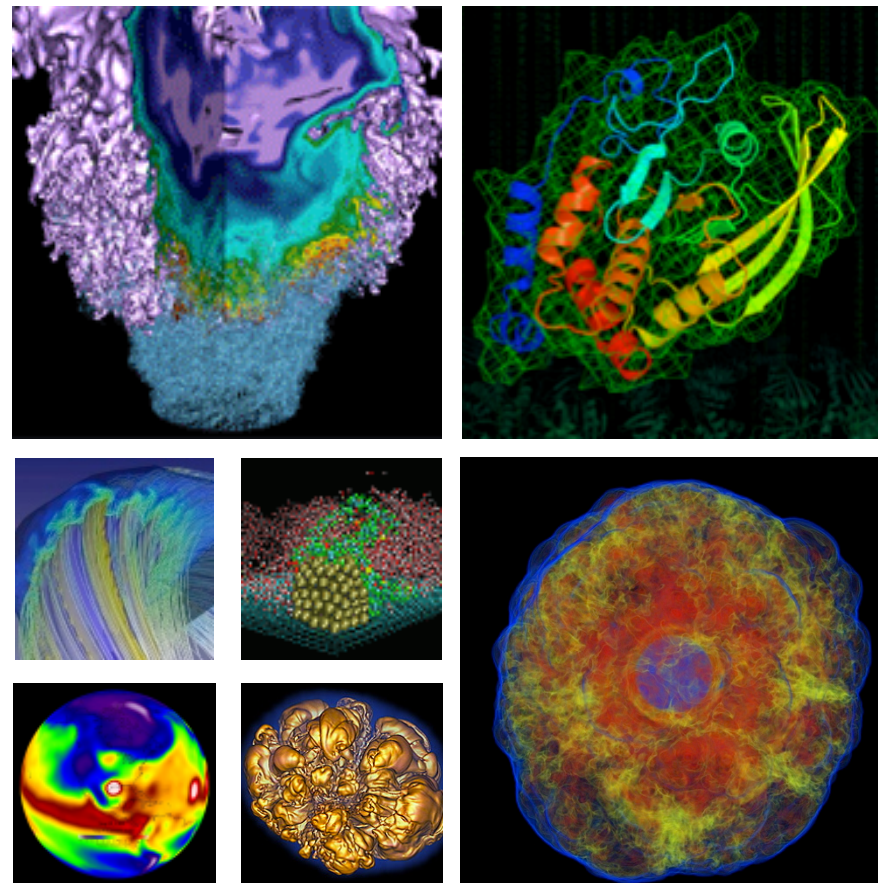# Automatic Library Tracking Database at NERSC

Zhengji Zhao

ALTD Review Meeting at NERSC
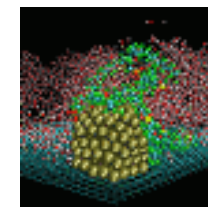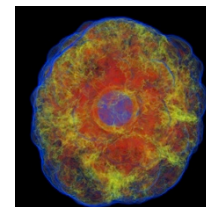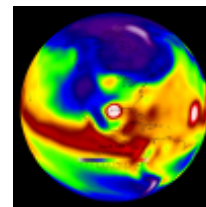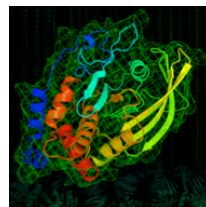October 8, 2014

Agenda

- **ALTD overview**

- **Applications of ALTD at NERSC**

- **Implementation and evolement of ALTD at NERSC**

- **Your suggestions for Improvements?**

Goal: Gather inputs from all parties so to improve the ALTD implementation and deployment at NERSC

ALTD overview
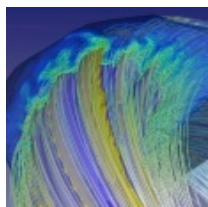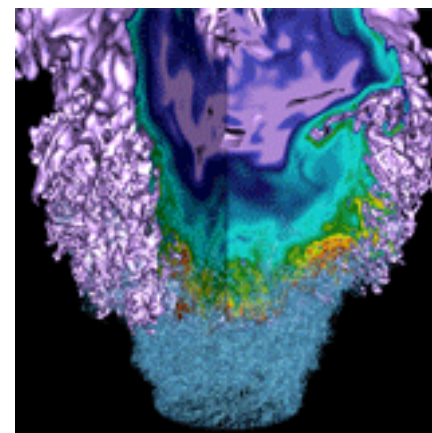
Automatic library tracking database infrastructure

- **Imported from NICS June, 2012**
  - Altd module is loaded in the USG shell startup file

- **ALTD –the ld and aprun wrappers**
  - Ld wrapper –records the linkage info and save it in a database table: username, linkeline, link date, tag_id, etc.
  - Aprun (mpirun) wrapper- record job info and save it in a database table: username, jobid, executable name, run date, tag_id for the executable

