In order to effectively utilize the limited number of MATLAB licenses on NAS-supported workstations or supercomputing systems:

- Each user is limited to a single interactive MATLAB license.
- When using the MATLAB GUI, after four hours of being idle and not running a job, the license will be revoked.
- Start a second MATLAB GUI on the same host to compile or use toolboxes. Exit the second GUI when you are done with the license to immediately free up the compiler/toolbox license.
- If users are waiting for licenses, a MATLAB process that has been idle for more than ten minutes may be terminated to revoke its license and make it available to another user.

For more information, including alternatives to using MATLAB licenses, see Using NAS MATLAB Licenses.

In order to effectively utilize the limited number of Interactive Data Language (IDL) licenses on NAS-supported workstations or supercomputing systems:

- Each user is limited to a single interactive IDL license.
- When using the IDL command line, after four hours of being idle and not running a job, the license will be revoked.
- If users are waiting for licenses, a IDL process that has been idle for more than ten minutes may be terminated to revoke its license and make it available to another user.

## Common Standard Billing Unit (SBU)

A common Standard Billing Unit (SBU) normalizes computing time usage across different types of processor architectures, and is used for allocating and tracking usage for both the HECC project and the NASA Center for Climate Simulation (NCCS).

For details about the charging formula and SBU rates for each processor type, see the Standard Billing Units policy on the NASA High-End Computing Program website.

The PI must, by law, manage, protect and control the export of the project's data in a way that complies with the security category of the data. There are five categories of data:

- Mission Information (MSN)
- Business and Restricted Technology Information (BRT)
- Scientific, Engineering, and Research Information (SER)
- Administrative Information (ADM)
- Public Access Information (PUB)

WARNING: Mission Information requires the most stringent security control and protection. Currently, the NAS Facility is not configured to provide services for MSN data. For Business and Restricted Technology Information (which includes ITAR/Export Control Data), no world access (write/read/execute) is allowed.

Detailed descriptions of each data categories are as follows:

## Mission Information (MSN)

If the information, software applications, or computer systems in this category are altered, destroyed, or unavailable, the impact on NASA could be catastrophic. The result could be the loss of major or unique assets, a threat to human life, or prevention of NASA from preparing or training for a critical Agency mission. Examples in this category are those that control or directly support one of the following:

1. Human space flight
2. Wide Area Networks
3. Development of the data or software used to control human flight
4. Training simulation vehicles
5. Wind tunnel operations
6. Launch operations
7. Space vehicle operations

## Business and Restricted Technology Information (BRT)

This category consists of information that NASA is required by law to protect. It includes information, software applications, or computer systems that support the Agency's business and technological needs. In general, if information in this category should be disclosed inappropriately, the disclosure could result in damage to our employees, in loss of business for our partners and customer businesses, in contract protest, or the illegal export of technology. This category includes systems containing technological information that is restricted from general public disclosure because of public laws. Examples in this category are those that are related to the following kinds of information:

1. Financial
2. Legal
3. Payroll
4. Personnel
5. Procurement
6. Source selection
7. Proprietary information entrusted to the Government
8. Export controlled technical information (includes disclosure to foreign nationals)

## Scientific, Engineering, and Research Information (SER)

All official NASA information held by NASA employees may be released publicly only in accordance with NASA regulations; however, systems in this category do not contain information for which the release is otherwise governed by law. This category consists of information that supports basic research, engineering, and technology development but is less restricted against public disclosure.

1. Alteration, destruction, unauthorized disclosure, or unavailability of the systems, application, or information would have an adverse or severe impact on individual projects, scientists, or engineers; however, recovery would not impede the Agency in accomplishing a primary mission.
2. Integrity is the driving concern in this category followed by availability. Confidentiality is important and should be considered in a risk assessment insofar as it protects individual researchers from such things as premature disclosure of their work by another party. The impact, however, is primarily on an individual rather than on the Agency.

## Administrative Information (ADM)

Administrative Information includes, but is not limited to electronic correspondence, briefing information, project/program status, infrastructure design details, predecisional notes, vulnerability descriptions, passwords, and internet protocol addresses. Organizations run various applications-from problem reports to configuration management tools-on administrative IT systems.

1. This category includes systems, applications, and information that support NASA's daily activities, such as electronic mail, forms processing, networking, and management reporting.
2. Integrity and availability are the driving IT security concerns. The impact is primarily managerial in nature, which would require time and resources to correct. Confidentiality may be of concern in certain specific administrative information. In such

instances, additional security controls must be imposed as a risk analysis dictates.

## Public Access Information (PUB)

This category includes information, software applications, and computer systems specifically intended for public use or disclosure, such as a public web site or hands-on demonstrations. The loss, alteration, or unavailability of information in this category would have little direct impact on NASA's missions but might expose the Agency to embarrassment, loss of credibility, or public ridicule.

1. Information posted for public access which could expose NASA missions to risk if compromised should be afforded additional protective measures. In these cases, the baseline requirements for ADM information should be implemented. (For example, contractors may submit proposals based on information from NASA web sites. Loss, alteration, or unavailability of data at the site could result in protests, thereby impacting procurement cycle time and ultimately NASA missions.)
2. Integrity and availability are the driving concerns. IT security controls are selected to protect the resources themselves and are not intended to protect the confidentiality of the information.

