Advancing a Framework for National Commercial Cloud Adoption in Research

Purpose

The New Digital Research Infrastructure Organization (NDRIO) has expressed interest in providing commercial cloud ("Cloud") support to researchers. Cloud adoption both within and across Canadian academic institutions is impacted by barriers such as cost, perceptions of increased privacy and security risks, and insufficient dedicated expertise. As a national organization, NDRIO is positioned to lead Cloud initiatives across Canada and tackle these barriers.

This white paper provides a brief overview of the barriers that exist in the current Cloud environment in Canada and recommends NDRIO apply a Research Data Management (RDM) framework to enable researchers' use of the Cloud.

Background

Cloud services provide a host of advantages including flexibility, elasticity, scalability, and a vast breadth of product offerings. Academic researchers have integrated and embraced the flexibility of Cloud for their work. In the Canadian context, barriers across and within academic institutions have resulted in disparate levels of access for researchers. These barriers include:

Funding models

- Academic institutions typically fund research infrastructure through capital investments, rather than operational expenditures.
- External funding agencies prioritize awarding projects on-premise infrastructure to be housed, managed and coordinated by Compute Canada, or in exceptional circumstances at the awardee's institution.

Privacy and risk

- There is a shortage of Cloud-specific privacy and security expertise to support research projects in meeting the security requirements required for storing and analyzing sensitive data within the Cloud.
- There are perceptions amongst many privacy and security practitioners that there is increased risk in using Cloud services

Dedicated resources to support use

- Use of Cloud services requires a higher level of technical expertise, and in many cases, system administration skills. There are insufficient national and regional resources at present to provide the training and project-level support required for increased use of the Cloud.

RECOMMENDATIONS

In order to facilitate the adoption and growth of Cloud in Canadian research, it is imperative that a strategic approach be applied to leverage, build, and further develop the necessary skills and expertise. NDRIO's interest in exploring supporting the use of Cloud services for research should serve as a catalyst to increase accessibility and fill the gaps in the current national computing landscape. Cloud should not be seen as a replacement for existing services, but as an additional resource available to researchers.

To address the identified barriers, it is recommended that NDRIO consider a standard national approach to Cloud adoption through a Research Data Management (RDM) framework. While many of the barriers to Cloud are separate and dissimilar on the surface, they can be addressed when considering the entire lifecycle of the data and the expertise at each step of the cycle. It is for this reason that the RDM framework is the backbone of the recommendations put forth.

It is recommended NDRIO:

Re-Imagine National Landscape

- **Implement a single National Training team** responsible to oversee and coordinate sub-teams and working groups, each with specific tasks and goals and composed of experts across domains. Technical expertise should be grounded and mapped into RDM concepts and tools, allowing for holistic training initiatives that are focused on enabling research.
- **Increase resources to the Cloud National Team** to provide necessary expertise and support to researchers using Cloud services.
- **Leverage expertise across domains** to promote collaboration between HPC experts, RDM experts, privacy/security experts, commercial cloud providers, as well as researchers. The merging of various expert groups into the shared umbrella of NDRIO is an opportunity to begin the coordination of training and education across these domains.
- **Consolidate working groups** to ensure domain specific experts have the time to collaborate, develop, and fulfill appropriate working group mandates.

Establish best practices in Cloud-based research

- **Apply best practices in efficient research system and software use.** As Cloud is pay-per-use, it is imperative that researchers use it as cost-effectively as possible.

Mitigate privacy and risk

- **Engage the right expertise** to address concerns around safeguarding sensitive information. This involves the creation of interdisciplinary groups which include experts with the appropriate Cloud security, policy, regulatory, and institutional expertise, and domain specific experts that can speak to any system and software requirements impacting the research workflow. **Work in these groups can feed into the RDM framework through data management planning to mitigate risks across the entire data lifecycle.**

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