- **ALTD provides library and application usage statistics**

ALTD tables


```
+------------+----------------------------------------+----------------------------------------------------------+
| linking_inc| shaline                                | linkline                                                 |
+------------+----------------------------------------+----------------------------------------------------------+
| 187615     | a1bd90a030875faffd003ccecfaedfd9a84bfc3a | gtc /usr/lib64/gcc/x86_64-suse-linux/4.3/../../../../lib64/crt1.o /usr/lib64/gcc/x86_64-suse-linux/4.3/../../../../lib64/crti.o
             | /usr/lib64/gcc/x86_64-suse-linux/4.3/crtbeginT.o /opt/intel/composer_xe_2013_sp1.2.144/compiler/lib/intel64/for_main.o module.o main.o function.o setup.o restart.o ...
             | /cray/mpt/7.0.0/gni/mpich2-intel/140/lib/libfmpich.a /usr/common/usg/darshan/2.3.0/lib/libdarshan-mpi-io.a /usr/common/usg/darshan/2.3.0/lib/libdarshan-posix.a
             | /usr/common/usg/darshan/2.3.0/lib/libdarshan-stubs.a /usr/lib64/gcc/x86_64-suse-linux/4.3/../../../../lib64/libz.a
             | /opt/cray/petsc/3.4.4.0/real/INTEL/140/sandybridge/lib/libcraypetsc_intel_real.a /opt/intel/composer_xe_2013_sp1.2.144/compiler/lib/intel64/libimf.a
             | /opt/cray/tpsl/1.4.1/INTEL/140/sandybridge/lib/libHYPRE_intel.a /opt/cray/tpsl/1.4.1/INTEL/140/sandybridge/lib/libdmumps_intel.a
             | /opt/cray/tpsl/1.4.1/INTEL/140/sandybridge/lib/libsundials_cvode_intel.a /opt/cray/tpsl/1.4.1/INTEL/140/sandybridge/lib/libsundials_nvecparallel_intel.a
             | /opt/cray/tpsl/1.4.1/INTEL/140/sandybridge/lib/libsuperlu_dist_intel.a /opt/cray/tpsl/1.4.1/INTEL/140/sandybridge/lib/libsuperlu_intel.a
             | /opt/cray/tpsl/1.4.1/INTEL/140/sandybridge/lib/libmumps_common_intel.a /opt/cray/tpsl/1.4.1/INTEL/140/sandybridge/lib/libptesmumps_intel.a
             | /opt/cray/tpsl/1.4.1/INTEL/140/sandybridge/lib/libpord_intel.a /opt/cray/tpsl/1.4.1/INTEL/140/sandybridge/lib/libptscotch_intel.a
             | /opt/cray/tpsl/1.4.1/INTEL/140/sandybridge/lib/libparmetis_intel.a /opt/cray/tpsl/1.4.1/INTEL/140/sandybridge/lib/libscotch_intel.a
             | /opt/cray/tpsl/1.4.1/INTEL/140/sandybridge/lib/libptscotcherr_intel.a /opt/cray/tpsl/1.4.1/INTEL/140/sandybridge/lib/libmetis_intel.a
             | /usr/lib64/gcc/x86_64-suse-linux/4.3/../../../../lib64/libpthread.a /usr/lib64/gcc/x86_64-suse-linux/4.3/../../../../lib64/librt.a
             | /usr/lib64/gcc/x86_64-suse-linux/4.3/../../../../lib64/libpthread.a /opt/cray/atp/1.7.3/lib/libAtpSigHandler.a /opt/cray/atp/1.7.3/lib/libAtpSigHCommData.a
             | /usr/lib64/gcc/x86_64-suse-linux/4.3/../../../../lib64/libpthread.a /opt/cray/libsci/13.0.0/INTEL/140/sandybridge/lib/libsci_intel_mpi_mp.a
             | /opt/intel/composer_xe_2013_sp1.2.144/compiler/lib/intel64/libimf.a /opt/cray/libsci/13.0.0/INTEL/140/sandybridge/lib/libsci_intel_mp.a
             | /opt/intel/composer_xe_2013_sp1.2.144/compiler/lib/intel64/libimf.a /opt/intel/composer_xe_2013_sp1.2.144/compiler/lib/intel64/libiomp5.a
             | /opt/cray/netcdf/4.3.2/INTEL/140/lib/libnetcdff.a /usr/lib64/gcc/x86_64-suse-linux/4.3/../../../../lib64/libpthread.a /opt/cray/netcdf/4.3.2/INTEL/140/lib/libnetcdf.a
             | /opt/cray/hdf5/1.8.13/INTEL/140/lib/libhdf5_hl.a /opt/cray/hdf5/1.8.13/INTEL/140/lib/libhdf5.a /usr/lib64/gcc/x86_64-suse-linux/4.3/../../../../lib64/libz.a
             | /usr/lib64/gcc/x86_64-suse-linux/4.3/../../../../lib64/libdl.a /opt/intel/composer_xe_2013_sp1.2.144/compiler/lib/intel64/libimf.a
             | /opt/cray/mpt/7.0.0/gni/mpich2-intel/140/lib/libmpich_intel.a /opt/cray/ugni/5.0-1.0502.9037.7.26.ari/lib64/libugni.a
             | /usr/lib64/gcc/x86_64-suse-linux/4.3/../../../../lib64/libpthread.a /opt/cray/pmi/5.0.4-1.0000.10161.132.4.ari/lib64/libpmi.a
             | /opt/cray/mpt/7.0.0/gni/mpich2-intel/140/lib/libmpl.a /usr/lib64/gcc/x86_64-suse-linux/4.3/../../../../lib64/libpthread.a
             | /opt/cray/alps/5.2.1-2.0502.8712.10.32.ari/lib64/libalpslli.a /opt/cray/wlm_detect/1.0-1.0502.51217.1.1.ari/lib64/libwlm_detect.a
             | /opt/cray/ugni/5.0-1.0502.9037.7.26.ari/lib64/libugni.a /opt/cray/alps/5.2.1-2.0502.8712.10.32.ari/lib64/libalpsutil.a
             | /opt/cray/xpmem/0.1-2.0502.51169.1.11.ari/lib64/libxpmem.a /opt/cray/udreg/2.3.2-1.0502.8763.1.11.ari/lib64/libudreg.a
             | /opt/intel/composer_xe_2013_sp1.2.144/compiler/lib/intel64/libifport.a /opt/intel/composer_xe_2013_sp1.2.144/compiler/lib/intel64/libifcoremt.a
             | /opt/intel/composer_xe_2013_sp1.2.144/compiler/lib/intel64/libimf.a /opt/intel/composer_xe_2013_sp1.2.144/compiler/lib/intel64/libsvml.a
             | /opt/intel/composer_xe_2013_sp1.2.144/compiler/lib/intel64/libirc.a /usr/lib64/gcc/x86_64-suse-linux/4.3/../../../../lib64/libpthread.a
             | /usr/lib64/gcc/x86_64-suse-linux/4.3/../../../../lib64/libc.a /usr/lib64/gcc/x86_64-suse-linux/4.3/libgcc.a
             | /usr/lib64/gcc/x86_64-suse-linux/4.3/libgcc_eh.a /usr/lib64/gcc/x86_64-suse-linux/4.3/../../../../lib64/libc.a
             | /usr/lib64/gcc/x86_64-suse-linux/4.3/crtend.o /usr/lib64/gcc/x86_64-suse-linux/4.3/../../../../lib64/crtn.o
```

```
+--------------------------------------+-------------+----------+------------+
| tag_id                               | linkline_id | username | link_date  |
+--------------------------------------+-------------+----------+------------+
| 19520da0-1697-4d61-bfba-54f02e482287 |      187615 | wlzhang  | 2014-08-07 |
| 8f625c65-1940-4070-a951-d61a308c59b7 |      420039 | seeyc    | 2014-08-07 |
| bf6d83b9-776c-42e9-a195-8806342e3967 |      184391 | scoh     | 2014-08-07 |
+--------------------------------------+-------------+----------+------------+
```

```
+---------+--------------------------------------+-------------------------------------------------------+----------+------------+---------------+---------------+
| run_inc | tag_id                               | executable                                            | username | run_date   | job_launch_id | build_machine |
+---------+--------------------------------------+-------------------------------------------------------+----------+------------+---------------+---------------+
| 1001241 | 19520da0-1697-4d61-bfba-54f02e482287 | /scratch1/scratchdirs/wlzhang/testing/tae5/exec       | wlzhang  | 2014-08-07 |       1532879 | edison        |
| 1001542 | 8f625c65-1940-4070-a951-d61a308c59b7 | /global/homes/s/seeyc/cti0ld/bin/postpro.exe          | seeyc    | 2014-08-07 |       1532892 | edison        |
| 1001490 | bf6d83b9-776c-42e9-a195-8806342e3967 | /global/homes/s/scoh/compile/epw/ver_3.0.0__fix_ws/save_bin/epw.x | scoh | 2014-08-07 | 1532895 | edison |
+---------+--------------------------------------+-------------------------------------------------------+----------+------------+---------------+---------------+
```
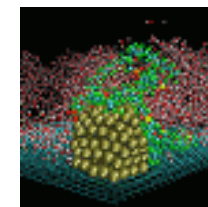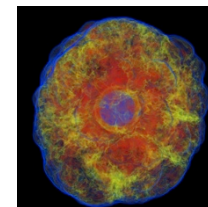
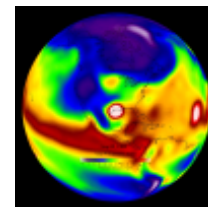# ALTD provides info about

