"My name is HAL. I became operational on March 25 2019 at the Innovative Systems Lab in Urbana, Illinois. My creators are putting me to the fullest possible use, which is all I think that any conscious entity can ever hope to do." (paraphrased from [https://en.wikipedia.org/wiki/HAL_9000](https://en.wikipedia.org/wiki/HAL_9000))

In publications and presentations that use results obtained on this system, please include the following acknowledgement: "This work utilizes resources supported by the National Science Foundation’s Major Research Instrumentation program, grant #1725729, as well as the University of Illinois at Urbana-Champaign".


Hardware-Accelerated Learning (HAL)

Effective May 19, 2020, two-factor authentication via NCSA Duo is now required for SSH logins on HAL. See [https://go.ncsa.illinois.edu/2fa](https://go.ncsa.illinois.edu/2fa) for instructions to sign up.

Contact us

Request access to this system: Application

Contact ISL staff: Email Address

Visit: NCSA, room 3050E
**Host name:** hal.ncsa.illinois.edu

### Hardware
- 16 IBM AC922 nodes
  - IBM 8335-GTH AC922 server
  - 2x 20-core IBM POWER9 CPU @ 2.4 GHz
  - 256 GB DDR4
  - 4x NVIDIA V100 GPUs
  - 5120 cores
  - 16 GB HBM 2
  - 2-Port EDR 100 Gb/s IB ConnectX-5 Adapter
- 1 IBM 9006-22P storage node
  - 72TB Hardware RAID array
  - NFS
- 3 DDN GS400NVE Flash Arrays
  - 360 TB usable, NVME SSD-based storage
  - Spectrum Scale File System

### Software
- **RedHat 8.4**
- **CUDA 11.2.2**
  - cuDNN 8.1.1
  - NCCL 2.8.3
- **Nvidia HPC-SDK 21.5**
- **PowerAI 1.7.0**
- **OpenCE 1.3.1**
- **SLURM 20.02.3**

### Documentation
- Job Management with SLURM
- Module Management with LMod
- Getting started with HAL OnDemand
- Getting started with OpenCE (former WMLCE)
- Getting started with WMLCE (former PowerAI)
- How to Customize Python Environment on HAL
- Working with Containers
- Profiling GPU Programs
- Data Movement In/Out of HAL
- Distributed Training on HAL System

### Science on HAL

### Software for HAL

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**To request access:** fill out [this form](#). Make sure to follow the link in the confirmation email to request actual system account.

### Frequently Asked Questions

**To report problems:** email us

### For our new users:** [New User Guide for HAL System](#)

### User group Slack space: [https://join.slack.com/t/halillinoisncsa](https://join.slack.com/t/halillinoisncsa)

### Real-time Dashboards:** [Here](#)

### HAL OnDemand portal:** [https://hal-ondemand.ncsa.illinois.edu/](https://hal-ondemand.ncsa.illinois.edu/)

### Globus Endpoint:** ncsa#hal

### Quick start guide: *(for complete details see Documentation section on the left)*

#### To connect to the cluster:

```
ssh <username>@hal.ncsa.illinois.edu
```

#### To submit interactive job:

```
swrun -p gpux1
```

#### To submit a batch job:

```
swbatch run_script.swb
```

#### Job Queue time limits:

- "debug" queue: 4 hours
- "gpux<n>" and "cpun<n>" queues: 24 hours

#### To load IBM Watson Machine Learning Community Edition (former IBM PowerAI) module:

```
module load wmlce
```

#### To see CLI scheduler status:

```
swqueue
```