

# Singularity on the OSG

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# Brian's talk yesterday

- Brian talked about CMS's use of Singularity
- CMS is concerned about **Isolation**, the OSG cares about **Environments**

## Singularity in CMS

“Over a million containers served”

# The old days!

- The OSG manages many modules for software

```
$ module load python/3.3
```

- Leverages OSG team's expertise installing and maintaining software

# You know your software better than us!

- The module relies on our expertise to install and operate software
- Unfortunately, we are not experts in your software,
- You know how to run your software, and probably how to install it!

# Introduction



- Again, not going to cover why Singularity other containers
- This time, we will talk about the user side of Singularity on the OSG

# What is capable with Singularity

- Virtualize your local environment anywhere, create a docker image of your environment
- Some software comes with pre-made docker images!
- OSG integrated Singularity directly into their submit infrastructure to make it easy to use!

# OSG is EL6 and EL7

- OSG provides an easy way to get only RHEL6

```
universe = vanilla
executable = job.sh
Requirements = HAS_SINGULARITY == TRUE

should_transfer_files = IF_NEEDED
when_to_transfer_output = ON_EXIT

output = out
error = err
log = log

queue
```

# OSG is EL6 and EL7

- All OSG jobs that can be run in Singularity... are.

```
universe = vanilla
executable = job.sh
Requirements = HAS_SINGULARITY == TRUE

should_transfer_files = IF_NEEDED
when_to_transfer_output = ON_EXIT

output = out
error = err
log = log

queue
```



# Hosted Images

- The OSG hosts a few very common images
  - OS Images: Centos, Fedora, Ubuntu, Debian...
  - Programming Environments: Python, OpenJDK, R, Tensorflow
  - Experiment Specific: LIGO, CMS, and ATLAS WNs
- Images are hosted on CVMFS

# Hosted Images

- You can add your own Docker images by adding it to a github repo: <https://github.com/opensciencegrid/cvmfs-singularity-sync>
- Automatically sync'd to CVMFS, even new Docker updates!

# OSG is EL6 and EL7

- Singularity is the default
- RHEL7 is just a simple line change

```
universe = vanilla
executable = job.sh
Requirements = HAS_SINGULARITY == TRUE

+SingularityImage = "/cvmfs/singularity.opensciencegrid.org/rynge/osgvo:el7"
+SingularityBindCVMFS = True

should_transfer_files = IF_NEEDED
when_to_transfer_output = ON_EXIT

output = out
error = err
log = log

queue
```

# View From the Worker Node

```
slurmstepd: [8295392]
  \_ /bin/bash /var/spool/slurmd/job8295392/slurm_script
    \_ /bin/bash /var/lib/globus/condor-ce/spool/5263/0/cluster4115263.proc0.
      \_ /bin/bash /scratch/glide_kmuqIk/main/condor_startup.sh glidein_co
        \_ /scratch/glide_kmuqIk/main/condor/sbin/condor_master -f -pidfi
          \_ condor_procd -A /scratch/glide_kmuqIk/log/procd_address -l
            \_ condor_startd -f
              \_ condor_starter -f login02.osgconnect.net
                \_ /util/opt/singularity/2.2.hcc-c0d435a/gcc/4.4.7/li
                  \_ /util/opt/singularity/2.2.hcc-c0d435a/gcc/4.4.
                    \_ /util/opt/singularity/2.2.hcc-c0d435a/gcc/
                      \_ /bin/bash /srv/condor_exec.exe
                        \_ pegasus-kickstart -n job-wrapper.s
                          \_ /bin/bash ./job-wrapper.sh 100
                            \_ /usr/bin/time -f corsika:
                              \_ /bin/bash ./execute_co
                                \_ ./corsika75000Linu
```

**Site Batch System**

**Pilot**

**Singularity**

**User Payload**

# View from inside

- Only see your own usage! (well that's boring)

```
USER          PID  %CPU  %MEM    VSZ   RSS TTY      STAT   START       TIME COMMAND
cuser1         1   0.1   0.0   11580   732 ?        S      18:03       0:00 /bin/sh /srv/condor_exec.exe
cuser1        64   0.0   0.0   47388  1656 ?        R      18:03       0:00 ps auxf
```

# Conclusion

- The OSG can run a lot of different types of OS
- The OS on the site no longer matters, as long as Singularity is available
- I will talk more on Thursday morning

# Some Stats

- 2,337,943 Singularity starts on the OSG
- 60.5% of opportunistic OSG were Singularity jobs for March

