Using RHEL6 Singularity Container

Many thanks to Wei Yang for creating and documenting use of the container. Note that Singularity rebranded itself to Apptainer. So you can use those names interchangeably at present.

Singularity image files:

- /gpfs/slac/fermi/fs2/software/containers/slac-fermi.img.ext3
    - This is an old, tested image
- /gpfs/slac/fermi/fs2/software/containers/fermi-centos6.20230314.sif
- on s3df, these containers can be found in: /sdf/group/fermi/sw/containers/

- They are available on both the AFS side and SDF side. You can copy them to other locations
- Instructions for how to build the container are in: /gpfs/slac/fermi/fs2/software/containers/fermi-rhel6.build.txt

For S3DF:

1. export myimage=/sdf/group/fermi/sw/containers//fermi-rhel6.sif. That is symlinked to the "prod" container in that directory.
2. Go inside the container:
    a. singularity shell -B /sdf $myimage
    b. By default, the prompt is changed to "Apptainer> ". You are now in a shell and can do "ls", "cd", etc.
    c. If you run command "id", you will see you are running as yourself.
    d. if you need to see SDF filesystems (Lustre), add -B /fs/ddn/sdf
3. Run a command in the container:
    a. singularity exec -B /sdf $myimage ls -l
    b. singularity exec -B /sdf $myimage sh myscript.sh
    c. The above is usually used in batch jobs.
        i. to work on the scratch space in batch, add **-B /lscratch**
    d. if you need to see SDF filesystems (Lustre), add -B /fs/ddn/sdf

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How to run Singularity container from rhel6-64, centos7 and sdf-login:

1. export myimage=/gpfs/slac/fermi/fs2/software/containers/slac-fermi.img.ext3
    a. or use the new image file:
    b. export myimage=/gpfs/slac/fermi/fs2/software/containers/fermi-centos6.sif
2. Go inside the container:
    a. singularity shell -B /afs:/afs -B /gpfs:/gpfs $myimage
    b. By default, the prompt is changed to "Apptainer> ". You are now in a shell and can do "ls", "cd", etc.
    c. If you run command "id", you will see you are running as yourself.
3. Run a command in the container:
    a. singularity exec -B /afs:/afs -B /gpfs:/gpfs $myimage ls -l /afs
    b. singularity exec -B /afs:/afs -B /gpfs:/gpfs $myimage sh /afs/slac/myscript.sh
    c. The above is usually used in batch jobs.
4. "-B /afs:/afs" means bind mount (make /afs available inside the container, as path /afs)
    a. Bind mount may not work well when running singularity on rhel6-64 machines, especially when autofs path (e.g. /nfs) is involved
    b. By default, /tmp and your working directories are bind mounted.
    c. on centos7, you can also bind mount nfs similarly.

How to build a RHEL6 Singularity container

Directory /sdf/group/fermi/sw/containers/ hosts most of the files needed to build a RHEL6 singularity container used by Fermi. The command to build a container is

1. sudo singularity build new.image.sif fermi-rhel6.singularity.def **or**
2. sudo singularity build --sandbox new.image.dir fermi-rhel6.singularity.def # this is an "image" in a directory that you can "cd" into and manually making changes.

The singularity definition file *fermi-rhel6.singularity.def* depends on docker rhel6 image, and SLAC's RHEL6 yum repo. Both could go away in the not too far future. When that happens, we will only be able to build new image from existing images. A definition file to do that looks like this;

```
Bootstrap: localimage
From: /sdf/group/fermi/sw/containers/fermi-rhel6.sif
%post
```

page for collecting questions/issues and answers