OpenPOWER GPU Development Infrastructure

- Users get an account to access the head machine "openpower.cgrb.oregonstate.edu" using SSH/SCP/SFTP.
- Users can submit jobs using the SGE based scheduler system.
- Users can get command line access to individual processing machines with GPU processing and CAPI NVMe cards on processing hardware.
- Users can request more resources if needed by responding the email generated when their account was created.

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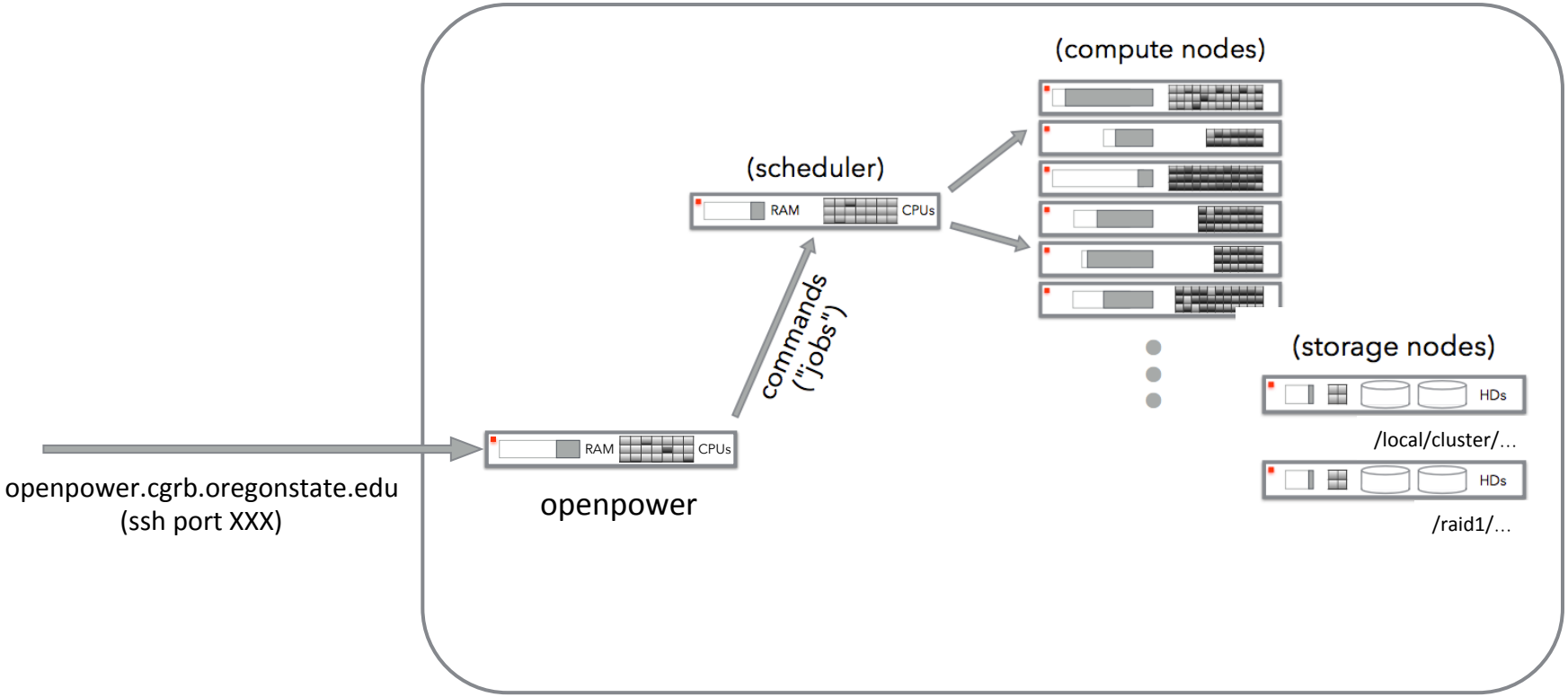
OpenPOWER GPU Development Infrastructure



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Running Jobs on the OpenPOWER GPU Development Infrastructure

- Use "**SGE_Avail"** to determine what computational resources are available to your account.
- Submit jobs with "**SGE_Batch"** using quotes around the command you want to run
- Use "**qstat**" to monitor jobs that have been submitted to the cluster.
- If you would like to directly access a machine with a GPU use "**qrsh**" to check that machine out.
- Programs and tools are located under **"/local/cluster"** mount point.
- Tensorflow and other tools can be accessed through miniconda or can be installed by the user.

