Adoption of Cloud Resources for High Performance Computing: Barriers, Drivers, and Rationale

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> **This report preview is presented as an overview of the complete research study. The full report, data set, and analyst inquiry time are available from Intersect360 Research.**
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REPORT PREVIEW

Intersect360 Research conducted a survey of High Performance Computing[1] (HPC) users 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.

This study will help the HPC vendor community understand the size of the cloud opportunity in HPC and guide them in the development of products and services to meet the needs of HPC users who choose to adopt cloud. Analysis includes why, when, and how various groups of HPC users are migrating workflows to the cloud, as well as what these HPC users' requirements are. Careful targeting of the market will be critical in enabling some segments of the HPC market to use cloud resources.

Figure 1: HPC Cloud Usage Status
(Among All Survey Respondents)

Using 25%
Evaluating 48%
Not Using 27%
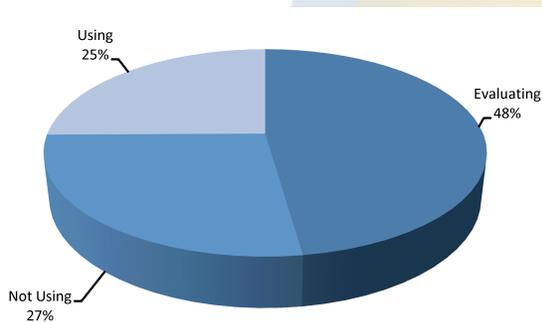
Source: Intersect360 Research, Cloud Adoption Survey, 2010

Figure 2: Type of Cloud In Use or Evaluation
(Among Those Who Have Considered/Adopted)

PUBLIC 14.0%
PRIVATE 18.7%
3.3%
12.0%
8.0%
2.7%
NOT USING 21.3%
HYBRID 20.0%
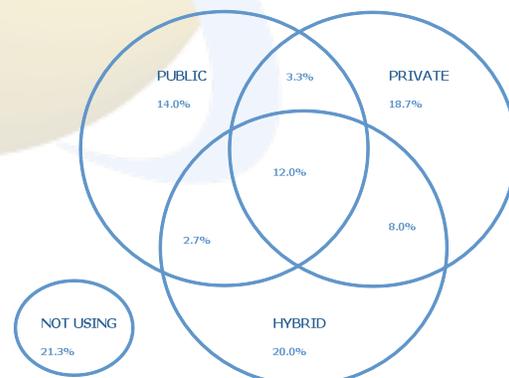
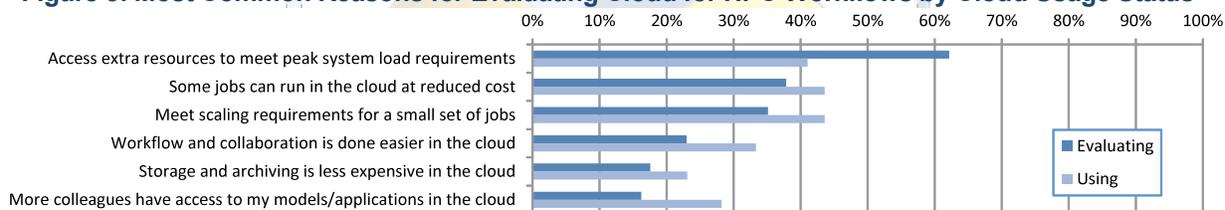Source: Intersect360 Research, Cloud Adoption Survey, 2010

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[1] High performance computing (HPC) is the use of servers, clusters, and supercomputers – plus associated software, tools, components, storage, and services – for scientific, engineering, or analytical tasks that are particularly intensive in computation, memory usage, or data management. HPC is used by scientists, engineers, analysts, and strategic information gatherers, both in research and in production, across industry, government, and academia.

The web-based survey received 155 qualified responses from the HPC community. Cloud computing was defined as a distributed computing instantiation in which IT infrastructure or workflow is accessed using a web (or web-like) interface[2]. All respondents were asked a foundation of questions to characterize their use of cloud computing for HPC workflows at this time: using, evaluating (with no decision to adopt or not yet), not using (decided not to adopt). Depending on the response, they were directed to a more detailed panel of questions to delve further into their thought process surrounding cloud computing. Those who were using or evaluating cloud were asked to distinguish between public, private, and hybrid models [See Figures 1 and 2.]

> **Cloud Computing Definition:**
> Accessing part of an IT infrastructure or workflow through a web (or web-like) interface[2].

Access to extra resources to meet peak system load requirements is the driving force for respondents to evaluate the cloud. [See Figure 3.] The allure of almost instant access to more resources is the Holy Grail for traditional compute-intensive HPC users. The cloud, in theory, virtually eliminates or at least significantly minimizes the time for procurement and installation and provides a means for the user to get their job done now. Once the respondent is utilizing the cloud, cost and scalability become greater factors.

Figure 3: Most Common Reasons for Evaluating Cloud for HPC Workflows by Cloud Usage Status

Source: Intersect360 Research, Cloud Adoption Survey, 2010

Barriers: More than 50% of respondents cited bandwidth of network connection to the cloud or security of data in the cloud as meaningful barriers to increasing their usage of cloud for HPC workflows. Current cloud users rated every barrier as less of a concern than evaluators did, by 15 to 30 percentage points in nearly all cases.

Drivers: Increase in capability compared to non-cloud options and ability to provide capacity leveling were cited as meaningful drivers toward increased cloud computing for more than 50% of respondents. Users and evaluators were much closer in their selections to one another than they were for barriers.

Sample Sections of the Report:
- Forecast of cloud computing penetration in HPC
- Stage of usage of cloud resources for HPC workflows
- Reasons for and reasons against using cloud resources for HPC workflows
- Cloud infrastructure types (public, private, hybrid)
- Barriers and drivers to increasing cloud adoption
- Applications running in the cloud and discussion of what types of jobs run well in the cloud
- Impact of cloud on usage of HPC and timing of impact
- Ideal cloud model (cost, pricing model, dedication of resources, control required)

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[2] "IT infrastructure and workflow" is specified to exclude Web 2.0 applications, such as Facebook games or photo-sharing sites, from our definition. "Web interfaces" are specified to distinguish cloud from other utility computing paradigms such as grid. "Web-like" includes the notion of some tablet apps or corporate intranets that are not true web browsers but have similar user interfaces.