





EOS Code structure & testing

Elvin Sindrilaru
on behalf of the EOS team

Overview

- Git repository structure
- Build prerequisites
- Contributing code and tests
- EOS up and running in 60 seconds

Git repo structure (1)



- **git clone** <https://gitlab.cern.ch/dss/eos.git>



Git repo structure (2)



- Directory structure follows the **logical separation of functionalities** between daemons
- Some special files/dirs
 - **.gitlab-ci.yml** - holds all the integration with GitLab i.e. pipelines, docker images etc.
 - **CMakeLists.txt** - usual structure for any CMake project
 - **./debian** - holds Ubuntu specific packaging scripts
 - **.clang-*** - clang tools specific configuration files

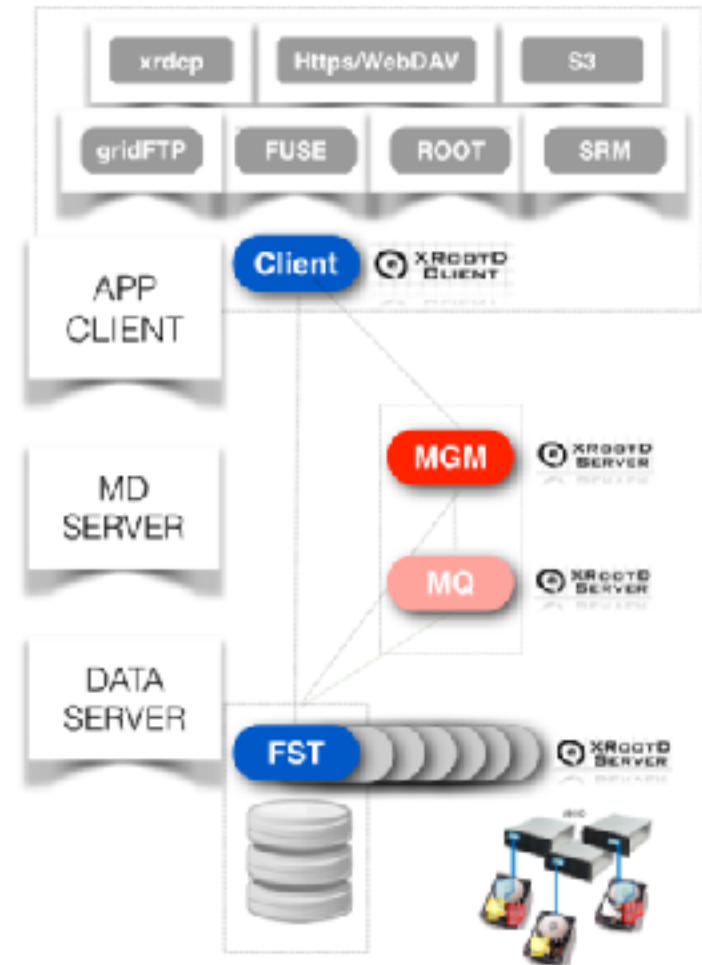
Git repo structure (2)



- **./common**
 - Holds utility data structures, functions and classes that are shared between all the daemons
- **./mq**
 - XRootD daemon with a custom OFS plugin
 - Handles service communication between FSTs and MGM