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```
Desktop-Computer:~ sullichr$ ssh -p 822 openpower.cgrb.oregonstate.edu


*******************************************************************************
*
*        Welcome to the Center For Genome Research Genome Cluster
*
*              . ,-"-.    ,-"-. ,-"-.    ,-"-. ,-"-.    ,
*               X | | \ / | | X | | \ / | | X | | \ /
*              / \| | |X| | |/ \| | |X| | |/ \| | |X|
*                 `-!-' `-!-"   `-!-' `-!-'   `-!-' `-
*
*       System Summary (collected Sun May 20 21:46:02 PDT 2018)
*
*       - Hostname                  = openpower
*       - CPU Usage (average)       = 0%
*       - Memory in use (real)      = 51%
*       - Total Memory              = 506 GB
*       - Swap in use               = 0 GB
*       - Total Swap                = 7 GB
*       - Load Average              = 0.23, 1.42, 3.02
*       - Total Space               = 10 TB
*       - Total Free Local Space    = 719.571 GB
*       - Total Used Local Space    = 106.455 GB
*       - Private IP                = 128.193.83.27
*       - Public  IP                = 128.193.83.27
*
*  -={ this information can be obtained by running the command systat }=-
*
*******************************************************************************

[sullichr@openpower ~]$ uname -r
3.10.0-693.11.6.el7.ppc64le
[sullichr@openpower ~]$ cat /etc/redhat-release
CentOS Linux release 7.4.1708 (AltArch)
```

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```
[sullichr@openpower ~]$ date; sleep 20; date
Sun May 20 21:49:02 PDT 2018
Sun May 20 21:49:22 PDT 2018
[sullichr@openpower ~]$ SGE_Avail
               #HOST  TOTRAM FREERAM    TOTSLOTS             Q  QSLOTS  QFREESLOTS   QSTATUS     QTYPE
          openpower2  1018.0  1006.1         160         all.q      60          60    normal        BP
          openpower1  1018.0  1001.1         160         all.q      60          60    normal        BP
          openpower3  1021.9  1001.0         160         all.q      60          60    normal        BP
          openpower2  1018.0  1006.1         160        centos      10          10    normal       BIP
          openpower3  1021.9  1001.0         160        ubuntu      10          10    normal       BIP
          openpower2  1018.0  1006.1         160      gpu_base       1           1    normal       BIP
          openpower1  1018.0  1001.1         160      gpu_base       1           1    normal       BIP
          openpower3  1021.9  1001.0         160      gpu_base       1           1    normal       BIP
[sullichr@openpower ~]$ SGE_Batch -c 'date; sleep 20; date' -r Date_Sleep

        * Beginning the Data run
                RunID = Date_Sleep
                Dir = Date_Sleep

        * Your job 934795 ("Date_Sleep") has been submitted

[sullichr@openpower ~]$ qstat
job-ID  prior   name       user         state submit/start at     queue                          slots ja-task-ID
-----------------------------------------------------------------------------------------------------------------
 934795 0.00000 Date_Sleep sullichr     qw    05/20/2018 21:49:47                                  1
[sullichr@openpower ~]$ qstat
job-ID  prior   name       user         state submit/start at     queue                          slots ja-task-ID
-----------------------------------------------------------------------------------------------------------------
 934795 0.00000 Date_Sleep sullichr     qw    05/20/2018 21:49:47                                  1
[sullichr@openpower ~]$ qstat
job-ID  prior   name       user         state submit/start at     queue                          slots ja-task-ID
-----------------------------------------------------------------------------------------------------------------
 934795 0.55500 Date_Sleep sullichr     r     05/20/2018 21:49:50 all.q@openpower1.cgrb.oregonst     1
[sullichr@openpower ~]$ qstat
job-ID  prior   name       user         state submit/start at     queue                          slots ja-task-ID
-----------------------------------------------------------------------------------------------------------------
 934795 0.55500 Date_Sleep sullichr     r     05/20/2018 21:49:50 all.q@openpower1.cgrb.oregonst     1
[sullichr@openpower ~]$ qstat
job-ID  prior   name       user         state submit/start at     queue                          slots ja-task-ID
-----------------------------------------------------------------------------------------------------------------
 934795 0.55500 Date_Sleep sullichr     r     05/20/2018 21:49:50 all.q@openpower1.cgrb.oregonst     1
[sullichr@openpower ~]$ qstat
[sullichr@openpower ~]$ qstat
```

