PDSF User Meeting

- PDSF performance
- Announcements
- AOB
- Action items
aggregated load on PDSF interactive nodes

https://portal-auth.nersc.gov/pdsf-mon/
SLURM CPU*h aggregated over last month

SLURM: completed jobs in last month
http://portal.nersc.gov/project/mpccc/ebasheer/jobbygroup.php

3800 jobs * 24 h = 91k cpu*h/day
→ 640k cpu*h /week
→ 2.7 M cpu*h per month

Summary for May 11, 2018 (18:00) to Jun 11, 2018 (21:00)
The average and standard deviation refer to the average and standard dev series across the date-time range selected. The values are all in units of th

<table>
<thead>
<tr>
<th>Series</th>
<th>Total</th>
<th>Total (%)</th>
<th>Average</th>
</tr>
</thead>
<tbody>
<tr>
<td>rhstar</td>
<td>537,796</td>
<td>30.4%</td>
<td>2,159.8</td>
</tr>
<tr>
<td>star</td>
<td>0</td>
<td>0.0%</td>
<td>0.0</td>
</tr>
<tr>
<td>matcomp</td>
<td>13,481</td>
<td>0.8%</td>
<td>54.1</td>
</tr>
<tr>
<td>majorana</td>
<td>19,088</td>
<td>1.1%</td>
<td>76.7</td>
</tr>
<tr>
<td>lux</td>
<td>22,714</td>
<td>1.3%</td>
<td>91.6</td>
</tr>
<tr>
<td>IZ</td>
<td>525,663</td>
<td>29.7%</td>
<td>2,111.1</td>
</tr>
<tr>
<td>dayabay</td>
<td>66,597</td>
<td>3.8%</td>
<td>268.5</td>
</tr>
<tr>
<td>cuore</td>
<td>1,246</td>
<td>0.1%</td>
<td>5.0</td>
</tr>
<tr>
<td>atlas</td>
<td>100,745</td>
<td>5.7%</td>
<td>404.6</td>
</tr>
<tr>
<td>alice</td>
<td>481,487</td>
<td>27.2%</td>
<td>1,933.7</td>
</tr>
<tr>
<td>Total</td>
<td>1,768,817</td>
<td>100.0%</td>
<td>7,103.7</td>
</tr>
</tbody>
</table>
### Existing Slurm Shifter queues (unchanged)

<table>
<thead>
<tr>
<th>partition</th>
<th>OS provider</th>
<th>TotalCPUs</th>
<th>Time limit</th>
<th>MaxJobPA (per account)</th>
<th>MaxJobPU (per user)</th>
<th>Relative priority</th>
<th>remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>shared-chos</td>
<td>chos</td>
<td>3352</td>
<td>2 days</td>
<td>250</td>
<td>0</td>
<td>Share 94% of hardware</td>
<td></td>
</tr>
<tr>
<td>alice</td>
<td>chos</td>
<td>3224</td>
<td>2 days</td>
<td>1500</td>
<td>0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>realtime-chos</td>
<td>chos</td>
<td>128</td>
<td>4 hours</td>
<td>50</td>
<td>0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>debug-chos</td>
<td>chos</td>
<td>128</td>
<td>30 min</td>
<td>2</td>
<td>10</td>
<td></td>
<td></td>
</tr>
<tr>
<td>long</td>
<td>shifter</td>
<td>384</td>
<td>2 days</td>
<td>0</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>short</td>
<td>shifter</td>
<td>288</td>
<td>5 hours</td>
<td>0</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>realtime</td>
<td>shifter</td>
<td>128</td>
<td>4 hours</td>
<td>50</td>
<td>0</td>
<td>share common hardware</td>
<td></td>
</tr>
<tr>
<td>debug</td>
<td>shifter</td>
<td>128</td>
<td>30 min</td>
<td>2</td>
<td>10</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The capacity of queues is as shown below, note **totalCPus** denotes max number of jobs when 2 tasks can run on a single physical core. This is disabled by default and user must specify: `#SBATCH --mem1900M --oversubscribe` to actually run that way.

