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Alliance Researcher Council: Meeting the Digital Research Infrastructure Needs of the Canadian Research Community

Update on Cloud Computing

Digital Research Alliance of Canada | Alliance de recherche numérique du Canada

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Overview

Research in Canada is being transformed by the expanding scope and availability of digital research infrastructure (DRI): the dynamic network of hardware, software, people, organizations, methods, practices and services involved in creating and mobilizing knowledge. DRI is a catalyst for discovery and innovation, and is critical to ensuring Canada's economic and social well-being.

The Digital Research Alliance of Canada (the Alliance) has been established by Innovation, Social and Economic Development Canada (ISED) to provide Canadian scientists and scholars with the digital infrastructure needed to conduct innovative and world-leading research. As a foundational step, the Alliance established a Researcher Council[1] to formalize the regular consultation of researchers in Canada. Representing a range of cultures, languages, identities, expertise and regions, as well as a broad array of academic disciplines and institutions, the Researcher Council provides advice to the Alliance Management and Board of Directors.

In our earlier document,[2] the Researcher Council provided a list of priorities in a number of critical areas such as the National Infrastructure; the self-determination and data sovereignty for Indigenous Peoples in Canada; equity, diversity and inclusion; professional support personnel; research data management and stewardship practices; education and training; research software; and national and international engagement.

This document provides an update and a more detailed review of the priorities on the use of computing clouds, including their storage and services, by the research community. Computing clouds and cloud storage are critical resources used by many researchers. The Alliance offers a community cloud service that is operated by the host sites (McGill University, Simon Fraser University, University of Toronto, University of Victoria and University of Waterloo). Currently, the Alliance does not support the use of commercial computing cloud resources but is considering them as an important service offering in the coming years to the research community. Currently, the use of commercial clouds with the research community is done on an ad hoc basis, funded either by an institution or through grants held by individual researchers.

The priorities presented are based on the outcomes of a number of working groups and a national survey as well as the Alliance's Canadian Digital Research Infrastructure Needs Assessment.[3]

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[1] The Alliance Researcher Council is a group of researchers, selected from across Canada, for their expertise in DRI.

[2] Meeting the Digital Research Infrastructure needs of the Canadian Research Community (2021).

[3] Canadian Digital Research Infrastructure Needs Assessment.

Background

Cloud computing can be defined as the delivery of computing resources (e.g., servers, storage, databases, analytics and software) from remote facilities in an on-demand ("elastic") manner. The facilities can be funded by the government and operated by researchers, such as the Alliance cloud, ("community cloud") or be offered by commercial providers on a pay-as-you-go-basis ("commercial cloud").

The Alliance recently distributed a survey to help understand how Canadian researchers use the community and commercial cloud offerings. The survey was conducted in January 2023 and received responses from a diverse set of researchers.[4] In brief, the most common uses of clouds are for the storage of data (e.g., Dropbox or similar storage services), compute resources and software platforms or packages. A key outcome of the survey was the observation that "ease of use" was one of the most important reasons for using clouds.

The Alliance offers a community cloud that was originally deployed by Compute Canada. It primarily offers access to compute resources (through the use of virtual machines). Access to the Alliance Community Cloud is available to all researchers on a limited basis but additional resources can be obtained with an application through the Alliance Resource Allocation Competition (RAC). Researchers are able to obtain assistance to use the Alliance Community Cloud.

There are many commercial computing clouds in the world. The common ones are the Amazon Elastic Cloud (EC2), Microsoft Azure and Google Compute Engine (GCE) to name a few; there are also specialized cloud services such as Dropbox. The commercial clouds offer a wide range of solutions for industry and research that can be purchased on-demand. It is an attractive solution for many companies that do not wish to operate a computing center and can pay only for the required services. In the Canadian research community, commercial clouds are widely used and access is provided through their institution or funded by their research grants (a number of the commercial cloud providers offer in-kind grants to researchers). A key motivation for using commercial over community clouds is the ease of use, the ability to quickly get additional compute capacity and the flexible storage systems. Commercial clouds, by their scale, can offer specialized hardware (e.g., GPUs) and software platforms.

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[4] Alliance Researcher Council Cloud Survey Report

Outcomes

The priorities identified by the Researcher Council are divided into those of a general nature, those related to the Alliance's Community Cloud and how the Alliance should provide access to commercial cloud resources.

We remark that the Alliance needs to follow the new Cybersecurity Act (Bill C-26). All the vendors and the suppliers of the vendors of both the Alliance Community Cloud and commercial cloud providers should be evaluated through the lens of national security to avoid potential foreign interference and infiltration.

General

▸ Strive to meet the cloud computing requirements of Canadian researchers by providing a refreshed and expanded Alliance Community Cloud that is augmented by the complementary resources of commercial clouds.

▸ Understand, educate and provide documentation to the research community on best and safe practices on the use of clouds, and helping researchers ensure the security of their data on both the Alliance Community Cloud and commercial clouds.

▸ Expand the dedicated cloud support group with a mandate to advise Canadian researchers on cloud technologies (community and commercial) best adapted to their specific needs and provide subsequent technical support, training and documentation.

Alliance Community Cloud infrastructure

▸ Ensure that the Alliance Community Cloud provides a wide range of compute, storage and services that are able to adapt to changing demands ("elastic") of the research community. The survey identified a number of services that should be added to the Alliance Community Cloud (e.g., Docker and Kubernetes) and the need for improved documentation, training material and chat support.

Commercial cloud computing

▸ Provide a flexible model for commercial cloud computing that facilitates transparent access or by providing in-kind credits to researcher groups to directly purchase cloud compute, storage or services from a vendor of their choice.

▸ Ensure that Alliance-managed access to commercial clouds is done so that compute, storage and services are provided in a manner that is vendor-agnostic.

▸ Consider commercial clouds for opportunistic computing when Alliance resources are oversubscribed or offline.