Filesystems on Pleiades and Lou have the following types of quotas:

- Limits on the total disk space occupied by your files
- Limits on the number of files (represented by inodes) you can store, regardless of size. For quota purposes, directories count as files.

## Hard and Soft Quota Limits

NAS quotas have hard limits and soft limits. Hard limits should never be exceeded. Soft limits can be exceeded temporarily, for a grace period of 14 days. If your data remains over the soft limit for more than 14 days, the soft limit is enforced as a hard limit. On some filesystems, this means that write attempts will fail. On other filesystems, it will mean that your PBS jobs will no longer start. To reduce your data to below the quota limits, you can delete unneeded files or copy important files elsewhere, such as the Lou mass storage system, and then remove them locally.

Filesystem quotas are shown in the following table:

| | **Pleiades** | **Lou** |
|---|---|---|
| **$HOME** | NFS | XFS |
| Space: soft | 8 GB | none |
| Space: hard | 10 GB | none |
| Inode: soft | none | 250,000 |
| Inode: hard | none | 300,000 |
| **/nobackup** | Lustre /nobackupp*X* | N/A |
| Space: soft | 1 TB | N/A |
| Space: hard | 2 TB | N/A |
| Inode: soft | 500,000 | N/A |
| Inode: hard | 600,000 | N/A |

To learn how to check your disk space, inode usage, and quotas, see the following articles:

- Pleiades Home Filesystem
- Pleiades Lustre Filesystems
- The Lou Mass Storage System

## Email Warnings and Consequences

It is expected that your data will exceed your soft limits as needed. When this occurs, you will begin to receive daily emails to inform you of your current disk space and how much of your grace period remains. However, if your data is still over the soft limit or if you reach the hard limit, restrictions are put in place.

The following table shows the quota enforcement policy for each type of filesystem.

| **Filesystem** | **Grace Period** | **Enforcement** |
|---|---|---|
| /nobackupp*X* | 2 weeks | Batch jobs won't run |
| /nobackupnfs2 | 2 weeks | Writes are disabled |
| Pleiades home directory | 2 weeks | Writes are disabled |
| Lou home directory | 2 weeks | Writes are disabled |

More details are available in the following sections.

## Lustre Filesystems (/nobackupp*X*)

If your grace period has expired, then your batch queue access is restricted and no new jobs can be run until your data on the Lustre filesystem is reduced to an amount below the soft limit. Any jobs that are running will continue to run. If you reach the hard limit, your batch access is immediately restricted, but any running jobs will continue.

## Pleiades Home Directory and /nobackupnfs2

If your grace period has expired, then any writes to that filesystem will fail, and any jobs that attempt to write to the filesystem will fail. You will be unable to write to the filesystem until your data is reduced to an amount below the soft limit. Similarly, if you reach the hard limit, any writes will immediately fail and you will be unable to write to the filesystem until your data is reduced to an amount below the hard limit.

## Lou Home Directory

If your grace period has expired, then any writes that attempt to create new files will fail. You will be unable to create any new files until the number of files is reduced to below the soft limit. If you reach the hard limit, any writes that attempt to create new files will fail until the number of files is reduced to below the hard limit.

The maximum size of a tar file moved to Lou should not exceed 2 TB. If you need to archive larger files, please contact the NAS Control Room at support@nas.nasa.gov for assistance.

Note: The Shift tool, which is a convenient way to transfer files to Lou, can created a set of smaller independent tar files from a single large directory. For more information, see Shift File Transfer Overview.

## Changing Your Quotas

If an account needs larger quota limits, send an email justification tosupport@nas.nasa.gov. Your request will be reviewed by management for approval.

Mission directorate shares have been implemented on HECC systems for more than ten years. Implementing shares guarantees that each mission directorate gets its fair share of resources.

The share to which a job is assigned is based on the project group ID (GID) used by the job. After all the cores within a mission directorate's share have been assigned, other jobs assigned to that share must wait. This is true even if cores are available in a different mission directorate's share, with the following exception:

> When a mission directorate is not using all of its cores, other mission directorates can borrow those cores, but only for jobs that will finish within 4 hours. When part of the resource is unavailable, the total number of cores decreases, and each mission directorate loses a proportionate number of cores.

You can display the share distribution by adding the `-W shares=-` option to the `qstat` command. For example:

```
%qstat -W shares=-

Group   Share% Use%  Share Exempt    Use  Avail Borrowed Ratio Waiting
------- ------ ---- ------ ------ ------ ------ -------- ----- -------
Overall    100    0 405070      0     44 405026        0  0.00   47680
 ARMD       27   28 110166    747 116736      0     6570  1.06  392206
 HEOMD      23   21  93560   1360  87952   5608        0  0.94  125004
 SMD        33   33 136088     16 136696      0      608  1.00  390340
 ASTRO      14    7  56703      0  30724  25979        0  0.54  131656
 NAS         2    0   8505      0   3080   5425        0  0.36   67488
```

Mission shares are calculated by combining the mission's HECC share of the shared assets with the mission-specific assets. The second column of the sample output above shows the mission shares. Other information displayed includes: the amount of resources used and borrowed by each mission, the amount of resources available to each mission, and the resources each mission is waiting for.

