

Introduction to Minerva Restricted Cluster (Minerva-Res)

Minerva Scientific Computing Environment

<https://labs.icahn.mssm.edu/minervalab>

Yiyuan Liu, PhD
The Minerva HPC Team

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**Icahn
School of
Medicine at
Mount
Sinai**

Outline

- **What is Minerva-Res?**
- **Getting Started: Project Allocation and User Account**
- **How to Login and Use Minerva-Res**
- **Data Migration During Transition Period**
- **Data Transfer After Transition Period**
- **Network Access**
- **Other Services: Open OnDemand, Data Archive**
- **Security Compliance**

What is Minerva-Res?

A secure and dedicated HPC cluster designed for controlled data for Mount Sinai researchers.

- It is operated using NIST SP 800-171 Rev. 3 as the baseline security framework.
- There is no direct connection between Minerva and Minerva-Res.

Approved for handling:

1. Data from [NIH controlled-access repositories](#)
2. Centers for Medicare & Medicaid Services (CMS) Research Identifiable Files (RIF) and Limited Data Sets (LDS) data paired with a Minerva HPC Data Management Plan (DMP) Security Assessment Questionnaire (SAQ)

For complete details, see the Minerva-Res documentation

https://labs.ica hn.mssm.edu/minervalab/documentation/minerva_restricted_cluster/

Minerva-Res Resources

System Specs

- **2×** login nodes
- **6.9 PB** encrypted GPFS storage at /arionencrypt
- **1.5 TiB** memory per compute node for a set of nodes (expandable)
- **GPUs** to be added
- **TSM** archival storage system on login nodes

These services are **NOT available** — please plan your workflows accordingly:

- × Database server
- × Web server
- × Posit Connect
- × Globus
- × On-the-fly scripts (Jupyter, RStudio IDE, Ollama)

Minerva-Res: Project Allocation

1. Allocation Request

- An active [Data Use Agreement \(DUA\) managed by the institution GCO](#) subject to NIST SP 800-171 is required.
- Pls submit [Minerva Restricted Cluster: Project Resource Allocation Request Form](#).

2. Policies Agreement

- Pls review & agree to [Annual Minerva Restricted Supercomputer Policies and Procedures](#).
 - *After logging in, navigate to **Minerva-Res Forms**, and select **Minerva Restricted Supercomputer Policies and Procedures**.*

Changes & Deactivation

- **Modifications:** Use your return code to log back into the same REDCap to make updates.
- **Deactivation (PI Responsibility):** occurs when the DUA expires, the project completes, or the institutional affiliation terminates.

Minerva-Res: User Account

PREREQUISITE | A project allocation has been created

1 User Request

Users review & agree to the [Annual Minerva Restricted Supercomputer Policies and Procedures](#)

2 PI Approval

PIs approve the user request to access Minerva-Res

NOTE

External accounts are not currently supported due to background screening security requirements.

For permission/access to a specific project directory, please submit an [HPC ticket](#).

Logging In

Once your Minerva-Res access is granted, log in as follows:

Connection endpoints

Campus network or VPN

- minerva-res.hpc.mssm.edu — Round-robin redirect • (recommended)
- [ci06e01](https://ci06e01.hpc.mssm.edu) / ci06e02.hpc.mssm.edu — Specific login node (reconnect a screen session)

1 Connect

SSH to a login node using an endpoint above.

2 Password

Enter your Sinai School Password only.

3 MFA

Complete the Multi-factor Authentication (MFA) on your mobile device.

```
SHELL
```

```
ssh yourUserID@minerva-res.hpc.mssm.edu
```

```
(yourUserID@minerva.hpc.mssm.edu) Password: <Enter your Sinai School Password Only>
```

```
Enter Your Microsoft verification code<609017>
```

Minerva-Res Storage

- Storage is organized into the `$HOME` directory and one or more `Projects` directories.

Storage Type	Path	Quota
Home Directory	/arionencrypt/users/<userid>	30 GiB, 1M files
Project Data	/arionencrypt/projects/<projectid>	Per project allocation
CMS Project Data	/arionencrypt/cmsdata/<projectid>	Per project allocation

Check Current Usage & Quota

```
du -sh /arionencrypt/users/<userid> (for Home directory)
```

```
df -h /arionencrypt/projects/<projectid> (for project directory)
```

```
df -h /arionencrypt/cmsdata/<projectid> (for CMS data)
```

Software Environment

Module System

Software Availability

Software is available through the read-only Lmod module system at `/hpc/packages`.