Command To Run

Submit Job using “SGE_Batch”

Monitor Jobs with “qstat”

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Tensorflow Example

```
[sullichr@openpower2 ~]$ source /local/cluster/PPC64LE/miniconda2/source_conda.(csh/sh)
[sullichr@openpower2 ~]$ which pythoh
pythoh: Command not found.
[sullichr@openpower2 ~]$ source /local/cluster/PPC64LE/miniconda2/source_conda.(csh/sh)
[sullichr@openpower2 ~]$ which python
/local/cluster/PPC64LE/miniconda2/bin/python
[sullichr@openpower2 ~]$ python
Python 2.7.14 |Anaconda, Inc.| (default, Feb  2 2018, 12:38:40)
[GCC 7.2.0] on linux2
Type "help", "copyright", "credits" or "license" for more information.
>>> import tensorflow as tf
>>> hello = tf.constant('Hello, TensorFlow!')
>>> sess = tf.Session()
2018-05-20 22:25:16.081428: I tensorflow/core/common_runtime/gpu/gpu_device.cc:940] Found device 0 with properties:
name: Tesla P100-SXM2-16GB
major: 6 minor: 0 memoryClockRate (GHz) 1.4805
pciBusID 0002:01:00.0
Total memory: 15.89GiB
Free memory: 15.60GiB
2018-05-20 22:25:16.188606: W tensorflow/stream_executor/cuda/cuda_driver.cc:523] A non-primary context 0x1001aa67450
 exists before initializing the StreamExecutor. We haven't verified StreamExecutor works with that.
2018-05-20 22:25:16.190420: I tensorflow/core/common_runtime/gpu/gpu_device.cc:940] Found device 1 with properties:
name: Tesla P100-SXM2-16GB
major: 6 minor: 0 memoryClockRate (GHz) 1.4805
pciBusID 0006:01:00.0
Total memory: 15.89GiB
Free memory: 15.60GiB
2018-05-20 22:25:16.190610: I tensorflow/core/common_runtime/gpu/gpu_device.cc:832] Peer access not supported between
 device ordinals 0 and 1
2018-05-20 22:25:16.190651: I tensorflow/core/common_runtime/gpu/gpu_device.cc:832] Peer access not supported between
 device ordinals 1 and 0
2018-05-20 22:25:16.190714: I tensorflow/core/common_runtime/gpu/gpu_device.cc:961] DMA: 0 1
2018-05-20 22:25:16.190739: I tensorflow/core/common_runtime/gpu/gpu_device.cc:971] 0:   Y N
2018-05-20 22:25:16.190763: I tensorflow/core/common_runtime/gpu/gpu_device.cc:971] 1:   N Y
2018-05-20 22:25:16.190808: I tensorflow/core/common_runtime/gpu/gpu_device.cc:1030] Creating TensorFlow device (/gpu
:0) -> (device: 0, name: Tesla P100-SXM2-16GB, pci bus id: 0002:01:00.0)
2018-05-20 22:25:16.190837: I tensorflow/core/common_runtime/gpu/gpu_device.cc:1030] Creating TensorFlow device (/gpu
:1) -> (device: 1, name: Tesla P100-SXM2-16GB, pci bus id: 0006:01:00.0)
>>> print(sess.run(hello))
Hello, TensorFlow!
>>>
[sullichr@openpower2 ~]$
```