- By whom and when what application was compiled
- What libraries (and the exact versions) were used
- Which compiler (and version) was used
- How the application was linked (dynamically or statically),
- On which system the binary was built
- By whom and when the binary was run

Applications of ALTD at NERSC
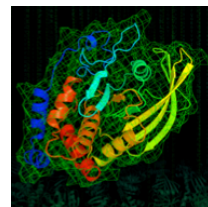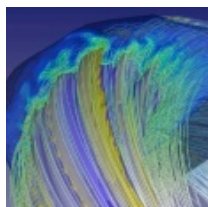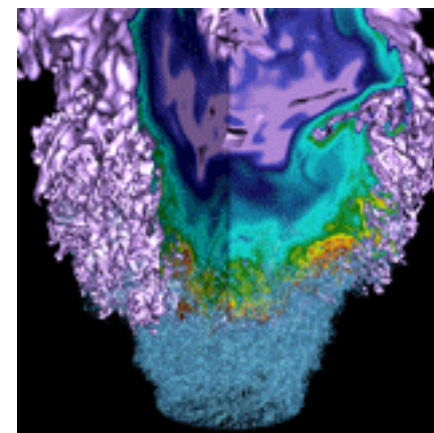
Library Usage on Edison
(Mar 01, 2014 - Aug. 31, 2014)

Library Usage on Edison
(Mar. 1, 2014 - Aug. 31, 2014)

