

PDSF Users Meeting

- * PDSF performance
- * announcements
- * Performance comparison for
PDSF, Edison, Cori, Google Cloud
(LZ simulations case)
- * AOB

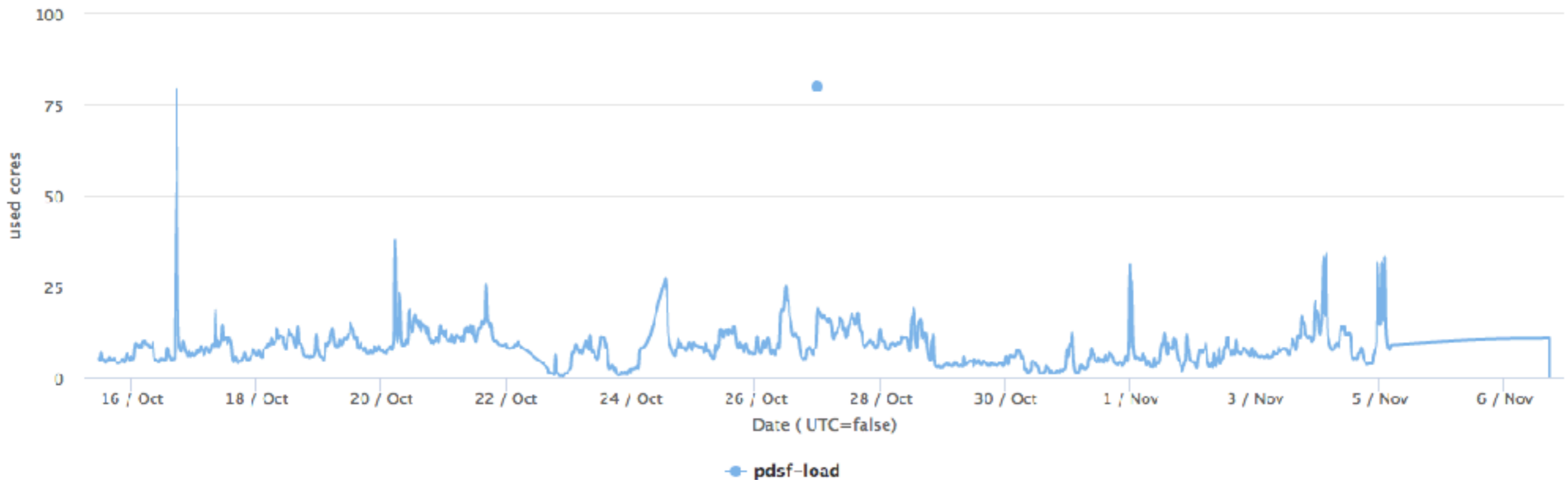
November 8, 2016

Jan Balewski

aggregated load on PDSF interactive nodes

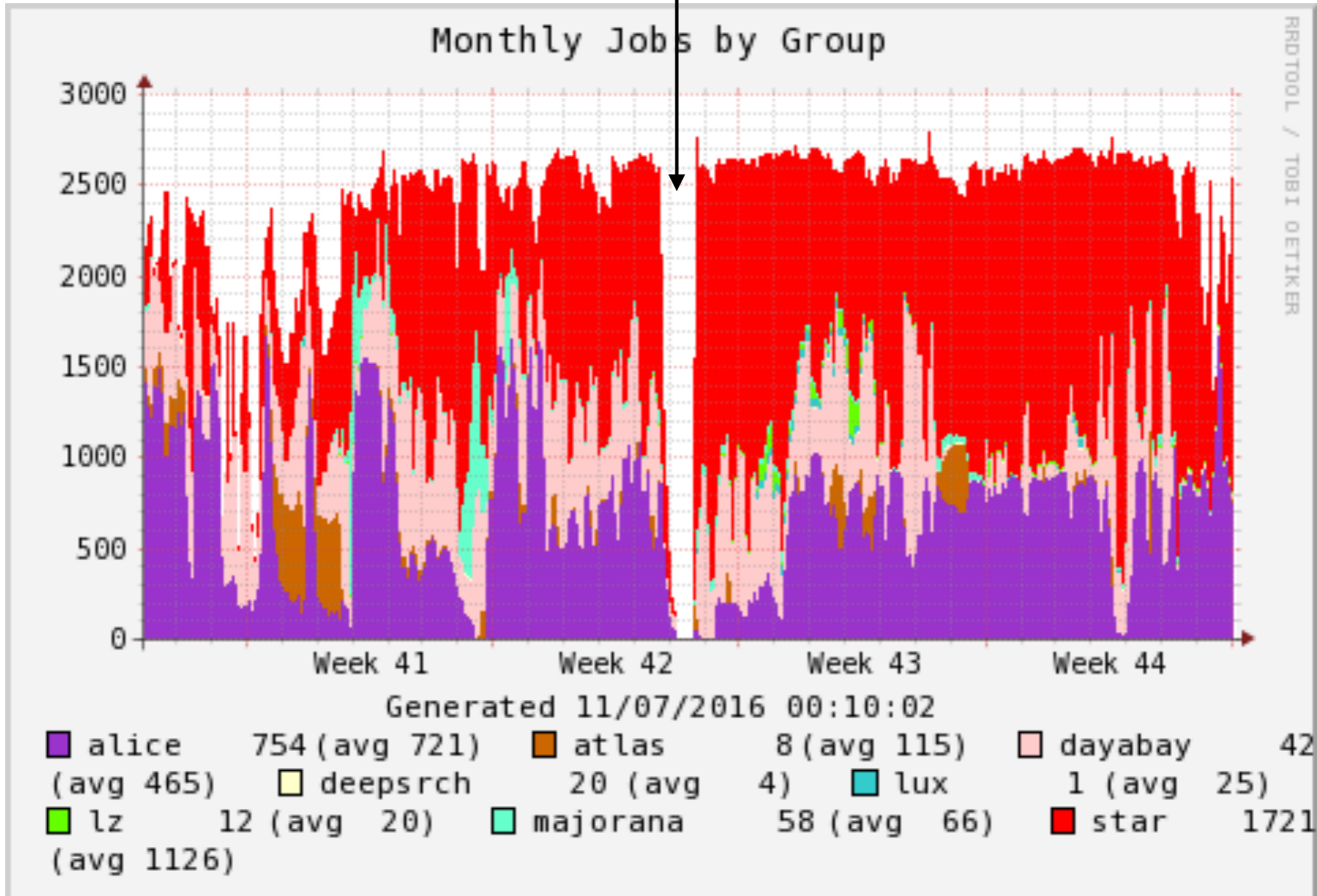
<https://portal-auth.nersc.gov/pdsf-mon/>