Loading Applications

Use the module command to load an available application(s): `module load <software_name>`

Documentation & Support

For complete details, see the Minerva software documentation:

<https://labs.icahn.mssm.edu/minervalab/documentation/software-environment-lmod/>

Requesting Software

To request additional software, send in an HPC ticket: hpchelp@hpc.mssm.edu

Running Jobs (LSF Scheduler)

LSF Scheduler

Workloads are still managed by the IBM Spectrum LSF scheduler. All jobs must be submitted to the scheduler.

For complete details, please visit <https://labs.ica hn.mssm.edu/minervalab/documentation/lsf-job-scheduler/>.

Job Queues

Queue	Description	Max Walltime
Express Queue	Rapid turnaround job	12h
Premium Queue	Normal submission queue	144h

Interactive Jobs

Suitable for real-time debugging, testing, and active development.

Command:

```
bsub -q express -W 1:00 -P  
project_id -Is /bin/bash
```

Note: SSH X11 forwarding (-XF) is disabled.

Data Migration During Transition Period

ACTION REQUIRED

Who must act?

Researchers currently working on NIH controlled-access genomic data on the Minerva Cluster.

This includes PIs and team members working under an active [Data Use Agreement \(DUA\) managed by the institution GCO](#), subject to NIST SP 800-171.

- Specifically, PIs who signed the REDCap form with GCO: [“Agreement to use Minerva for federally designated controlled, unclassified genomic data sets.”](#)

Data Migration During Transition Period

Minerva to Minerva-Res Migration window: 07/15 - 08/26 (6 weeks)

Minerva arion file system and home directory is available in **read-only mode** for data migration. Please migrate all controlled data and supporting scripts needed.

Phase 1: Before August 26th (Migration & Cleanup)

1. Users may migrate data from the Minerva project `/sc/arion/projects` and home directories `/hpc/users/<userid>` to the Minerva-Res storage under `/arionencrypt`.
2. Users must remove all NIH controlled-access data subject to NIST 800-171 completely from the standard Minerva cluster.
3. **PIs must formally attest that all controlled data has been fully removed from Minerva.**

Phase 2: After August 26th (Compliance & Restrictions)

- **Compliance Requirement:** No NIH controlled-access data is allowed on Minerva.
- **TSM Archived Data:** Please do not retrieve Minerva-Res archived data directly to Minerva.

Minerva-Res Data Transfer After Transition Period

Core Security Policies

Strict Restrictions

Standard SFTP/SSH and general internet access are **disabled by default**.

Zero Leakage Policy

Do **not** copy/paste, download, screenshot, or screen record data to unapproved environments.

Encryption Required

All approved data transfers must use cryptographic tools during transit.

Data Derivatives**

Any data derived from controlled-access datasets must be treated with the exact same level of protection (unless explicitly approved for release by the PI as non-controlled data)

** Data Derivative: Data derived from controlled-access datasets obtained from NIH-designated data repositories. Examples of derived data include imputed datasets and single nucleotide polymorphisms, or any data explicitly designated as Data Derivatives by NIH.

See NIH page at

<https://grants.nih.gov/policy-and-compliance/policy-topics/sharing-policies/accessing-data/certification-agreement> and <https://grants.nih.gov/news-events/nih-extramural-nexus-news/2025/05/protecting-human-genomic-data-when-developing-generative-artificial-intelligence-tools-and-applications>

Minerva-Res Data Transfer After Transition Period

Transfer Summary — Data Classification & Transfer Procedures

Data Classification	Transfer Route	Required Action & Approvals
Non-Controlled Data (Standard & CMS)	Data In (Ingress)	HPC approval .
	Data Out (Egress)	PI approval required.*
Controlled Data (Standard & CMS)	Data In (Ingress)	• CASE 1: Complete the External Connectivity Form for direct data download from a remote server. • CASE 2: Otherwise, submit an HPC ticket for guidance.
	Data Out (Egress)	STRICTLY PROHIBITED. Requires DUA amendment & institutional review. Contact: hpchelp@hpc.mssm.edu

* PI Responsibility

PIs are responsible for the classification of the data and for approving that the data to be released is non-controlled and complies with the applicable Data Use Agreement (DUA) and institutional policies.

Non-Controlled Data Transferred into Minerva-Res

Non-controlled data may be transferred from Minerva Arion to Minerva-Res with HPC approval.

1. Place your files in the designated group-specific staging directory:

```
/sc/arion/projects/<project>/from-arion-to-arionencrypt
```

- If the staging directory does not exist, create it under your Arion project directory:

```
mkdir from-arion-to-arionencrypt
```

- Recommended: create a subfolder named after your Minerva user ID to avoid naming conflicts:

```
/sc/arion/projects/<project>/from-arion-to-arionencrypt/<userid>
```

2. Submit a **data transfer request**.
3. The HPC team review the request and transfer users' files to the Minerva-Res staging directory.
4. Move the transferred files from the staging directory into your working directory.