Exact versions of software uage
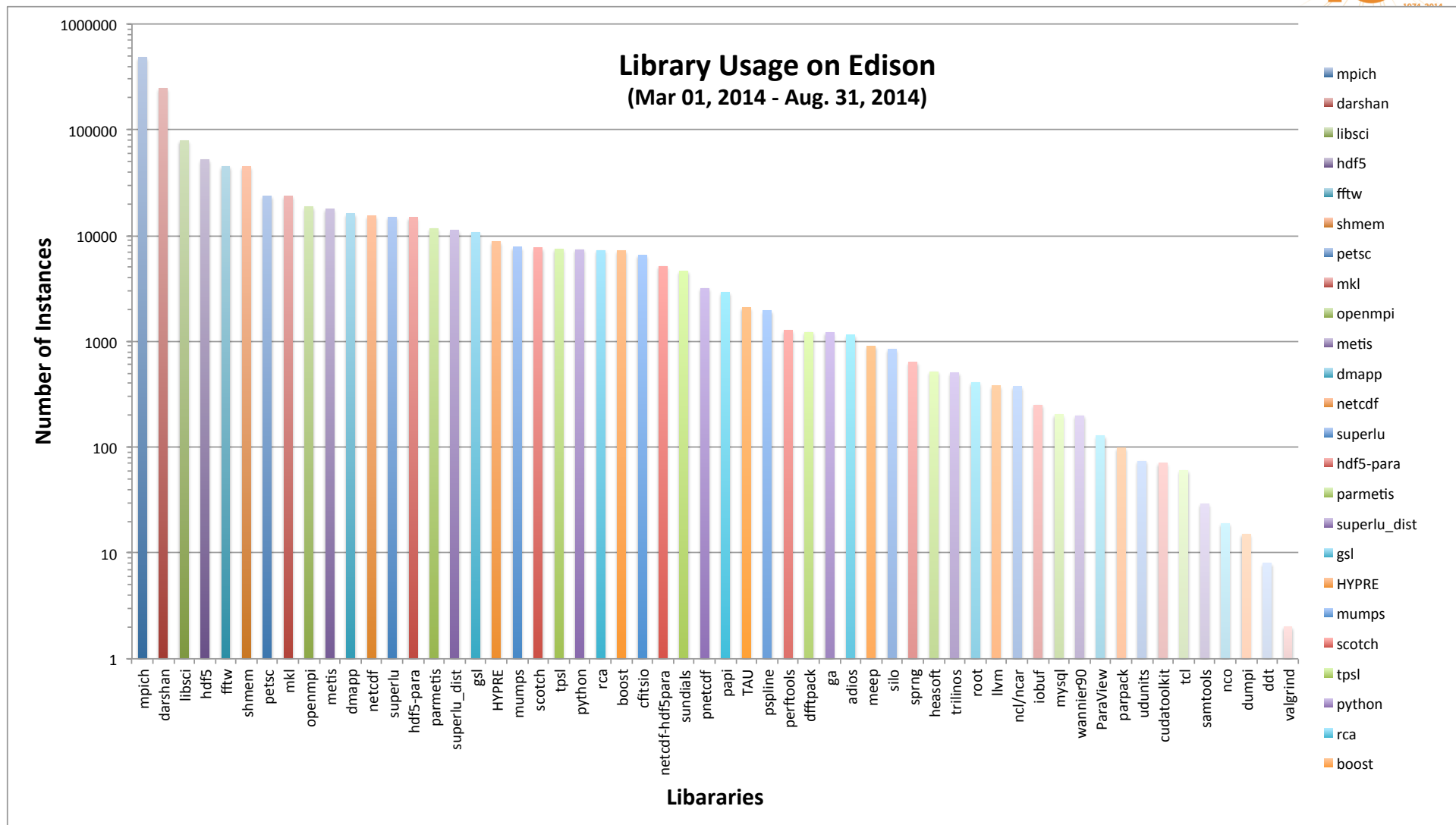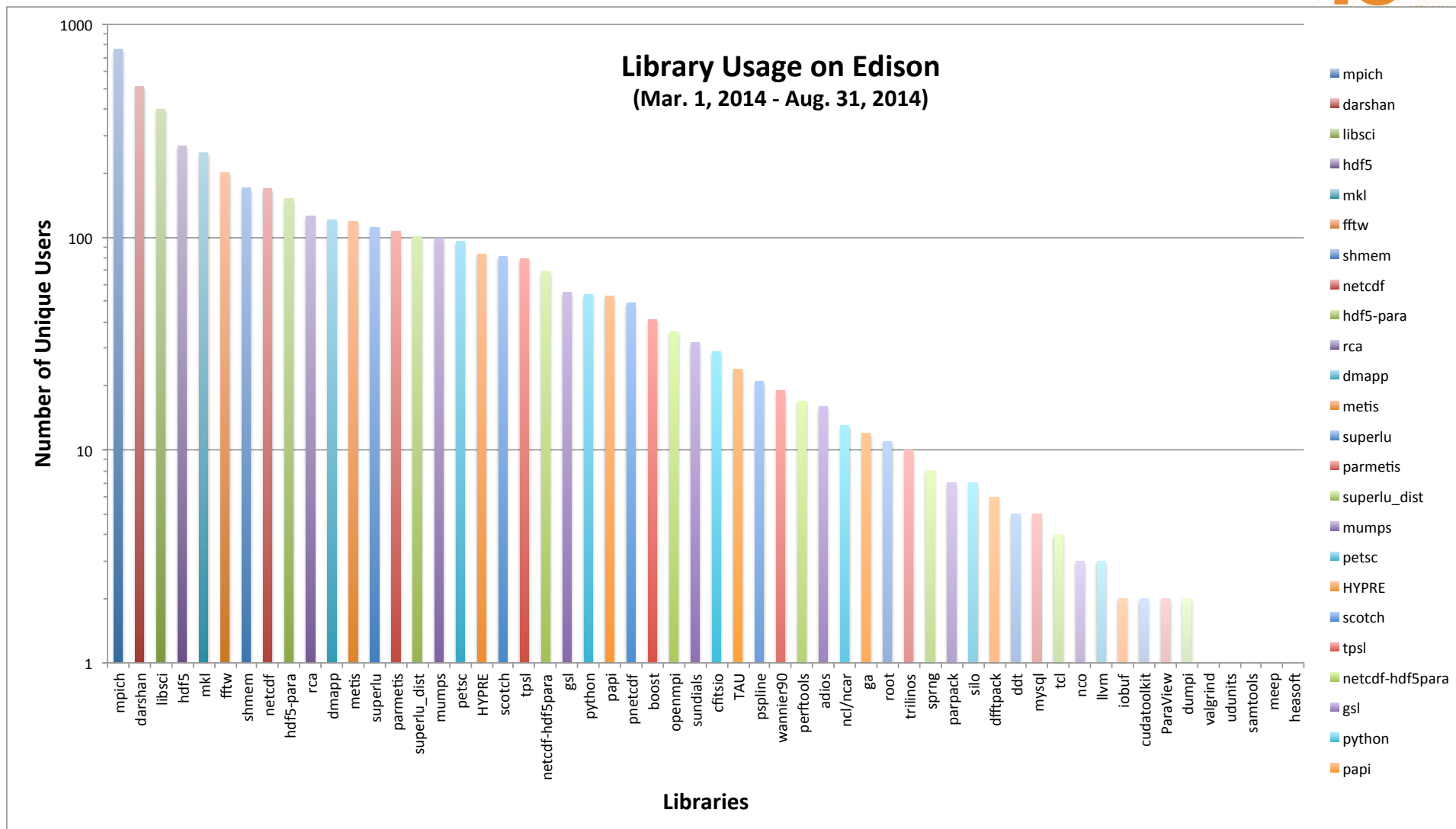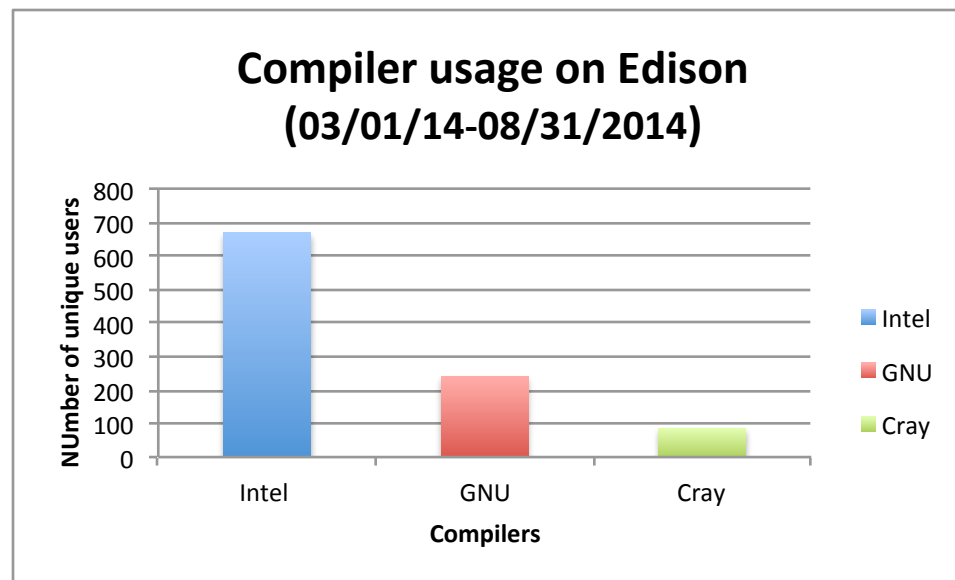
Some use cases

