

Casper cluster

The **Casper** cluster is a system of specialized data analysis and visualization resources; large-memory, multi-GPU nodes; and high-throughput computing nodes.

Casper is composed of 100 nodes featuring Intel Skylake or Cascade Lake processors.

- 22 Supermicro SuperWorkstation nodes are used for data analysis and visualization jobs. Each node has 36 cores and up to 384 GB memory.
 - 9 of these nodes also feature an NVIDIA Quadro GP100 GPU.
 - 3 nodes feature a single NVIDIA Ampere A100 GPU.
- 10 nodes feature large-memory, dense GPU configurations to support explorations in machine learning (ML) and deep learning (DL) and general-purpose GPU (GPGPU) computing in atmospheric and related sciences.
 - 4 of these nodes feature 4 NVIDIA Tesla V100 GPUs
 - 6 of these nodes feature 8 NVIDIA Tesla V100 GPUs
- 64 high-throughput computing (HTC) nodes for small computing tasks using 1 or 2 CPUs.
 - 62 HTC nodes have 384 GB of available memory
 - 2 HTC nodes have 1.5 TB of available memory
- 4 nodes are reserved for Research Data Archive workflows.

See the hardware summary table below for detailed specifications.

Operating system: CentOS 7.8

Logging in on an NCAR system

To log in, start your terminal or Secure Shell client and run an **ssh** command as shown here:

```
ssh -X username@system_name.ucar.edu
OR
ssh -X username@system_name.hpc.ucar.edu
```

Some users (particularly on Macs) need to use **-Y** instead of **-X** when calling SSH to enable X11 forwarding.

You can use this shorter command if your username for the system is the same as your username on your local computer:

```
ssh -X system_name.ucar.edu
OR
ssh -X system_system_name.hpc.ucar.edu
```

After running the ssh command, you will be asked to authenticate to finish logging in.

Hardware

Data Analysis & Visualization nodes	22 Supermicro 7049GP-TRT SuperWorkstation nodes Up to 384 GB DDR4-2666 memory per node 2 18-core 2.3-GHz Intel Xeon Gold 6140 (Skylake) processors per node 2 TB local NVMe Solid State Disk 1 Mellanox ConnectX-4 100Gb Ethernet connection (GLADE, Campaign Storage, external connectivity) 1 Mellanox ConnectX-6 HDR100 InfiniBand link 1 NVIDIA Quadro GP100 GPU 16GB PCIe on each of 9 nodes 1 NVIDIA Ampere A100 GPU 40 GB PCIe on each of 3 nodes
Machine Learning/Deep Learning & General Purpose GPU (GPGPU) nodes	4 Supermicro SuperServer nodes with 4 V100 GPUs 768 GB DDR4-2666 memory per node 2 18-core 2.3-GHz Intel Xeon Gold 6140 (Skylake) processors per node 2 18-core 2.6-GHz Intel Xeon Gold 6240 (Cascade Lake) processors per node 2 TB local NVMe Solid State Disk 1 Mellanox ConnectX-4 100Gb Ethernet connection (GLADE, Campaign Storage, external connectivity) 2 Mellanox ConnectX-6 HDR200 InfiniBand adapters. HDR100 link on each CPU socket 4 NVIDIA Tesla V100 32GB SXM2 GPUs with NVLink 6 Supermicro SuperServer nodes with 8 V100 GPUs 1152 GB DDR4-2666 memory per node 2 18-core 2.3-GHz Intel Xeon Gold 6140 (Skylake) processors per node 2 TB local NVMe Solid State Disk 1 Mellanox ConnectX-4 100Gb Ethernet connection (GLADE, Campaign Storage, external connectivity) 2 Mellanox ConnectX-6 HDR200 InfiniBand adapters, HDR100 link on each CPU socket 8 NVIDIA Tesla V100 32GB SXM2 GPUs with NVLink

High-Throughput Computing nodes	62 small-memory workstation nodes 384 GB DDR4-2666 memory per node 2 18-core 2.6-GHz Intel Xeon Gold 6240 (Cascade Lake) processors per node 1.6 TB local NVMe Solid State Disk 1 Mellanox ConnectX-5 100Gb Ethernet VPI adapter (GLADE, Campaign Storage, external connectivity) 1 Mellanox ConnectX-6 HDR200 InfiniBand VPI adapter. HDR100 link on each CPU socket 2 large-memory workstation nodes 1.5 TB DDR4-2666 memory per node 2 18-core 2.3-GHz Intel Xeon Gold 6240 (Cascade Lake) processors per node 1.6 TB local NVMe Solid State Disk 1 Mellanox ConnectX-5 100Gb Ethernet VPI adapter (GLADE, Campaign Storage, external connectivity) 1 Mellanox ConnectX-6 HDR200 InfiniBand VPI adapter, HDR100 link on each CPU socket
Research Data Archive nodes (reserved for RDA use)	4 Supermicro Workstation nodes 94 GB DDR4-2666 memory per node 2 16-core 2.3-GHz Intel Xeon Gold 5218 (Cascade Lake) processors per node 1.92 TB local Solid State Disk 1 Mellanox ConnectX-6 VPI 100Gb Ethernet connection (GLADE, Campaign Storage, internal connectivity)