used cores, arerged over pdsf6,7,8

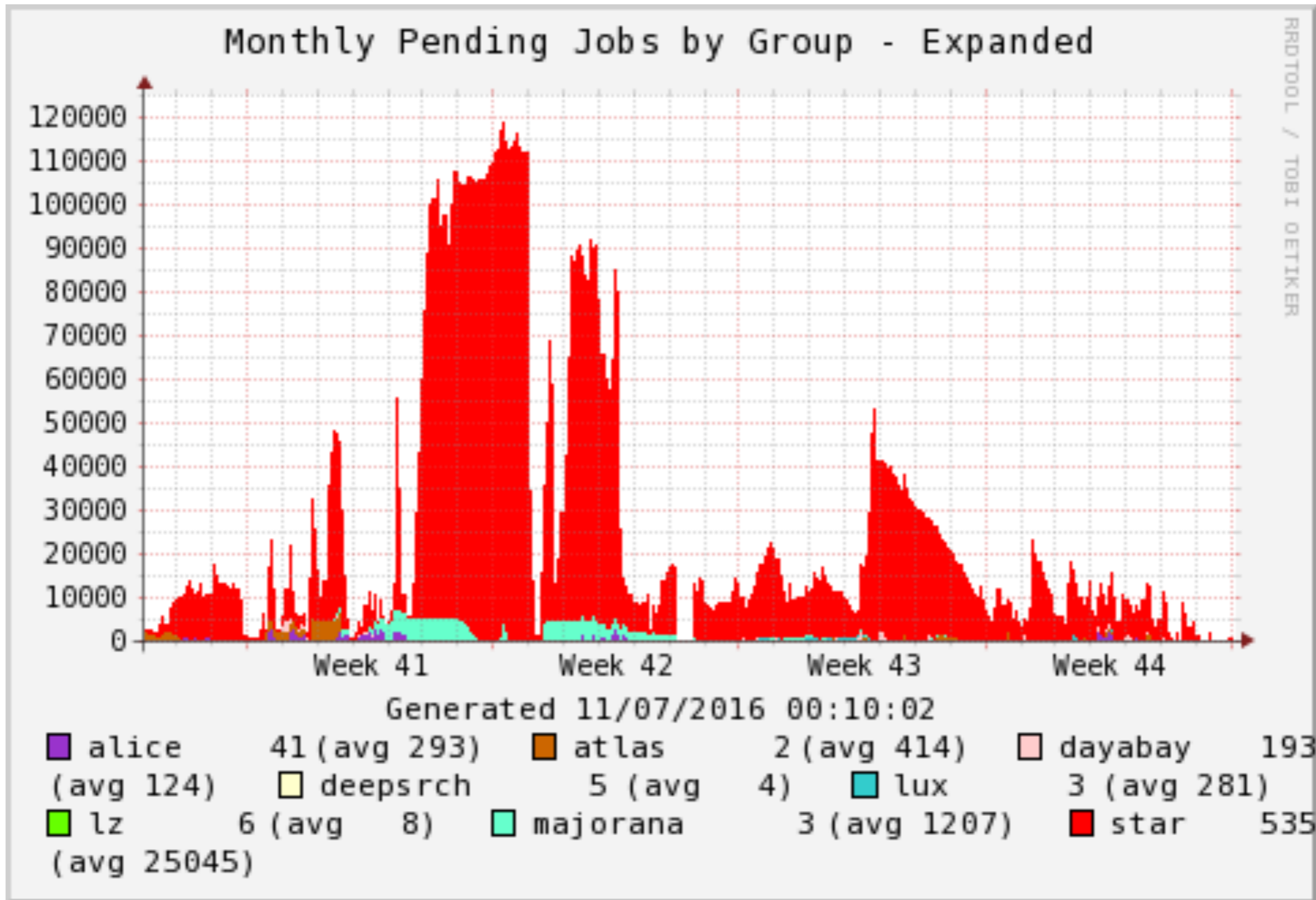


CPU Utilization

PDSF
maintenance



UGE queue load



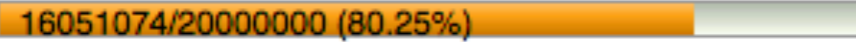
Disc space utilization

FillStatus (Quota): *PROJECT* (2016-11-07 16:11)

star - size



star - inodes



starprod - size



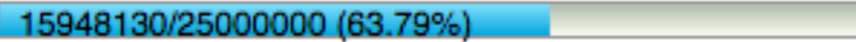
starprod - inodes



alice - size



alice - inodes



FillStatus (Quota): *PROJECTA* (2016-11-07 16:11)

starprod - size



starprod - inodes



STAR is close to fill the disc quota

Announcements

Bi-weekly office hours 12:30 -2:30pm

Thursday, November 10 & 24, 59-4016-CR

PDSF user meeting

- Tuesday, December 13, 11am - 12pm, 59-3034-CR

AOB

PDSF

LZ software stack

```
$ git clone git@lz-git.ua.edu:sim/LUXSim.git LUXSim
$ cd LUXSim-pdsf
module load ROOT
module load CLHEP
module load Geant4
$ make -j (to compile)
```

As default I'll pick those from pdsf
 ROOT/5.34.10
 Geant4-9.5.2
 CLHEP/2.1.3.1

If you want to try running the executable, the instructions are:

```
--- test-A
cd LUXSim-pdsf
time ./LUXSimExe LUXSimMacros/LZQuickCheckNoVis.mac >&lgs1
```



