"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)

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".


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 for instructions to sign up.
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
- 2 DDN GS400NV3 Flash Arrays
  - 244 TB usable, NVME SSD-based storage
  - Spectrum Scale File System

**Software**
- CentOS 7.7
- CUDA 10.2.89
  - cuDNN 7.6.5
  - NCCL 2.5.6
- IBM XL Fortran and IBM XLFORTRAN 16.1.1
- Advance toolchain for Linux on Power 12.0
- PGI Community Edition 19.4
- PowerAI 1.7.0
- SLURM 20.02.0

**Documentation**
- Job management with SLURM
- Modules management
- Getting started with WMLCE (former PowerAI)
- Working with containers
  - Installing python packages
  - Getting started with HAL OnDemand
  - Profiling GPU Programs
  - Data Movement In/Out of HAL

**Science on HAL**

**Software for HAL**

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 system status: [https://hal-monitor.ncsa.illinois.edu:3000/](https://hal-monitor.ncsa.illinois.edu:3000/)

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:

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

To submit interactive job:

```bash
swrun -p gpux1
```

To submit a batch job:

```bash
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:

```bash
module load wmlce
```

To see CLI scheduler status:

```bash
swqueue
```