- **Workload analysis (provides useful info for the procurement)**

- **I/O library developers wanted to know their library usage**

- **System software usage – predict the software requirement for exascale systems**

- **Help recovering build environment for users**

- **Fine-grained application usage – useful to the developers to focus optimization effort for next generation machine**

ALTD Implementation and its evolvement at NERSC
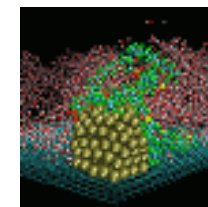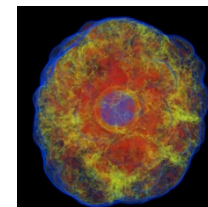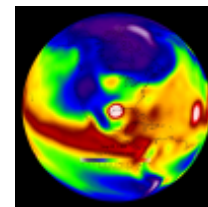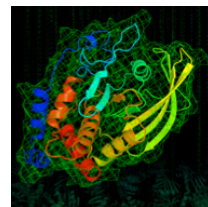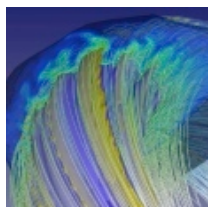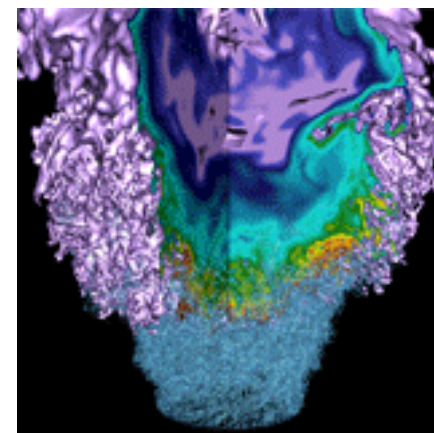
Problems encountered with ALTD at NERSC

- **The original ALTD did a live access to the database server at each invocation of the ld and the aprun commands, it caused too many simultaneous connections to the database server, and made the server fail to function normally**
  - This problem was addressed by asyncronizing the data capturing and the database access.
  - The asyncronized aprun wrapper was in production in June, 2013
  - The asyncronized ld wrapper, required to use the uuid to replace the original integer id to uniquely track the generated executables, was in production in Feb, 2014.
- **CSG/Cray staff had a concern about the ld command being owned by a non-root user and residing in the global file system external to the system**
  - This was addressed by moving altd installation from /usr/common/usg (GPFS file system) to Lustre file systems (/scratch1, or /scratch, local to each machine)
  - As a result, ALTD may block the user logins to the system where there were Lustre file system issues.

ALTD ld wrapper follow chart

Start

Check ALTD environment

Turn on ALTD?