Prepare Docker image

```
a) - Start w/ beelof on SL6.4
This image is built in docker using recipe from my GIT
git clone https://balewski@bitbucket.org/balewski/janNersc
run this script to reproduce
~/janNersc/lzExp/docker-SL6.4/Dockerfile
```

```
service sshd start
b) install manually
b.1) cmake 3.6 from https://cmake.org/install/
./bootstrap
make
make install
```

```
Location of
/usr/include/expat.h
/usr/lib64/libexpat.so
/usr/lib64/libexpat.a
/lib64/libexpat.so.1
/lib64/libexpat.so.1.5.2
```

```
Docker: Dockerfile
docker commit -m "blankB" -a "Jan Balewski" ae7a508d954b balewski/sl64:blankB
```

```
c) CERN Root installation
git clone http://root.cern.ch/git/root_git
cd root
git tag -l
git checkout -b v5-34-36 v5-34-36
```

```
./configure --prefix=/usr/local/root_v5.34.34 --enable-soversion --enable-roofit --enable-minuit2 --enable-fftw3 --enable-fitsio --enable-gsl-shared --enable-...
make
make install
Worked: source /usr/local/root_v5.34.34/bin/thisroot.sh
root -b -q
```

```
Docker: Dockerfile
docker commit -m "SL6.4-root" -a "Jan Balewski" ae7xx balewski/sl64-root:A
```

```
d) - - - Util code XERCES
instruction http://xerces.apache.org/xerces-c/download.cgi
```

```
su root, cd /tmp
wget http://mirror.nexcess.net/apache/xerces-c/3/sources/xerces-c-3.1.4.zip
Do: untar, ./configure; make; make install
/usr/local/lib/libxerces-c-3.1.so
/usr/local/include/xerces/
/usr/local/bin
```

```
e) -- add CLHEP, Used older version to be able to compile with gcc4.4 :
cd /tmp
wget http://proj-clhep.web.cern.ch/proj-clhep/DISTRIBUTION/tarFiles/clhep-2.1.2.3.tar.gz
```

```
mkdir clhep_build
cd clhep_build/
cmake -DCMAKE_INSTALL_PREFIX=/usr/local/clhep_2.1.2.3 ./2.1.2.3/CLHEP/
make
sudo make install
```

```
-- Installing:
/usr/local/clhep_2.1.2.3/lib/
/usr/local/clhep_2.1.2.3/bin/
/usr/local/clhep_2.1.2.3/include/
```

```
f) -- Geant, as balewski
wget http://geant4.cern.ch/support/source/geant4_9_6_p02.zip
unzip geant4_9_6_p02.zip
mkdir geant_build
cd geant_build
```

```
cmake -DCMAKE_INSTALL_PREFIX=/usr/local/geant4.9.6.p02 ./geant4_9_6_p02 -DGEANT4_INSTALL_DATA=ON -DGEANT4_USE_OPENGL_X11=ON -DGEANT4_INSTALL_EXAMPLES=ON -DBUILD...
time make (47 min)
make install
```

```
-- Installing: /usr/local/geant4.9.6.p02/lib64/libG4OpenGL.a
-- Installing: /usr/local/geant4.9.6.p02/include/
```

```
f.1) - - - Added older G4.5.2
wget http://geant4.cern.ch/support/source/geant4_9_5_p02.zip
....
