New Trends on Using Cloud for HPC Workloads

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www.HyperionResearch.com
www.hpcuserforum.com

Alex Norton and Mark Nossokoff
HPC Cloud Forecast

**HPC cloud market forecast to surpass $9B 2025**

<table>
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</thead>
<tbody>
<tr>
<td><strong>HPC Cloud Forecast</strong></td>
<td>$3,910</td>
<td>$4,300</td>
<td>$5,100</td>
<td>$6,300</td>
<td>$7,150</td>
<td>$8,100</td>
<td>$9,300</td>
<td>16.7%</td>
</tr>
<tr>
<td><strong>HPC Broader Market Forecast</strong></td>
<td>$26,979</td>
<td>$27,283</td>
<td>$29,383</td>
<td>$34,121</td>
<td>$37,378</td>
<td>$40,015</td>
<td>$39,867</td>
<td>7.9%</td>
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Source: Hyperion Research, 2021
HPC Cloud Vertical Forecast

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

<table>
<thead>
<tr>
<th>Vertical</th>
<th>2019 ($M)</th>
<th>2020 ($M)</th>
<th>2025 ($M)</th>
<th>2020-2025 CAGR</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bio-Sciences</td>
<td>$1,221</td>
<td>$1,297</td>
<td>$2,331</td>
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<tr>
<td>CAE</td>
<td>$733</td>
<td>$795</td>
<td>$1,798</td>
<td>17.7%</td>
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<tr>
<td>Chemical Engineering</td>
<td>$98</td>
<td>$108</td>
<td>$223</td>
<td>15.7%</td>
</tr>
<tr>
<td>DCC &amp; Distribution</td>
<td>$222</td>
<td>$244</td>
<td>$549</td>
<td>17.6%</td>
</tr>
<tr>
<td>Economics/Financial</td>
<td>$205</td>
<td>$248</td>
<td>$699</td>
<td>23.0%</td>
</tr>
<tr>
<td>EDA</td>
<td>$285</td>
<td>$316</td>
<td>$723</td>
<td>18.0%</td>
</tr>
<tr>
<td>Geosciences</td>
<td>$240</td>
<td>$269</td>
<td>$622</td>
<td>18.2%</td>
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<tr>
<td>Mechanical Design</td>
<td>$20</td>
<td>$21</td>
<td>$36</td>
<td>10.8%</td>
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<tr>
<td>Defense</td>
<td>$296</td>
<td>$330</td>
<td>$753</td>
<td>18.0%</td>
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<tr>
<td>Government Lab</td>
<td>$274</td>
<td>$304</td>
<td>$594</td>
<td>14.3%</td>
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<tr>
<td>University/Academic</td>
<td>$196</td>
<td>$215</td>
<td>$360</td>
<td>10.8%</td>
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<tr>
<td>Weather</td>
<td>$42</td>
<td>$65</td>
<td>$361</td>
<td>41.1%</td>
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<tr>
<td>Other</td>
<td>$79</td>
<td>$88</td>
<td>$251</td>
<td>23.4%</td>
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<tr>
<td><strong>Total</strong></td>
<td><strong>$3,910</strong></td>
<td><strong>$4,300</strong></td>
<td><strong>$9,300</strong></td>
<td><strong>16.7%</strong></td>
</tr>
</tbody>
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Source: Hyperion Research, 2021
A Complete HPC Market Picture

Incorporating the cloud to the broader market forecast

Source: Hyperion Research, 2021

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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

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
Want to continue the conversation?

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