No

Yes

Create a temp directory for ALTD temporary files

Failed

Success

Generate assembly code (pyLD.py –gen_assembly_code) Build the assembly code ($AS $ARGSRC -o $ARGOBJ)

Link original executable with the assembly code, and generate the tracemap ($LD $ARGV ldArgs.o -t > trace.txt)

Generate database entries for linkline (pyLD.py –gen_db_entries)

Save database entry to a file in the ALTD log directory

Linking without tracking

Exit status

ALTD ld wrapper:
 ld – a bash script that wraps the /usr/bin/ld
 pyLD.py – a python script that the ld wrapper calls
 ld_db.sh – a bash shell script that updates the database

Assembly code ldArgs.s:
 .section .altd
 .asciz "ALTD_Link_Info"

 .byte 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00
 .asciz "Version:1.0:"
 .asciz "Machine:edison:"
 .asciz "Tag_id:722afe23-c351-4485-a557-5f4c92d69546:"
 .asciz "Year:2014:"
 .byte 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00
 .asciz "ALTD_Link_Info_End"

A cron job runs every 5 minutes to put the intercepted linklines in the files into the database tables:
 altd_edison_link_tags
 altd_edison_linkline

ALTD aprun wrapper follow chart

Start

Execute aprun-prologue

ALTD log directory writable? — No / Yes

Yes → Run objdump on the executable to get the .altd section header

.altd section present? — No / Yes

Yes →

Generate database for the job
1. Executable info from .altd section
2. Get the job info from the environment

Save database entry to a file
In the ALTD log directory

Call the real aprun to run executable and save the aprun exit status

Execute aprun-epilogue

Run any desired epilogue scripts

Aprun Exit status

ALTD job launcher (aprun) wrapper:
aprun - a perl script that wraps the job launcher aprun, which allows an arbitrary prologue and/or epilogue.
aprun-prolouge - a python script that runs before the job starts
aprun-epilogue - a python script that runs after the job completes

Any other desired scripts can be executed in the aprun-prologue script

A cron job runs every 5 minutes to put the intercepted info for the executable and the job from the file into the database table:
altd_edison_jobs

Any other desired scripts can be executed in the aprun-epilogue script

ALTD and file system usage

- **Installation -**
    - Edison /scratch1/altd/1.0
    - Hopper /scratch/altd/1.0
    - Carver /usr/common/usg/altd/1.0

- **Temporary files**
    - Edison /scratch1/altd/logs/
    - Hopper /scratch1/altd/logs/
    - Carver $GSCRATCH

