HARVARD MEDICAL SCHOOL

HMS Research Computing Overview

PROVIDING COMPUTATIONAL TOOLS AND EXPERTISE ACROSS THE RESEARCH PIPELINE

Research Computing
Harvard Medical School IT
3/29/2023

RC Mission Statement

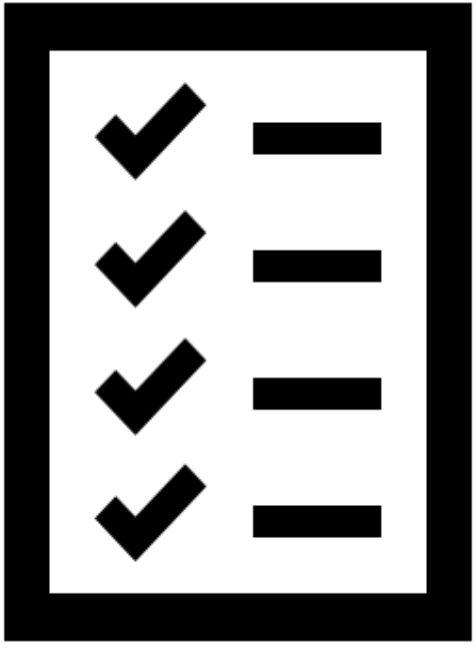
Collaboratively working with researchers to identify, design, and deliver a wide range of information technology solutions to support the ever-changing needs of biomedical research

What RC Does for You

- **Operate** – Provide reliable IT services for research
- **Consult** – Help researchers use IT
- **Train** – Teach researchers to use IT

- **Support** – Assist researchers when there is a problem
- **Innovate** – Prototype IT to advance the research mission

In Other Words…



- Help researchers evaluate and choose effective solutions
- Help researchers access and use those solutions efficiently
- Build and operate solutions when needed
- Empower researchers to do good science

Who We Are

Agenda

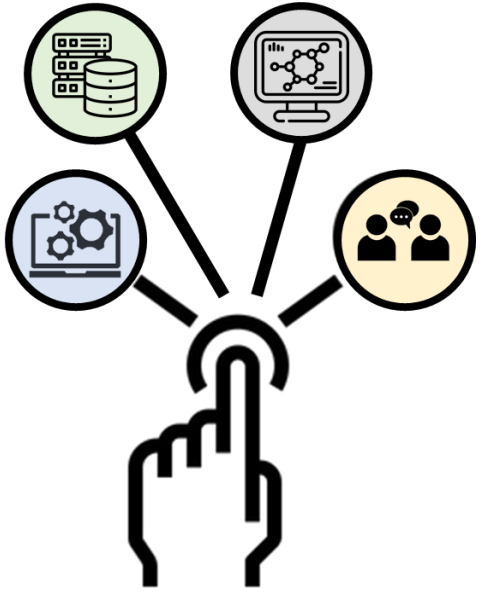
- Consulting and Training
- High-Performance Computing
- Research Data Management
- Storage Solutions
- Research Imaging Solutions
- Research Applications and Software
- Research Computing Core

Consulting and Training

- 2-hour workshops, 30-minute info sessions
- 1-1 meetings to:
  - Plan a project, estimate resource needs
  - Design a pipeline
    - microscope -> analysis -> archive
  - Troubleshoot a job on the O2 compute cluster
  - Get help using imaging or data transfer software
- New in 2023: Help with NIH Data Mgmt & Sharing plans

HPC and Bioinformatics

- O2 cluster – compute, GPUs, storage, high-memory, interactive sessions
- Graphical uses: R Studio, Jupyter, MATLAB, O2 Portal
- "My jobs take too long to start running!"
- Bioinformatics software
- SQL databases, bio datasets
- Advice building workflows, scripting, bioinformatics, efficient resource use



Research Data Management

- Collaborate with researchers to better organize, manage, and store research data throughout the various stages of the data lifecycle
- Develop automated methods for migrating data between storage platforms
  - Advance and refine processes to move infrequently accessed data to long term storage
- Create and maintain data management tools and resources to prepare data for sharing and reuse