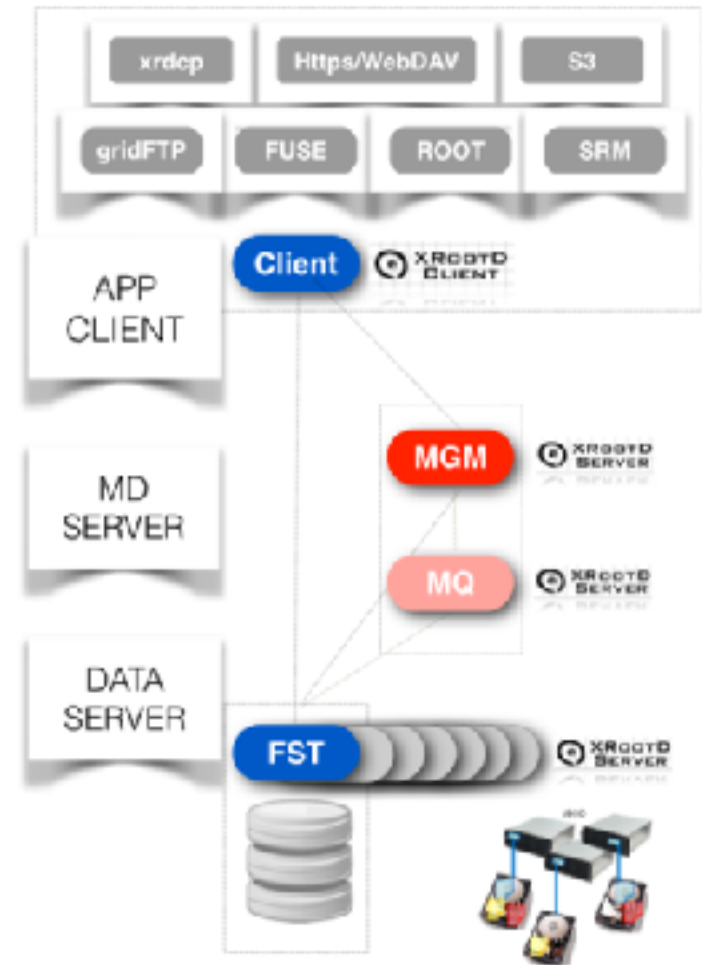
MGM - manager node ./mgm

- **XRootD** with specialised OFS plugin
- **Scheduling** subsystem
- Authorisation and QoS functionality
- **Internal-housekeeping**: balancing/drainning/group balancing/fsck
- Handles all client requests and **console commands**
- **Namespace** hierarchy



FST - storage node(s) ./fst

- **XRootD** with specialised OFS plugin
- Handles different types of **file layouts**: plain/replica/RAIN
- Handles different types of **I/O transfers**: local/remote/third-party transfers
- Responsible for **scrubbing and storage check** functionality



Git repo structure (3)



- **./fuse**
 - Holds the old fuse implementation
- **./fusex**
 - Holds the new fuse implementation
 - eosxd executable
 - Provides default parameters and autofs configuration
- **./namespace**
 - In-memory namespace implementation
 - QuarkDB namespace
 - Namespace implementation is **dynamically loaded**
 - **mgmofs.nslib** /usr/lib64/libEosNsInMemory.so
- **./console**
 - All eos console commands

Beryl-aquamarine to Citrine common pitfalls

- Configuration changes:

- **MGM**: new **mgmofs.nslib** <nslib.so>
- **FST**: xrootd.fslib **-2** libXrdEosFst.so
- New parameter in **XRootD 4**



- **New scheduling**

- By default placing data on un-geotagged FSTs is disabled
- Set as an env variable on the **FST**

```
grep GEOTAG /etc/sysconfig/eos_env  
EOS_GEOTAG="0513::R::0050::CI04"
```

- Use command from **MGM**

```
geosched disabled rm nogeotag * *
```

Build pre-requisites

- **CMake** $\geq 3.0.0$, **gcc** ≥ 4.8 and a bunch of other packages
- **ccache**
- **Ninja** build system



```
# Using Makefiles
```

```
cmake3 -DBUILD_QUARKDB_NAMESPACE=ON --DBUILD_TESTS=ON ..
```