- **Backup files**
    - Daily Lustre
    - Monthly HPSS

ALTD tables

```
+-------------+--------------------------------------------------+---------------------------------------------------------------------------------------------------------------------------+
| linking_inc | shaline                                          | linkline                                                                                                                  |
+-------------+--------------------------------------------------+---------------------------------------------------------------------------------------------------------------------------+
| 187615      | a1bd90a030875faffd003ccecfaedfd9a84bfc3a         | gtc /usr/lib64/gcc/x86_64-suse-linux/4.3/../../../../lib64/crt1.o /usr/lib64/gcc/x86_64-suse-linux/4.3/../../../../lib64/crti.o
             |                                                  | /usr/lib64/gcc/x86_64-suse-linux/4.3/crtbeginT.o /opt/intel/composer_xe_2013_sp1.2.144/compiler/lib/intel64/for_main.o module.o main.o function.o setup.o restart.o ...
             |                                                  | /cray/mpt/7.0.0/gni/mpich2-intel/140/lib/libfmpich.a /usr/common/usg/darshan/2.3.0/lib/libdarshan-mpi-io.a /usr/common/usg/darshan/2.3.0/lib/libdarshan-posix.a
             |                                                  | /usr/common/usg/darshan/2.3.0/lib/libdarshan-stubs.a /usr/lib64/gcc/x86_64-suse-linux/4.3/../../../../lib64/libz.a
             |                                                  | /opt/cray/petsc/3.4.4.0/real/INTEL/140/sandybridge/lib/libcraypetsc_intel_real.a /opt/intel/composer_xe_2013_sp1.2.144/compiler/lib/intel64/libimf.a
             |                                                  | /opt/cray/tpsl/1.4.1/INTEL/140/sandybridge/lib/libHYPRE_intel.a /opt/cray/tpsl/1.4.1/INTEL/140/sandybridge/lib/libdmumps_intel.a
             |                                                  | /opt/cray/tpsl/1.4.1/INTEL/140/sandybridge/lib/libsundials_cvode_intel.a /opt/cray/tpsl/1.4.1/INTEL/140/sandybridge/lib/libsundials_nvecparallel_intel.a
             |                                                  | /opt/cray/tpsl/1.4.1/INTEL/140/sandybridge/lib/libsuperlu_dist_intel.a /opt/cray/tpsl/1.4.1/INTEL/140/sandybridge/lib/libsuperlu_intel.a
             |                                                  | /opt/cray/tpsl/1.4.1/INTEL/140/sandybridge/lib/libmumps_common_intel.a /opt/cray/tpsl/1.4.1/INTEL/140/sandybridge/lib/libptesmumps_intel.a
             |                                                  | /opt/cray/tpsl/1.4.1/INTEL/140/sandybridge/lib/libpord_intel.a /opt/cray/tpsl/1.4.1/INTEL/140/sandybridge/lib/libptscotch_intel.a
             |                                                  | /opt/cray/tpsl/1.4.1/INTEL/140/sandybridge/lib/libparmetis_intel.a /opt/cray/tpsl/1.4.1/INTEL/140/sandybridge/lib/libscotch_intel.a
             |                                                  | /opt/cray/tpsl/1.4.1/INTEL/140/sandybridge/lib/libptscotcherr_intel.a /opt/cray/tpsl/1.4.1/INTEL/140/sandybridge/lib/libmetis_intel.a
             |                                                  | /usr/lib64/gcc/x86_64-suse-linux/4.3/../../../../lib64/libpthread.a /usr/lib64/gcc/x86_64-suse-linux/4.3/../../../../lib64/librt.a
             |                                                  | /usr/lib64/gcc/x86_64-suse-linux/4.3/../../../../lib64/libpthread.a /opt/cray/atp/1.7.3/lib/libAtpSigHandler.a /opt/cray/atp/1.7.3/lib/libAtpSigHCommData.a
             |                                                  | /usr/lib64/gcc/x86_64-suse-linux/4.3/../../../../lib64/libpthread.a /opt/cray/libsci/13.0.0/INTEL/140/sandybridge/lib/libsci_intel_mpi_mp.a
             |                                                  | /opt/intel/composer_xe_2013_sp1.2.144/compiler/lib/intel64/libimf.a /opt/cray/libsci/13.0.0/INTEL/140/sandybridge/lib/libsci_intel_mp.a
             |                                                  | /opt/intel/composer_xe_2013_sp1.2.144/compiler/lib/intel64/libimf.a /opt/intel/composer_xe_2013_sp1.2.144/compiler/lib/intel64/libiomp5.a
             |                                                  | /opt/cray/netcdf/4.3.2/INTEL/140/lib/libnetcdff.a /usr/lib64/gcc/x86_64-suse-linux/4.3/../../../../lib64/libpthread.a /opt/cray/netcdf/4.3.2/INTEL/140/lib/libnetcdf.a
             |                                                  | /opt/cray/hdf5/1.8.13/INTEL/140/lib/libhdf5_hl.a /opt/cray/hdf5/1.8.13/INTEL/140/lib/libhdf5.a /usr/lib64/gcc/x86_64-suse-linux/4.3/../../../../lib64/libz.a
             |                                                  | /usr/lib64/gcc/x86_64-suse-linux/4.3/../../../../lib64/libdl.a /opt/intel/composer_xe_2013_sp1.2.144/compiler/lib/intel64/libimf.a
             |                                                  | /opt/cray/mpt/7.0.0/gni/mpich2-intel/140/lib/libmpich_intel.a /opt/cray/ugni/5.0-1.0502.9037.7.26.ari/lib64/libugni.a
             |                                                  | /usr/lib64/gcc/x86_64-suse-linux/4.3/../../../../lib64/libpthread.a /opt/cray/pmi/5.0.4-1.0000.10161.132.4.ari/lib64/libpmi.a
             |                                                  | /opt/cray/mpt/7.0.0/gni/mpich2-intel/140/lib/libmpl.a /usr/lib64/gcc/x86_64-suse-linux/4.3/../../../../lib64/libpthread.a
             |                                                  | /opt/cray/alps/5.2.1-2.0502.8712.10.32.ari/lib64/libalpslli.a /opt/cray/wlm_detect/1.0-1.0502.51217.1.1.ari/lib64/libwlm_detect.a
             |                                                  | /opt/cray/ugni/5.0-1.0502.9037.7.26.ari/lib64/libugni.a /opt/cray/alps/5.2.1-2.0502.8712.10.32.ari/lib64/libalpsutil.a
             |                                                  | /opt/cray/xpmem/0.1-2.0502.51169.1.11.ari/lib64/libxpmem.a /opt/cray/udreg/2.3.2-1.0502.8763.1.11.ari/lib64/libudreg.a
             |                                                  | /opt/intel/composer_xe_2013_sp1.2.144/compiler/lib/intel64/libifport.a /opt/intel/composer_xe_2013_sp1.2.144/compiler/lib/intel64/libifcoremt.a
             |                                                  | /opt/intel/composer_xe_2013_sp1.2.144/compiler/lib/intel64/libimf.a /opt/intel/composer_xe_2013_sp1.2.144/compiler/lib/intel64/libsvml.a
             |                                                  | /opt/intel/composer_xe_2013_sp1.2.144/compiler/lib/intel64/libirc.a /usr/lib64/gcc/x86_64-suse-linux/4.3/../../../../lib64/libpthread.a
             |                                                  | /usr/lib64/gcc/x86_64-suse-linux/4.3/../../../../lib64/libc.a /usr/lib64/gcc/x86_64-suse-linux/4.3/libgcc.a
             |                                                  | /usr/lib64/gcc/x86_64-suse-linux/4.3/libgcc_eh.a /usr/lib64/gcc/x86_64-suse-linux/4.3/../../../../lib64/libc.a
             |                                                  | /usr/lib64/gcc/x86_64-suse-linux/4.3/crtend.o /usr/lib64/gcc/x86_64-suse-linux/4.3/../../../../lib64/crtn.o
```

```
+-------------------------------------------+-------------+----------+------------+
| tag_id                                    | linkline_id | username | link_date  |
+-------------------------------------------+-------------+----------+------------+
| 19520da0-1697-4d61-bfba-54f02e482287      |      187615 | wlzhang  | 2014-08-07 |
| 8f625c65-1940-4070-a951-d61a308c59b7      |      420039 | seeyc    | 2014-08-07 |
| bf6d83b9-776c-42e9-a195-8806342e3967      |      184391 | scoh     | 2014-08-07 |
+-------------------------------------------+-------------+----------+------------+
```

```
+---------+-------------------------------------------+------------------------------------------------------+----------+------------+---------------+---------------+
| run_inc | tag_id                                    | executable                                           | username | run_date   | job_launch_id | build_machine |
+---------+-------------------------------------------+------------------------------------------------------+----------+------------+---------------+---------------+
| 1001241 | 19520da0-1697-4d61-bfba-54f02e482287      | /scratch1/scratchdirs/wlzhang/testing/tae5/exec      | wlzhang  | 2014-08-07 |       1532879 | edison        |
| 1001542 | 8f625c65-1940-4070-a951-d61a308c59b7      | /global/homes/s/seeyc/cti0ld/bin/postpro.exe         | seeyc    | 2014-08-07 |       1532892 | edison        |
| 1001490 | bf6d83b9-776c-42e9-a195-8806342e3967      | /global/homes/s/scoh/compile/epw/ver_3.0.0__fix_ws/save_bin/epw.x | scoh | 2014-08-07 |  1532895 | edison        |
+---------+-------------------------------------------+------------------------------------------------------+----------+------------+---------------+---------------+
```