cmake -DCMAKE_INSTALL_PREFIX=/usr/local/geant4.9.5.p02 ./geant4_9_5_p02 -DGEANT4_INSTALL_DATA=ON -DGEANT4_USE_OPENGL_X11=ON -DGEANT4_INSTALL_EXAMPLES=ON -DBUILD...
```

```
g) -- setup macro ready
$ pwd
/home/balewski
$ cat setupPhys.sh
echo setup Geant4 and Root system variables
./usr/local/root_v5.34.xx/bin/thisroot.sh
./usr/local/geant4.9.6.p02/bin/geant4.sh
export G4INSTALL=/usr/local/geant4.9.6.p02/share/Geant4-9.6.2/geant4make
export G4SYSTEM=Linux-g++
export G4LIB=/usr/local/geant4.9.6.p02/lib64/Geant4-9.6.2/
export G4INCLUDE=/usr/local/geant4.9.6.p02/include/Geant4
export CLHEP_BASE_DIR=/usr/local/clhep_2.1.2.3
export LD_LIBRARY_PATH=/usr/local/lib64/CLHEP_BASE_DIR/lib64/CLHEP_PATH)
```

```
Docker: Dockerfile
docker commit -m "SL6.4-root-geant" -a "Jan Balewski" ae7xx balewski/sl64-geant:A
service sshd start
```

```
h) - - - deploy LZ software
git clone git@lz-git.ua.edu:sim/LUXSim.git LUXSim-org
cp -r LUXSim-org LUXSim-docker
cd LUXSim-docker
source ./setupPhys.sh
time make -j
```

```
Docker: Dockerfile
docker commit -m "SL6.4-LZ" -a "Jan Balewski" ae7xx balewski/sl64-lz:A
This Docker image has: ROOT/5.34.36, Geant4-9.6.p02, CLHEP/2.1.2.3
to run test simu do:
source ./setupPhys.sh
cd LUXSim-docker
time ./LUXSimExecutable LUXSimMacros/LZQuickCheckNoVis.mac >&lgs1
Run 0 time to completion: 41 seconds
real 2m49.295s
user 2m40.612s
sys 0m6.004s
```

```
Test write 3GB file (do it twice)
time dd if=/dev/zero of=large1.txt bs=1M count=3000
(5.2 GB) copied, 24.9476 s, 210 MB/s
(5.2 GB) copied, 27.1512 s, 193 MB/s
(3.1 GB) copied, 3.61891 s, 869 MB/s
(3.1 GB) copied, 5.95974 s, 528 MB/s
```

```
h) - - - Deploying image on Edison/Cori, interactively
date; time shifterimg pull docker:balewski/sl64-g2-lz:geant
module load shifter
shifterimg images | grep balewski | grep lz
-->> edison docker READY 4512c8679b 2016-08-23T20:09:40 balewski/sl64-lz:geant
```

```
-- interactive session
salloc -N 1 -p debug --image=docker:balewski/sl64-geant2-lz:geant -t 00:25:00 --account=mpccc
module load shifter
shifter /bin/bash
cd ~/LUXSim-edison4
./setupPhys.sh
root -b -q
```

```
----- BAD IS BELOW -----
Docker:
OUTPUT_DIR=/tmp/ NUM_EVE=2000 RND_SEED=123321
PDSF:
OUTPUT_DIR=/project/projectdirs/mpccc/balewski/lz-pdsf1 NUM_EVE=1000 RND_SEED=123321
```

```
Edison/Slurm:
OUTPUT_DIR=/tmp/ NUM_EVE=15 RND_SEED=123321
./LUXSimExecutable ~/janNersc/lzExp/testTasks/singletest_flat_serial.mac >&lgs211 &
```