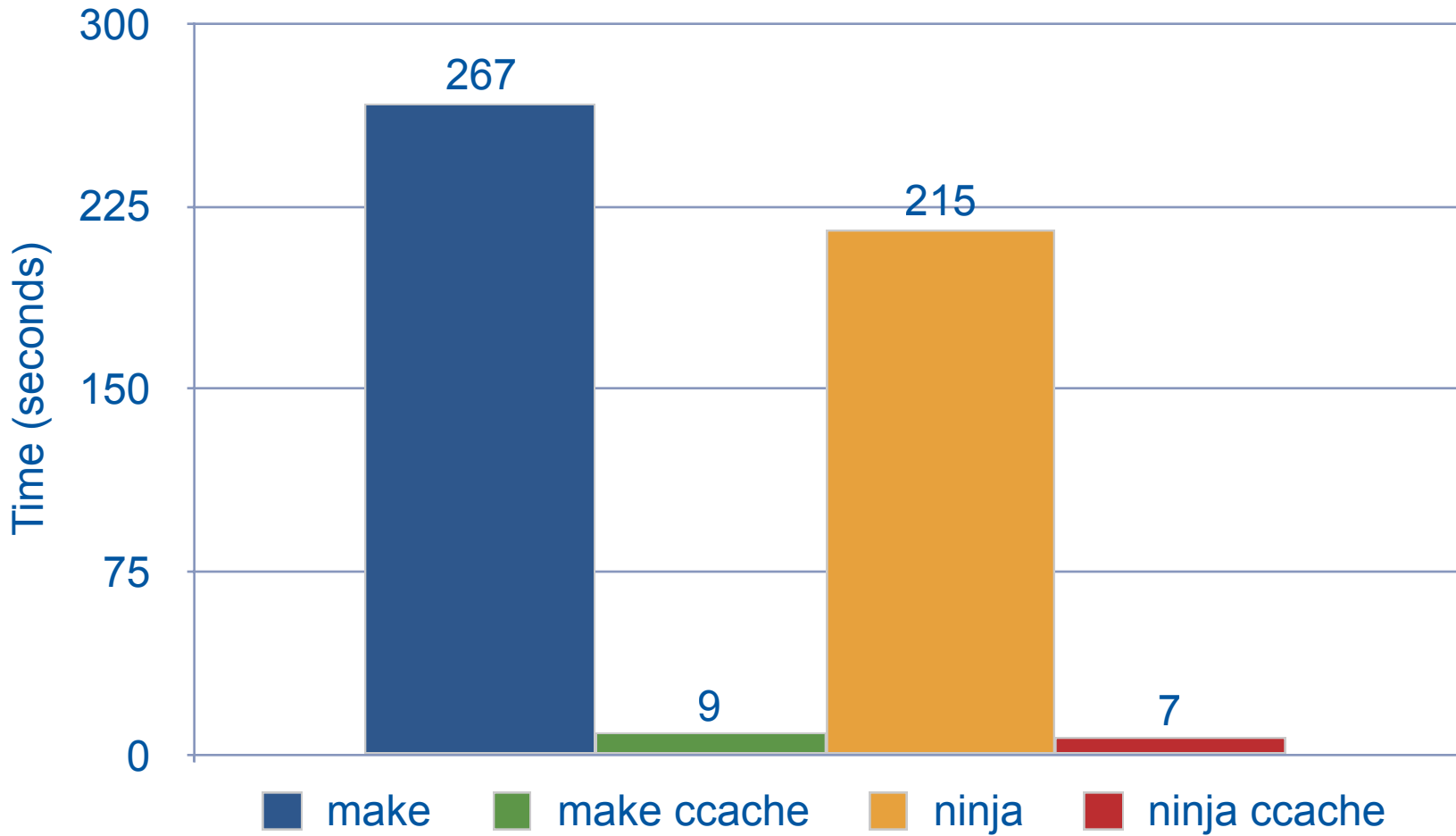
```
make -j 4
```

```
# Using ninja-build
```

```
cmake3 -G Ninja -DBUILD_QUARKDB_NAMESPACE=ON --DBUILD_TESTS=ON ..
```

```
ninja
```