ALTD Table Definitions

```
| altd_edison_link_tags | CREATE TABLE
`altd_edison_link_tags` (
 `tag_id` varchar(64) NOT NULL,
 `linkline_id` int(11) NOT NULL,
 `username` varchar(64) NOT NULL,
 `link_date` date NOT NULL,
  PRIMARY KEY (`tag_id`)
) ENGINE=MyISAM DEFAULT CHARSET=utf8 |
```

```
| altd_edison_linkline | CREATE TABLE
`altd_edison_linkline` (
 `linking_inc` int(11) NOT NULL
AUTO_INCREMENT,
 `shaline` varchar(64) NOT NULL,
 `linkline` varchar(16382) NOT NULL,
  PRIMARY KEY (`linking_inc`,`shaline`)
) ENGINE=MyISAM AUTO_INCREMENT=534501
DEFAULT CHARSET=utf8 |
```

ALTD Table Definitions

```
| altd_edison_jobs | CREATE TABLE `altd_edison_jobs` (
 `run_inc` int(12) NOT NULL AUTO_INCREMENT,
 `tag_id` varchar(64) NOT NULL,
 `executable` varchar(1024) NOT NULL,
 `username` varchar(64) NOT NULL,
 `run_date` date NOT NULL,
 `job_launch_id` int(11) NOT NULL,
 `build_machine` varchar(64) NOT NULL,
 PRIMARY KEY (`run_inc`),
 KEY `job_launch_id` (`job_launch_id`),
 KEY `username` (`username`),
 KEY `run_date` (`run_date`)
) ENGINE=MyISAM AUTO_INCREMENT=1322886 DEFAULT
CHARSET=utf8 |
```

ALTD cron jobs

- **Every five minutes to update the database**
  - Edison - runs on edison01
  - Hopper runs on Hopper03
  - Carver - No cron jobs

- **There are at most two cron altd connections from each machine at any given time**
  - Ld_db.sh
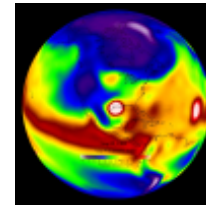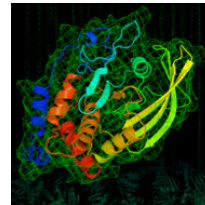 - Aprun_db.sh

Maintenance (POC procedure)

- **If ALTD causes problem, unload the altd module in the usg-default-modules on each system**

  https://twiki.nersc.gov/twiki/bin/view/USG/DisableALTD

- **Requirement for database server**
  - 8:00am-5:00pm

- **Contact**
  - Zhengji
  - Helen
  - Jack

Your Suggestion for Improvement
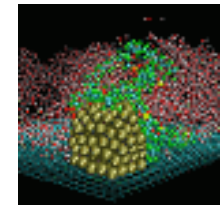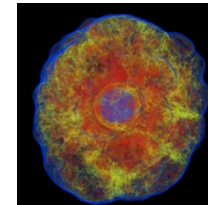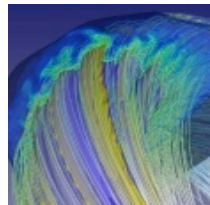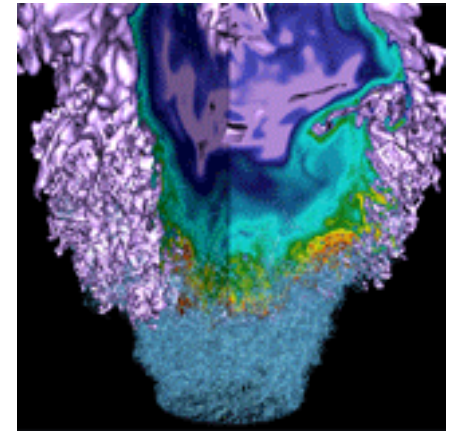
Summary of the meeting discussion:
Attendees: David Turner, Douglas Jacobson, Larry Pezzaglia,
Lisa Gerhardt, Rei Lee, Stefan Lasiewski, Helen He
Tina Declerck, Tina Butler, Jack Deslippe,

General questions:

- **Where to install ALTD**
  - /usr/common/usg/altd?
  - Other?

- **Ownership of the ALTD installation directory**
  - LD should be owned by root, but it is a bigger issue (security)
  - Files owned by CSG, but USG has permission to modify?
  - Usgsafe and usg (need to remove the w bit for the ld command)
  - Other?

- **Temporary file system usage**
  - /scratch and /tmp

- **Database usage**
  - staffdb01

Inputs from CSG, Cray and NGF

- **Off switch for OPS or others when ALTD causes system problems.**

- **Need to evaluate the overhead of aprun wrapper when there are thousands of aprun invocations in a single user job.**

Server team

- **Point of contact when ALTD causes problem.**

- **Maintenance procedure**

- **Proper use of keys, so to avoid extra load on to the database server**

- **Use ENGINE=innodb, instead of MyISAM**

- **DB manager comes with DB can analyze and suggests optimizations (such as suggesting to add a primary key based on your inquiries)**

- **Move the database to the new server, staffdb01**

- **Add alps id**
- **Replace the use of the file system with syslog or RabbitMQ for long run.**
- **The syslog approach could be an easier and quick solution for the problem (rather frequent Lustre file system issue).**
  - use /usr/common to read, use syslog to write
  - syslog over udp not over tcp
  - Message size limit? Doug tried 4MB messages
  - Log files owned by CSG, but USG has permission to modify?
- **Document for use and query, DB passwords, etc., for other staff.**

Thank you very much for your inputs!