Docker/ my laptop

```
balewski@ubuntu:~$ docker images |grep lz
us.gcr.io/pdsf-workflows/balewski/sl64-g2-lz :f b6550f93e0af 2 days ago 8.496 GB
balewski/sl64-g2-lz f e47b02d4d166 3 days ago 8.496 GB
balewski/sl64-g2-lz e e1f8cc6b144e 4 days ago 8.326 GB
balewski/sl64-lz a f6ade3835e38 9 weeks ago 6.051 GB
us.gcr.io/jgi-workflows/balewski/sl64-lz latest f6ade3835e38 9 weeks ago 6.051 GB
```

Edison

```
balewski@edison10:~> module load shifter
balewski@edison10:~> shifterimg images | grep balewski |grep lz
edison docker READY b7073638aa 2016-08-30T00:17:23 balewski/lz-sl64:g
edison docker READY 8aea02f624 2016-08-30T00:33:33 balewski/lz-sl64:h
edison docker READY 97d4b9e2bb 2016-10-19T11:20:51 balewski/sl64-g2-lz:c
edison docker READY 8e607dfee9 2016-10-21T12:55:21 balewski/sl64-g2-lz:e
edison docker READY 27f6004f16 2016-10-18T20:55:57 balewski/sl64-geant2-lz:a
edison docker READY 4512c8679b 2016-08-23T20:09:40 balewski/sl64-lz:a
```

Google

```
balewski@ubuntu:~$ gcloud alpha container images list --repository=us.gcr.io/pdsf-workflows/balewski
NAME
```

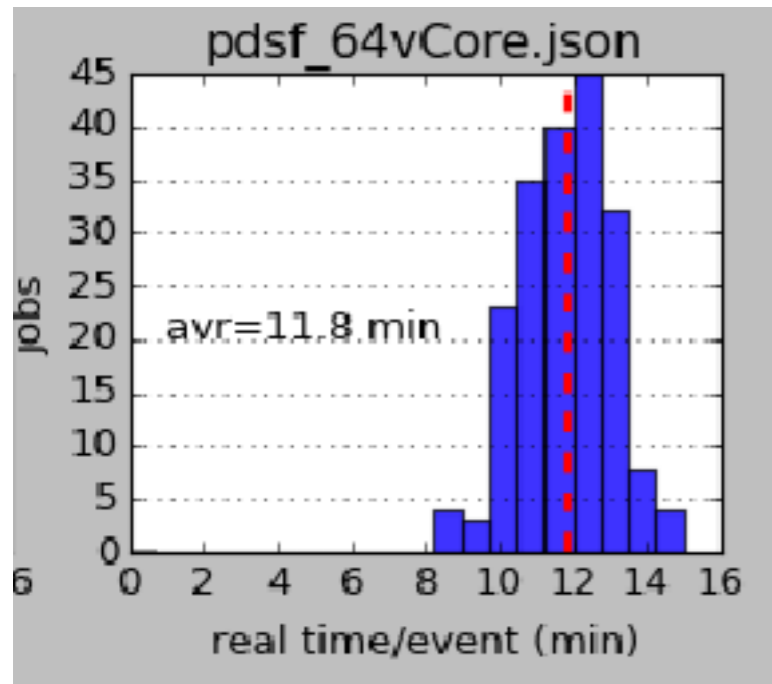
us.gcr.io/pdsf-workflows/balewski/sl64-g2-lz
 us.gcr.io/pdsf-workflows/balewski/sl64py27
 us.gcr.io/pdsf-workflows/balewski/sl67fuse
 us.gcr.io/pdsf-workflows/balewski/ubu14py27gcsfuse



