%
University/Academic	$196	$215	$360	10.8%
Weather	$42	$65	$361	41.1%
Other	$79	$88	$251	23.4%
Total	$3,910	$4,300	$9,300	16.7%

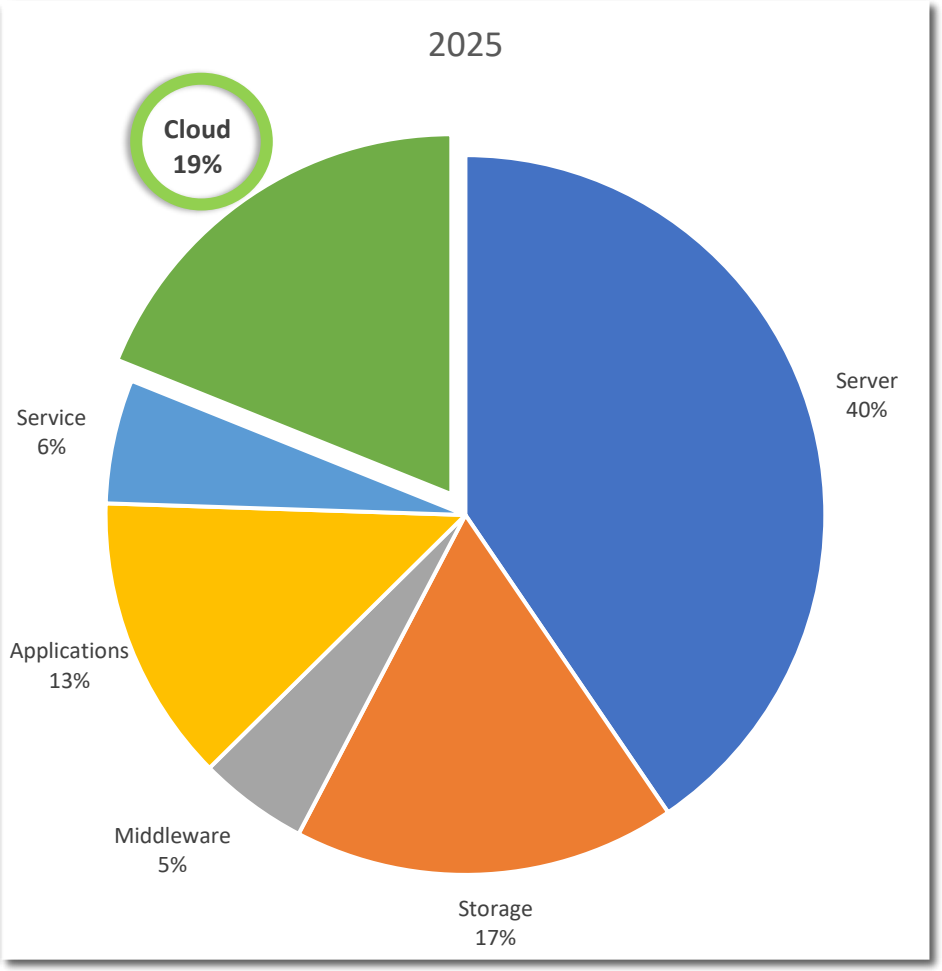
Source: Hyperion Research, 2021

A Complete HPC Market Picture

Incorporating the cloud to the broader market forecast



Source: Hyperion Research, 2021



Source: Hyperion Research, 2021

Impact of HPC Cloud on On-Premises

Organizations are increasingly factoring cloud into future on-premises deployment plans

- **Today, public cloud resources are complementary to many on-premises deployments**
  - Many longitudinal studies show that cloud is used primarily for burst capabilities by many HPC users
- **A recent study showed that almost 50% of the users are altering on-premises deployments due to cloud**
- **Migrating HPC workloads to cloud platforms requires new skills for datacenter managers and researchers**
  - Much of this education and training on using the cloud addresses which workloads can and should be run in the cloud versus remain on-premises
  - IT departments are factoring in data movement and security as they expand their resource pools to consist of cloud resources

Differing Approaches

"Cloud" deployments showing up in different ways

- **What is the UK Met deal actually like?**
  - Azure hosting multiple Cray machines
  - Working with UK Met on porting code and data
  - Currently in development phase, with compute to arrive around mid-2022
- **Where do offerings like HPE's Greenlake fit in "hybrid" cloud segment?**
  - Greenlake offers elastic compute capabilities, similar to cloud, but on-premises
  - Some off-prem hosting available
  - Example: HPE to provide NSA with "secure cloud services on-premises…"[1]
  - Services like this allows users to keep more "on-premises" rather than in a third-party environment

1: Hewlett Packard Enterprise wins $2B HPE GreenLake contract with the National Security Agency. https://bit.ly/3o1FBLW

What is Next for the Cloud?

Cloud computing for HPC workloads is changing the compute landscape

- **Continued rise of cloud-born HPC users**
  - Sites without previous on-premises infrastructure
  - Startups running computationally intensive or data-intensive workloads at scale on cloud
  - Cloud offers elastic capabilities with limited overhead
- **Cloud usage will boil down to an optimization problem among these requirements/restrictions:**
  - Cost
  - Time-to-solution
  - Performance
  - Data locality
  - Expertise

Conclusions

HPC in the cloud continues to evolve, as well as augment the broader HPC market

- **HPC users continue to increase their cloud usage and cloud spend, resulting in an aggressive growth**
- **Many barriers to increased HPC cloud usage have remained consistent over a few years**
  - CSPs are working to address these barriers
  - Users should look to educate themselves on current capabilities and improvements CSPs have made
- **Established and emerging HPC user sites should look to balance on-premises and cloud compute resources based on:**
  - Budget
  - Time to solution required
  - Skillsets
  - Current resources

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Want to continue the conversation?

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