

ND Center for Research Computing

Storage Policy

Updated: June 2025

This document defines the CRC's storage policy (SP) for ND Faculty regarding storage acquisition, installation, secure operation, performance tuning, maintenance and support. The SP will be reviewed annually and revised in line with CRC Faculty Advisory Council feedback.

1) Storage Summary

	Primary Storage Options (based on use cases)			
	Faculty research group storage for active projects	User home directory for customization and testing	Temporary storage for IO intensive calculations	Long term storage for infrequently accessed data
Mount points	/groups	/users /afs	/temp180 /scratch365	/bluefs /goldfs
Default quota	5 TB per PI	100 GB per user	500 GB per user	None
Additional storage cost	\$115 / TB / year	Fixed quota, not expandable	\$175 / TB / year	\$35 / TB / year
Nightly snapshot	Yes	Yes	None	Optional for an an additional \$35 / TB / year
Notes	Moderate performance (SSD).	Moderate performance (SSD).	Fastest NVMe SSD. Available on request. Auto deletion.	Low perf (HDD) This data is only accessible from login nodes.

2) Storage Options

2.1 Faculty Research Group Directory (Active Research Storage)

- Description:
 - Group directories are intended to hold current and active research data and should be the preferred storage location for collaborative work.
- Additional notes:
 - The CRC provides an initial 5TB quota in this tier for each PI. This allotment is non-transferable between PIs nor between storage platforms.
 - Additional storage may be purchased at \$115 / TB / year.

- A PI may choose to assign individual user permissions inside the group directory or default to having all advisees have the same permissions.
 - Directories are on a hybrid SSD system for moderate performance.
 - A nightly snapshot of these directories is provided by default.
- Location:
 - */groups/pi-netid*

2.2 User Home Directory (Active Research Storage)

- Description:
 - The home directory is intended to store configuration files, application preferences, or limited data for workflow testing and easy access.
- Additional notes:
 - Every CRC user is assigned a home directory with a maximum size of 100GB. Home directory quotas are not individually increased.
 - This directory does not count against the advisor's 5TB allotment.
 - Home directories are hosted on SSD drives for moderate performance.
 - A nightly snapshot of these directories is provided by default.
- Location:
 - */users/netid*

2.3 Long Term Storage (Lower Cost, Low Performance Bulk Storage)

- Description:
 - Long-term storage is intended to hold infrequently used data and is offered as a cost-effective solution.
- Additional notes:
 - There is no default allotment provided.
 - Data is only accessible from login nodes (no access from compute nodes).
 - Data hosted in */bluefs* does NOT include nightly snapshots and is \$35 / TB / year.
 - Data hosted in */goldfs* does include nightly snapshots and is \$70 / TB / year.
- Locations:
 - */bluefs/pi-netid and /goldfs/pi-netid*

2.4 Temporary High Performance Scratch Storage

- Description:
 - Scratch directories are temporary working spaces intended for IO intensive calculations requiring the highest level filesystem performance.
- Additional notes:
 - Data is automatically purged from scratch directories according to the naming policy. i.e. a file in */temp180* is purged 180 days after creation.
 - There are no nightly snapshots for any scratch directories.
 - Quotas are based on demonstrated short term user requirements.
- Locations:
 - */temp180/pi-netid/net-id and /scratch365/net-id*

2.5 Collaborative Project or Departmental Directory (not a unique physical filesystem)

- *Description:*
 - Collaborative directories are available when multiple-PI and/or departmental storage locations are desired.
 - Directories can be deployed on either the “Active Storage” platform described above for user and group directories OR the “Long Term Storage” platform.
- *Additional notes:*
 - Collaborative directories are intended to be fully PI/Department funded for the desired tier. There is no aggregation of the 5TB individual faculty allocation.
 - PIs may choose to assign individual user permissions inside the collaborative directory or default to having all contributors have the same permissions.

3) Definitions

- *Snapshot / Nightly Backup*
 - A snapshot means that we are able to reproduce a complete copy of the data as it existed at a previous point in time. Snapshots are stored offsite from the primary data center. The CRC provides up to 30 days of recovery.
- *Principle Investigator (PI)*
 - A PI is a current, full-time faculty member who is responsible for overseeing students and staff. The PI is the owner of all data generated by their advisees.
- *Redundant/Resilient Storage*
 - All CRC storage systems (covered by this policy) have some degree of hardware redundancy for resilience to hardware failure (such as RAID).
- *Temporary Scratch Storage*
 - Scratch storage is any storage system or location that is intended to be used only for temporarily storing data. Since files in this space are automatically deleted at regular intervals, it is imperative that important data be moved to long term storage. In addition, files in scratch storage are never backed up. Examples:
 - /tmp – data purged on server restart
 - /scratch365 – data purged after 365 days
 - /temp180 – data purged after 180 days

4) Frequently Asked Questions

- *Am I able to mount or otherwise attach CRC storage directly to my local workstation?*
 - CRC storage is not directly accessible outside of CRC-owned and maintained servers. You may use file transfer tools to manage data. We recommend using Cyberduck or FileZilla for internal use and Globus for larger or external transfers.
- *Can I store restricted and/or confidential data on the CRC?*
 - In general, restricted and/or confidential data can not be stored in the primary access storage pool. The CRC can help direct you to the right resource (such as ND SECURE). Please reach out to discuss your specific use cases.
- *Where can I find more specific details about storage and each filesystem?*
 - Additional details can be found online: <https://docs.crc.nd.edu>