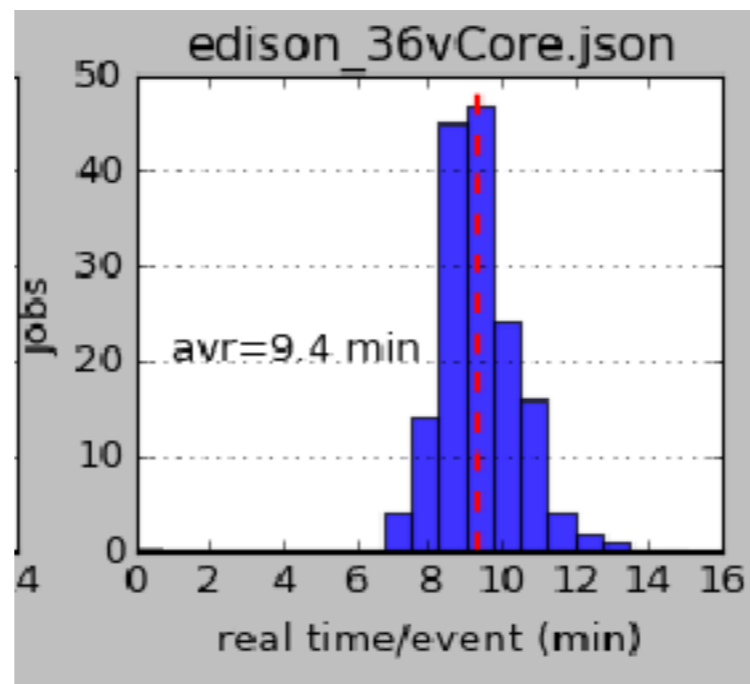
Optimized performance for LZ simulation

Setup: singleER_flat_serial event generator, 30 events/job, few 100 jobs per run, vary # // jobs, pick best throughput/vCore/hour (more is better). One Geant4 job on Cori would run for ~150 minutes and produce ~120MB of output, input: none, no DB access was needed.

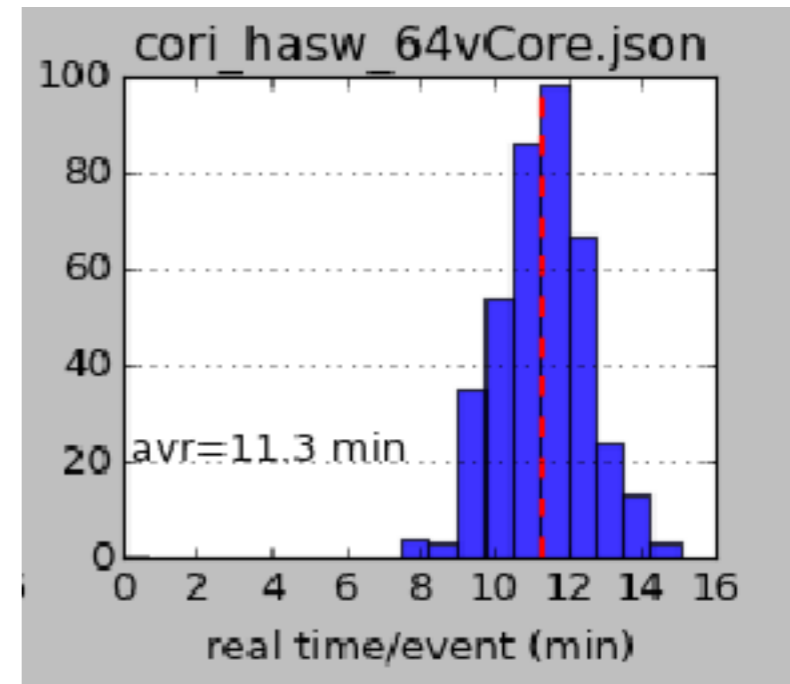
PDSF 64vCore/node
5.1 event/vCore/hour



Edison 48 vCore/node, RAM limit
FOM=4.8 event/vCore/hour



Cori Haswell 64 vCore/node
FOM=5.3 event/vCore/hour



Google Cloud [black box, shared]
FOM=6.0 event/vCore/hour