**List QOS limits**: `pdsf6 $ sacctmgr show qos format=Name,Priority,GrpTRES,MaxTRESPU,MaxTRESPA%100,MaxJobsPA,MaxJobsPU`

**List timeouts**: `pdsf6 $ sinfo -a ; scontrol show partition -a short`
Slurm defaults (unchanged)

The following changes were enforced on Slurm all queues:

- Use true RAM per node
- Compute high mem use tax: nCPU = mem/4 GB
- Num job slots per node: 2x phys cores, but …
- Each job locks 1 physical core by default but is available by using --oversubscribe
- Default mem per task: 4 GB (no changes)
- Used cpu*h half decay time: 4 days (was 14 days)
- Cap of 250 jobs/user is enforced, pseudo-user alicesgm is an exception

New working point set on April 10, 2018

TIP: If you are certain your jobs need less than 1.9 GB of RAM, you can add this line to your slurm job description:

```
#SBATCH --mem1900M --oversubscribe
```

and most likely it will double the number of running jobs (if free slots are available), but they will run 50% slower - your yield/wall hour can increase by 20-30%.
Use of --mem >4.0 GB locks CPU cores

FYI, PDSF consists of nodes w/ 4 GB RAM/CPU:
- 16 CPUs & 64 GB RAM
- 32 CPUs & 128 GB RAM (Haswell)

A job: --mem 8GB locks 2 CPUs, 16 such jobs locks full Haswell
If your task needs 1.3 GB of RAM - we could run 40-50 of your tasks on Haswell!

Avr request 5GB/job
How much RAM per job is actually needed?

Users ask for 3-5 times more RAM they need.

→ PDSF utilization plunges

Avr. used 1-2 RAM/job
# PDSF jobs profile in 2018 by project

Recent PLOT, produced 2018-06-08_15.15

<table>
<thead>
<tr>
<th>account + period (plots)</th>
<th>CPUs_job avr +/- std (vCores)</th>
<th>MaxRSS_job avr +/- std (GB)</th>
<th>MaxRSS_wallT avr +/- std (GB)</th>
<th>MemAlloc_job avr +/- std (GB)</th>
<th>cpu2wall_job avr +/- std (eff)</th>
<th>cpu2wall_wallT avr +/- std (eff)</th>
<th>nodeFail_job avr +/- std</th>
<th>wallH_job avr +/- std (hours)</th>
</tr>
</thead>
<tbody>
<tr>
<td>alice_158_days</td>
<td>1.5 +/- 0.5</td>
<td>0.7 +/- 1.1</td>
<td>2.1 +/- 1.1</td>
<td>5.3 +/- 1.9</td>
<td>0.5 +/- 0.4</td>
<td>0.8 +/- 0.3</td>
<td>7.8 +/- 3.3</td>
<td>2.7 +/- 4.9</td>
</tr>
<tr>
<td>rhstar_158_days</td>
<td>1.4 +/- 1.0</td>
<td>0.4 +/- 0.6</td>
<td>0.7 +/- 0.6</td>
<td>4.8 +/- 4.1</td>
<td>0.7 +/- 0.4</td>
<td>0.8 +/- 0.3</td>
<td>2.1 +/- 2.1</td>
<td>1.4 +/- 2.6</td>
</tr>
<tr>
<td>dayabay_158_days</td>
<td>1.2 +/- 0.5</td>
<td>0.4 +/- 0.9</td>
<td>0.5 +/- 1.0</td>
<td>3.7 +/- 1.8</td>
<td>0.5 +/- 0.4</td>
<td>0.4 +/- 0.4</td>
<td>2.7 +/- 2.6</td>
<td>3.0 +/- 5.0</td>
</tr>
<tr>
<td>majorana_158_days</td>
<td>1.4 +/- 0.6</td>
<td>0.2 +/- 0.4</td>
<td>0.7 +/- 0.8</td>
<td>3.7 +/- 2.6</td>
<td>0.4 +/- 0.4</td>
<td>0.7 +/- 0.4</td>
<td>6.2 +/- 6.5</td>
<td>0.3 +/- 1.1</td>
</tr>
<tr>
<td>atlas_158_days</td>
<td>1.6 +/- 1.1</td>
<td>0.6 +/- 0.9</td>
<td>0.9 +/- 0.9</td>
<td>5.2 +/- 5.8</td>
<td>0.6 +/- 0.3</td>
<td>0.7 +/- 0.3</td>
<td>1.7 +/- 0.0</td>
<td>0.3 +/- 0.8</td>
</tr>
<tr>
<td>lz_158_days</td>
<td>1.4 +/- 1.2</td>
<td>0.9 +/- 1.3</td>
<td>1.1 +/- 1.4</td>
<td>4.7 +/- 2.2</td>
<td>0.8 +/- 0.4</td>
<td>1.0 +/- 0.1</td>
<td>12.3 +/- 11.3</td>
<td>2.9 +/- 4.6</td>
</tr>
<tr>
<td>lux_158_days</td>
<td>2.3 +/- 5.1</td>
<td>0.4 +/- 4.0</td>
<td>0.8 +/- 3.9</td>
<td>4.9 +/- 3.7</td>
<td>0.6 +/- 0.4</td>
<td>0.9 +/- 0.3</td>
<td>15.3 +/- 0.1</td>
<td>1.1 +/- 3.1</td>
</tr>
<tr>
<td>cuore_158_days</td>
<td>1.0 +/- 0.2</td>
<td>0.4 +/- 0.6</td>
<td>0.6 +/- 0.7</td>
<td>3.3 +/- 1.4</td>
<td>0.7 +/- 0.4</td>
<td>0.9 +/- 0.3</td>
<td>0.0 +/- 0.3</td>
<td>1.4 +/- 2.6</td>
</tr>
<tr>
<td>all_pdsf_158_days</td>
<td>1.4 +/- 1.1</td>
<td>0.5 +/- 1.0</td>
<td>1.2 +/- 1.2</td>
<td>4.8 +/- 3.9</td>
<td>0.6 +/- 0.4</td>
<td>0.8 +/- 0.3</td>
<td>3.9 +/- 5.7</td>
<td>1.4 +/- 3.2</td>
</tr>
</tbody>
</table>

