Cloud Computing in HPC: Barriers to Adoption

Christopher G. Willard, Ph.D.   **Addison Snell**

Sue Gouws Korn, CFA   **Laura Segervall**

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EXECUTIVE SUMMARY

Intersect360 Research conducted a survey of users of High Performance Computing (HPC) regarding their adoption of cloud computing resources. This study sought to understand the adoption of cloud computing for HPC applications, as well as the barriers, drivers, and rationales for using or evaluating cloud resources.

Intersect360 Research defines cloud computing as the outsourcing of all or part of an IT infrastructure or workflow through the web or a web-like interface. This definition is inclusive of both public and private cloud models, as well as hybrid models that blend the two.

This report investigates the barriers to adopting cloud computing. On a five-point scale with a rating of 1 indicating "not a barrier" and a rating of 5 indicating "most significant barrier," respondents were surveyed about nine potential barriers, as follows:

- Security of data or intellectual property in the cloud

- Quality, reproducibility, or certifiability of results

- Bandwidth of network connected to the cloud

- Latency in terms of job turnaround time

- Provider capability to meet performance and capacity requirements

- Software rewrite costs associated with the need to modify application software

- Provider stability as shown by meeting service level agreements, predictable pricing, etc.

- Corporate policy exhibiting resistance to change or risk aversion regarding cloud systems

- Cost reduction not deemed significant enough

Barrier ratings are studied across all respondents as well as within market segments (i.e., government, academic, commercial) and within user types (i.e., cloud system users, evaluators, or non-users).

Security and bandwidth emerged as top concerns, while the barrier of rewriting software was rated highly by some market segments. Although most users cited multiple barriers, it only takes one significant barrier to block or limit cloud adoption. Adoption barriers tend to be independent of one another and multiplicative in their effect. Thus as the number of barriers increase, both the likelihood and extent of cloud usage asymptotically declines to zero.