The `qs` utility (available under `/u/scicon/tools/bin/qs`) provides similar information, and also includes details that break the resources into the different processor types. In addition, the utility can show the remaining time for jobs that are running, or how much time was requested by waiting jobs.

Specify the `-h` option of `qs` for instructions on how to use it. For example:

```
% /u/scicon/tools/bin/qs -h

usage: qs [-d] [-D] [-h] [-M] [-n N] [-o] [-r] [-s svr] [-t] [-u] [-v] [-w]
            [-x] [--audit f] [--file f] [--runout f] [--user U]
      -d        : darker colored resource bars (for a light background)
      -D        : show count of offline & down nodes
      -h        : provide this message
      -n NUM    : show time remaining before NUM nodes are free
      -N NUM    : show time remaining before NUM nodes are free; suppress
                  other output
      -o        : show old-style resource usage without time information
      -r        : show runout times & expansion factors
      -s svr    : show data for PBS server svr [default: pbspl1]
      -t        : show time remaining & nodes used for each running job
      -u        : highlight resources for jobs of user running qs
      -v        : (verbose) provide explanation of display elements
      -w        : have resource bars show wait time, not remaining time
                  (cannot be used with -n, -o, -t, or -x)
      -x        : have resource bars show expansion factor of jobs,
                  not remaining time (cannot be used with -n, -o, -t or -w)
      --audit f  : reserved for debugging
      --file f   : reserved for debugging
      --runout f : put runout information in file f
      --user U   : highlight resources for jobs of users U (comma-separated list)
      --noShares : highlight resources for jobs that could start now if no shares
      --1node    : highlight resources for jobs that use only 1 node
```

Here is a sample output file of `qs`:

```
pbspl1:10-Oct-2019 13:07  100% of mission share
ARMD        |
r:105%  14335    :::+325+55555555
w:412%  .4.55    :::+325+55555555
        :5:5    ::::+555+5555555+
        :545    :::5+555+5555555+
        1:55    :::5+555+5555555+
        2215    :::535.525555555+
        2245    :::+35+555555555
              -running, exempt from share
HEOMD       |
r: 95%  .33:    :;#25+
w:138%  +4+#    :#.55#
        352#    ;#55##
        4:3;    ;#55#
        ++.;    ;#55#
        11.2    ;#55#
              -running, exempt from share
ASTRO       |
r: 54%  251  +155+2551
w:233%  52  2+25512521
        54  5+25+225+

SMD         |
r:100%  .;5##    ::1:++++1111111111111111111111111111111111111111112+2+1
w:1369% 3++#    :::1++++1111111111111111111111111111111111111111112+251
        1#4#    ::.1++++1111111111111111111111111111111111111111112+251
        1#1#    :::5++++1111111111111111111111111111111111111111112+251
        2###    :::5++++1111111111111111111111111111111111111111112+551
        41##    ::3:++++1111111111111111111111111111111111111111115+551
        51##    ::5:++++1111111111111111111111111111111111111111151+51
        #4##    ::;:++++1111111111111111111111111111111111111111115155
        -running-  -waiting-----------------------------------------------
              -running, exempt from share
Key:    <=1h    <=2h    <=4h    <=8h    <=1d    <=2d    <=3d    <=4d    <=5d    >5d
         .       :       ;       +       1       2       3       4       5       #
Pleiades Used Nodes (above) .... san:1544  ivy:4713  has:1929  bro:1892  ele:1135  sky:2191  cas:1024
Pleiades Unused Nodes (below)... san:   1  ivy:   0  has:   1  bro:   4  ele:   4  sky:   0  cas:   0
Unused, but limited by Resv .... san:   0  ivy:   0  has:   0  bro:   2  ele:   0  sky:   0  cas:   0
Unused in devel,*ops queues .... san: 209  ivy: 243  has:  93  bro:  90  ele:   0  sky:   0  cas:   0
    Unused GPU Nodes (G,G) .........   58                                                   12
Unused ldan Nodes (L) .......... san:   3
Unused ded Nodes (Q,Q,Q,Q,Q,Q,Q) san:  36  ivy:  53  has:   5  bro:   1  ele:   0  sky:  41  cas: 106
        s  i  Q
          ib  Q

Merope Unused ........ wes: 398
        ww


Each letter/number/symbol (w,s,i,h,b,e,k,c,#,#,#,#,#,#,#,#) ~= the same number of SBUs/hr
(which varies with your window width and current mix of jobs running and queued)
==> in nodes: w,# ~= 354.4 wes; s,# ~= 265.8 san; i,# ~= 212.6 ivy; h,# ~= 177.2 has;
              b,# ~= 151.9 bro; e,# ~= 151.9 bro_ele; k,# ~= 106.3 sky_ele; c,# ~= 106.3 cas_ait nodes.
```