Research Data Management

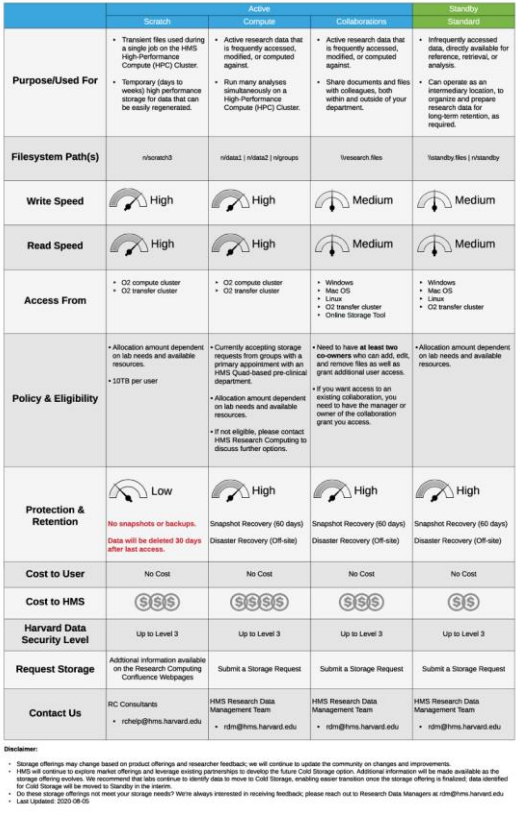
Resources

- Research Data Management On/Offboarding Checklists
- Data Management Plan HMS Template (DMPTool)
- Harvard Biomedical Research Data Management Website

https://datamanagement.hms.harvard.edu

Storage Solutions

- HMS offers several storage options that allow users to store data in different places, each with distinct behaviors, performance, and means of access
- **Active**
  - Compute (O2)
  - Collaborations (research.files)
- **Standby**
- **Cold** (going live Spring 2023)



	Active			Standby
	Scratch	Compute	Collaborations	Standard
Purpose/Used For	• Transient files used during a single job on the HMS High-Performance Compute (HPC) Cluster. • Temporary (days to weeks) high performance storage for data that can be easily regenerated.	• Active research data that is frequently accessed, modified, or computed against. • Run many analyses simultaneously on a High-Performance Compute (HPC) Cluster.	• Active research data that is frequently accessed, modified, or computed against. • Share documents and files with colleagues, both within and outside of your department.	• Infrequently accessed data, directly available for reference, retrieval, or analysis. • Can operate as an intermediary location, to organize and prepare research data for long-term retention, as required.
Filesystem Path(s)	n/scratch3	n/data1 | n/data2 | n/groups	\\research.files	\\standby.files | n/standby
Write Speed	High	High	Medium	Medium
Read Speed	High	High	Medium	Medium
Access From	• O2 compute cluster • O2 transfer cluster	• O2 compute cluster • O2 transfer cluster	• Windows • Mac OS • Linux • O2 transfer cluster • Online Storage Tool	• Windows • Mac OS • Linux • O2 transfer cluster
Policy & Eligibility	• Allocation amount dependent on lab needs and available resources. • 10TB per user	• Currently accepting storage requests from groups with a primary appointment with an HMS Quad-based pre-clinical department. • Allocation amount dependent on lab needs and available resources. • If not eligible, please contact HMS Research Computing to discuss further options.	• Need to have **at least two co-owners** who can add, edit, and remove files as well as grant additional user access. • If you want access to an existing collaboration, you need to have the manager or owner of the collaboration grant you access.	• Allocation amount dependent on lab needs and available resources.
Protection & Retention	Low No snapshots or backups. Data will be deleted 30 days after last access.	High Snapshot Recovery (60 days) Disaster Recovery (Off-site)	High Snapshot Recovery (60 days) Disaster Recovery (Off-site)	High Snapshot Recovery (60 days) Disaster Recovery (Off-site)
Cost to User	No Cost	No Cost	No Cost	No Cost
Cost to HMS	$$$	$$$$	$$$	$$
Harvard Data Security Level	Up to Level 3	Up to Level 3	Up to Level 3	Up to Level 3
Request Storage	Additional information available on the Research Computing Confluence Webpages	Submit a Storage Request	Submit a Storage Request	Submit a Storage Request
Contact Us	RC Consultants • rchelp@hms.harvard.edu	HMS Research Data Management Team • rdm@hms.harvard.edu	HMS Research Data Management Team • rdm@hms.harvard.edu	HMS Research Data Management Team • rdm@hms.harvard.edu

Disclaimer:

- Storage offerings may change based on product offerings and researcher feedback; we will continue to update the community on changes and improvements.
- HMS will continue to explore market offerings and leverage existing partnerships to develop the future Cold Storage option. Additional information will be made available as the storage offering evolves. We recommend that labs continue to identify data to move to Cold Storage, enabling easier transition once the storage offering is finalized; data identified for Cold Storage will be moved to Standby in the interim.
- Do these storage offerings not meet your storage needs? We're always interested in receiving feedback; please reach out to Research Data Managers at rdm@hms.harvard.edu
- Last Updated: 2020-08-05

Research Imaging Solutions

Overview

- Works to identify ways to streamline image preparation so researchers can maximize their time at the bench, writing grants and developing discoveries.

We provide:

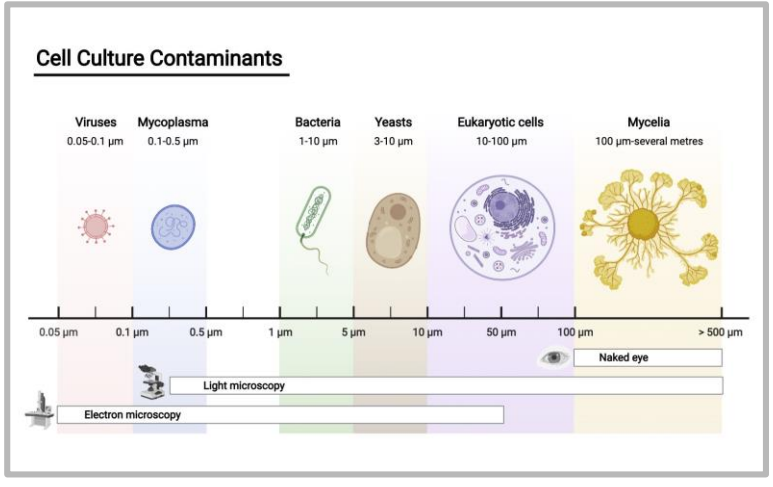
- Guiding researchers to effectively communicate their science
- Research Imaging Training and Seminars
- 24/7 Access to Imaging Resources and Guidelines

Research Applications and Software

- Access to scientific desktop software
- Solutions, applications, and software packages
- Focused on enabling and enhancing HMS researchers' ability to perform their research

Research Application Platforms

- BioRender ($)
  - A web platform for creating and sharing illustrative scientific figures for publications and communications using a scientifically accurate image library



- Data Transfers via Globus
- eLabNext Platform
  - Electronic Lab Notebook

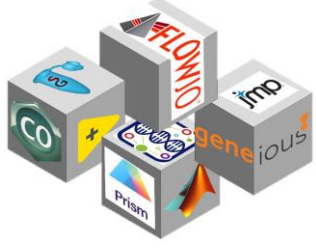
Research Applications Platform(2)

- OMERO
  - Visualization platform for the management of microscope images and metadata
- REDCap
  - A web-based Electronic Data Capture (EDC) application designed for building and managing online surveys and data capture for research and clinical studies
- Research Data Visualization Platform – Pilot
  - Shiny applications hosting via RStudio Connect system. Supporting R and Python code and libraries within Shiny applications

Research Software

Scientific Desktop Software

- ChemOffice
- DNAStar Lasergene
- FlowJo ($)
- Geneious
- GraphPad Prism ($)
- MATLAB (also on O2)
- SnapGene ($)
- JMP Genomics
- JMP Pro
- LabVIEW



Research Computing Core

Overview

- A set of billable services provided by Research Computing and HMS IT
- Promotes deeper collaboration across the greater Harvard biomedical research ecosystem
- Establishes transparent and sustainable IT services for our research community

Research Computing Core

Billable Services

- Storage and O2 Cluster Compute
  - Researchers whose PIs **do not** have a primary or secondary faculty appointment in an **HMS Basic and Social Science Department** are billable.
- Software like BioRender, FlowJo, GraphPad Prism, SnapGene
  - Only offered to Harvard faculty, staff, and students
  - Visit the RC website to learn about eligibility

The Most Important Slide!

Contact RC early and often:

- When new members join the lab
- Before starting a project / buying hardware
- When you're wondering how to do something
- When something doesn't work
- A 5-minute email may save time, frustration, $
- If you don't ask, we can't help

Thank you. Questions?

rchelp@hms.harvard.edu

https://it.hms.harvard.edu/rc