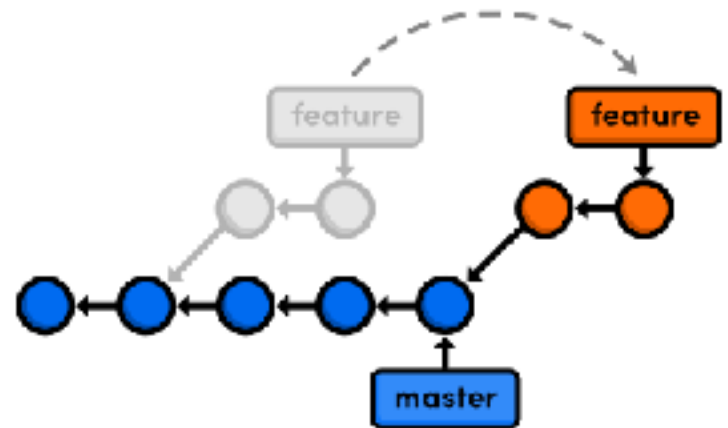
Compilation speed-up



Submitting git patches

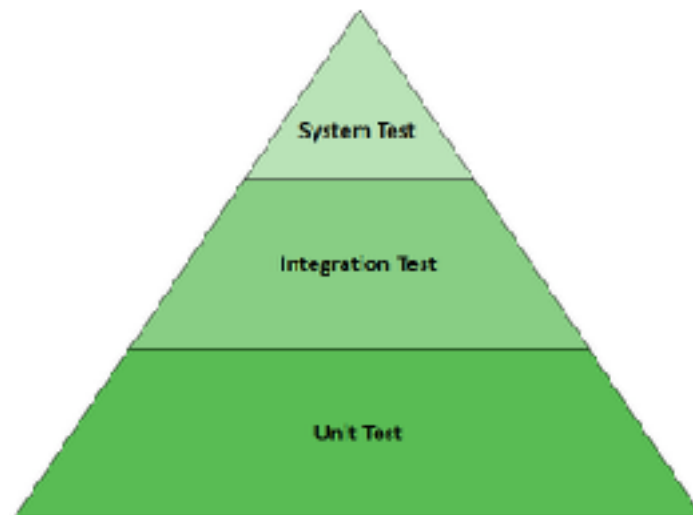
- **Rebase** your branch on top of the current master before submitting it for review

```
git checkout -b my_feature
git push ...
git push ...
git pull --rebase
git rebase origin/master
git push --force origin/
my_feature
```



Adding tests

- All tests are run automatically in the **Gitlab pipeline**
- **Unit tests**
 - `./unit_tests`
 - Using the **gtest** framework
- **System tests**
 - `./test/`
 - Most of them grouped in the `eos-instance-test` bash script
 - Assume a fully functional EOS instance



EOS instance in 60 seconds

git clone <https://gitlab.cern.ch/eos/eos-docker.git>

start a virtual instance with KDC, MGM, MQ, 6xFST

./eos-docker/scripts/start_services.sh

get a shell in the MGM service container

docker exec -it eos-mgm-test bash

run instance tests

eos-instance-test

```
[root@eos-docker tmp]# eos-docker/scripts/start_services.sh -i 0b153e8b6506
468d806d6f2d8ad9398006818d0df281ac73621eccc9b9c739c36596c2a05fb17
700257d7437b3a0b72f0ecdccfae95557932f5b73871ad27b1ee5ccd7dede03a
Starting kdc... Done.
Initing kdc... Done.
Populating kdc... added admin1@TEST.EOS with password "tDp5mfkjBx"
added host/eos-mgm-test.eoscluster.cern.ch@TEST.EOS with password ">CzjpraSdm"
Done.
378267ed609c0806a73bc9a4163aff27573ed089cf29d84eb81043d5876c635d
2ecea01ccabb84442a024ef458dd0117519ceca3b77b62085fa1a2a71b65bd42
success: set vid [ eos.rgid=0 eos.ruid=0 mgm.cmd=vid mgm.subcmd=set mgm.vid.auth=sss mg
m.vid.cmd=map mgm.vid.gid=0 mgm.vid.key=<key> mgm.vid.pattern=<pwd> mgm.vid.uid=0 ]
2dlba4c7111e933d89d6ad282643cb4287b11c47f6a7a94149cbb1763fae651
02398a7e926966300016004397e59d419c26a13c256f7a64e13969ae222f7512
4e906031e8eb8b61bea2692aa8aec41c9921136676daed4eccd7aa6ebef51f21
7f42121461ed5c28961e87689fdcc0671f72d19a7936473387a3dc112e4e3607
75e76e25e2ac435cffde5476779162775cbf705720b10f274dc7e378e39a8446
152bffdaafdac36af00a69b3dd3b7e68eabf9b54f479a15f3e09c6d7dobb915
Starting fstl ...
```

Thank you!

Questions & comments?