Non-Controlled Data Transferred Out of Minerva-Res

Non-controlled data may be transferred from Minerva-Res to Minerva Arion with PI approval.

1. Place your files in the designated staging directory:

```
/arionencrypt/projects/<project_res>/from-arionencrypt-to-arion
```

2. Submit a **data transfer request**.
3. The PI will be notified to review and approve the request.
4. Upon PI approval, HPC staff will transfer the data to the approved Arion staging area.
5. Move the transferred files from the destination staging directory into your working directory.

*** PI Responsibility**

PIs are responsible for the classification of the data and for approving that the data to be released is non-controlled and complies with the applicable Data Use Agreement (DUA) and institutional policies.

Data Transfer for CMS-Related Projects

Key points

- **Same procedure** — staging, request submission, and approval are identical to the standard non-controlled data process.
- **Different directories** — dedicated Data In (Minerva Arion) and Data Out (arionencrypt) locations, separate from the standard project paths.
- Use the CMS-specific paths from the documentation — not the standard project staging paths.

Full instructions

For the complete procedure and exact CMS staging directory paths, see the Minerva-Res Data Transfer documentation:

https://labs.ica hn.mssm.edu/minervalab/documentation/minerva_res_data_transfer/

Controlled Data Transferred into Minerva-Res

CASE 1:

Download Controlled Data from an Approved NIH Repo

1. Complete the [External Connectivity Request Form](#)
2. All requests are subject to security review and approval based on research justification
3. Once approved, the requested IP will be added to the allow-list
4. Perform the approved data ingress activities. Access will be removed once the transfer is complete.

CASE 2:

Otherwise, please contact hpchelp@hpc.mssm.edu for data upload guidance.

Controlled Data Transferred Out of Minerva-Res

PROHIBITED

Export or transfer of controlled-access data from the Minerva-Res environment is not permitted — unless expressly authorized under the applicable Data Use Agreement (DUA) and approved through the institutional review process.

REQUEST A REVIEW

Email the HPC team to begin the institutional review process:

hpchelp@hpc.mssm.edu

External Network Access

Login and compute nodes have no external network connectivity. To request access:

- Complete the [External Connectivity Request Form](#)
- The HPC team will evaluate the research justification and security requirements
- Approved IP sources will be whitelisted for the designated time frame

`module load res_proxies` (to access whitelisted URLs)

Open OnDemand

Web Portal Access

A dedicated Open OnDemand portal provides browser-based access to applications: <https://ondemand-res.hpc.mssm.edu/>

Available Applications

Access standard interactive workloads and environments directly from your browser, including:

- **Desktop & Jupyter**
- **RStudio**
- **SAS & Stata**

Important Restriction

Data transfer (upload or download) is disabled in the Open OnDemand Restricted environment.

Documentation

For additional information and step-by-step guides, see the Open OnDemand documentation page:

<https://labs.ica hn.mssm.edu/minervalab/documentation/open-ondemand/>

Long-Term Data Archive: TSM

Direct Node Access

TSM clients can be accessed directly on Minerva-Res login nodes.

Documentation & Support

For complete details, please visit the official documentation page:

[Access TSM with Command Line Documentation](#)

TSM Archived Data

Please do not retrieve Minerva-Res archived data directly to Minerva.

Security & Compliance

Minerva-Res is a lockdown environment designed to protect controlled-access data and maintain NIST SP 800-171 compliance.

Access & Network Controls

Minimum Necessary Principle: Users must only access data specifically required for their approved research.

Network Tunnels: Port forwarding is disabled. Bypassing security controls, creating unauthorized network tunnels, or using unapproved proxies is forbidden.

Monitoring & Logging

Session Monitoring: Sessions that remain idle will be automatically terminated after 1 hour.

Command Logging: All command activity is logged to central security platforms (Graylog/SIEM) for security auditing and system health monitoring.

Violations of compliance may result in immediate access revocation per institutional policy.

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The logo for the Clinical and Translational Science Awards (CTSA) is displayed. It features the acronym "CTSA" in a large, bold, dark red font. To the right of "CTSA", the words "Clinical & Translational" are stacked above "Science Awards", all in a smaller, dark red font. A registered trademark symbol (®) is located at the end of "Awards".

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Contact & Support

Got a question? Need help?

Send an email to the Minerva ticketing system:

hpchelp@hpc.mssm.edu

Thank You!