SLURM view of PDSF (scontrol show node <name>)  2018-06-11 16.48

**Haswell nodes:**
- 32 CPUs & 123 GB RAM

**Shifter queues**

**Possible load:** 32

**Achieved load:** 16

**System is underutilized**
Only ¼ of available RAM is actually used
http://portal.nersc.gov/project/star/jthaeder/diskUsage/overview/indexExt.html
https://my.nersc.gov/data-mgt.php

cori12:~> prjquota dayabay
          ------ Space (GB) ------       Inode ------
Project  Usage Quota Percent Usage Quota Percent
--------- --------- -------- -------- --------- --------- --------
dayabay   844341 870400  97     125840581 150000000  83

balewski@cori06:~> prjquota dayabay
          ------ Space (GB) ------       Inode ------
Project  Usage Quota Percent Usage Quota Percent
--------- --------- -------- -------- --------- --------- --------
dayabay   886813 1126400  78       6369886 10000000  63

balewski@cori06:~> prjquota majorana
          ------ Space (GB) ------       Inode ------
Project  Usage Quota Percent Usage Quota Percent
--------- --------- -------- -------- --------- --------- --------
majorana  38491  40960  94       3611135 4000000  90

balewski@cori06:~> prjquota majorana
          ------ Space (GB) ------       Inode ------
Project  Usage Quota Percent Usage Quota Percent
--------- --------- -------- -------- --------- --------- --------
majorana  57834  61440  94       6465561 10000000  64

Add Lz next time.
Past (May) Action Items

- Implement rolling upgrade of CVMFS to 2.5.0 - done
- Keep Snapshot of Job Stats twice a month, ~done, last 6 months is posted here: http://portal.nersc.gov/project/mpccc/balewski/tryAny/tmp-jeff3/
- Bump of Prio for the Alice users temporary - done, undone
- Turn off MaxMemPerCPU off for ALICE partition - done
- Bump alicesgm Priority using static QOS permanent - done
Action Items (June)

- PDSF shares will be adjusted to 2018 values, need final shares from Jeff
- Default RAM per job will be reduced from 4 GB to 2.5 GB/job next Tuesday
- Jan will send reminder to users to evaluate & reduce needed RAM
- The capacity & use of Shifter partitions was discussed, large PDSF shareholders do not need it, no decision, to be continued at the SC meeting on June 22
How much RAM my job used?

You can verify how much RAM you completed Slurm job needed by executing one this commands:

a) for one job (e.g. 153 MB for jobId=21115):

```
pdsf7 $ sacct --format=job,start,maxrs -j 21115
  JobID   MaxRSS
  12394_15.ba+ 2017-12-04T23:47:27 152,584K
```

b) for all jobs run by user=alicesgm since midnight today

```
pdsf7 $ sacct --format=job,start,maxrs -u alicesgm | grep K
  5237842.bat+ 2018-06-12T05:54:28 3987488K
  5238047.bat+ 2018-06-12T05:55:28 2530456K
  5238207.bat+ 2018-06-12T06:15:31 4336212K
```

c) for all jobs run by all STAR user since June 7

```
pdsf7 $ sacct --starttime 2018-06-07 --format=job,start,account,maxrs -a -A rhstar | grep K
  5030343.bat+ 2018-06-06T23:10:34 rhstar 381080K
  5030371.bat+ 2018-06-06T23:01:57 rhstar 381984K
  5030384.bat+ 2018-06-06T23:10:36 rhstar 384376K
  5030385.bat+ 2018-06-06T23:01:57 rhstar 385280K
```
Announcements

Slurm security patch applied 5/30/2018

PDSF Steering Committee meeting: June 22

Bi-weekly office hours  June 21, July 5, 59-4016A

PDSF user meeting: Tuesday, July 10