A virtualized cluster testing framework

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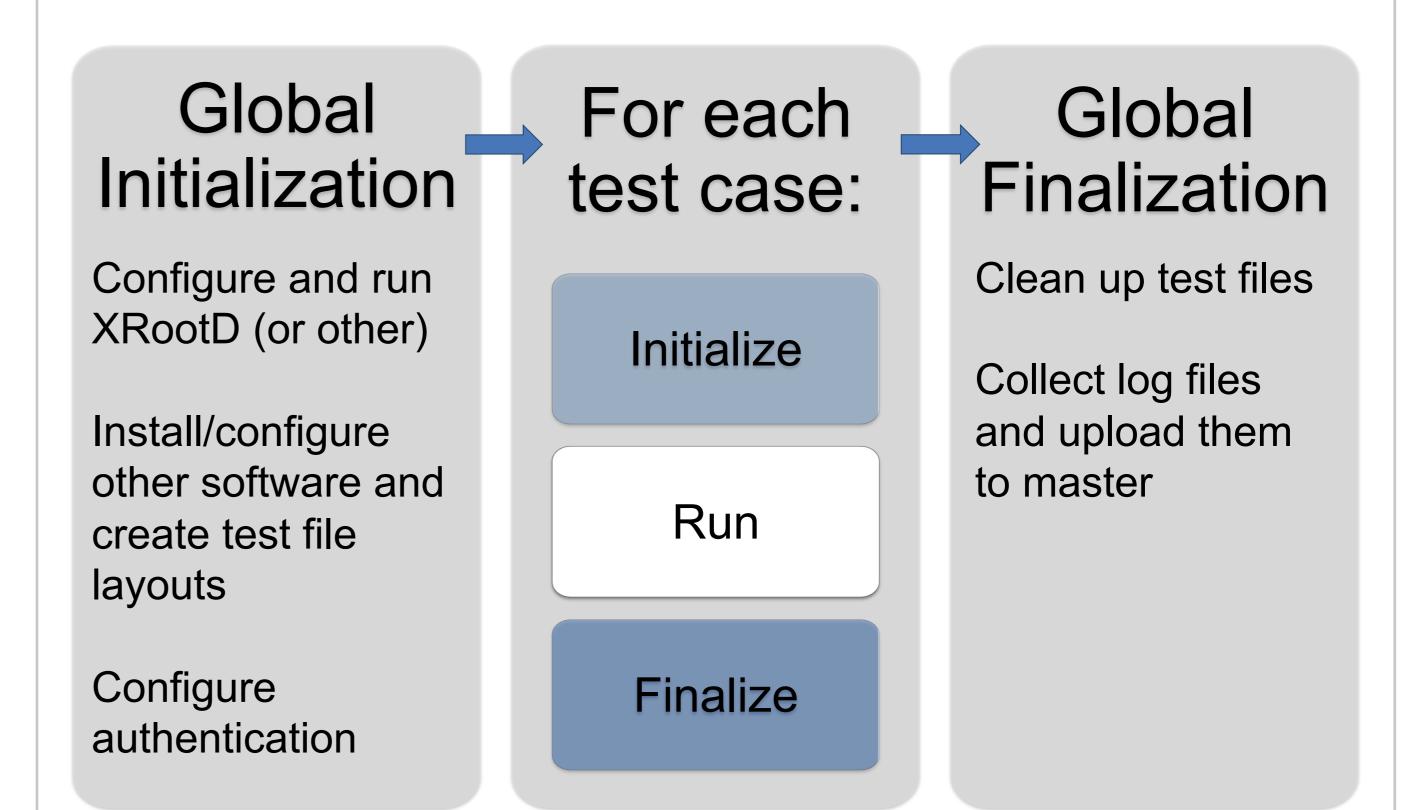
CERN Department

1. The Challenge...

- How can we do functional tests with distributed software?
 - We need a distributed setup (cluster) to test realworld scenarios
- How do we orchestrate the behavior of each machine?
 - We need to be able to explicitly control the actions of each participating machine
- How do we automate the process?
 - We want some kind of continuous integration support

3. Multi-stage test suites

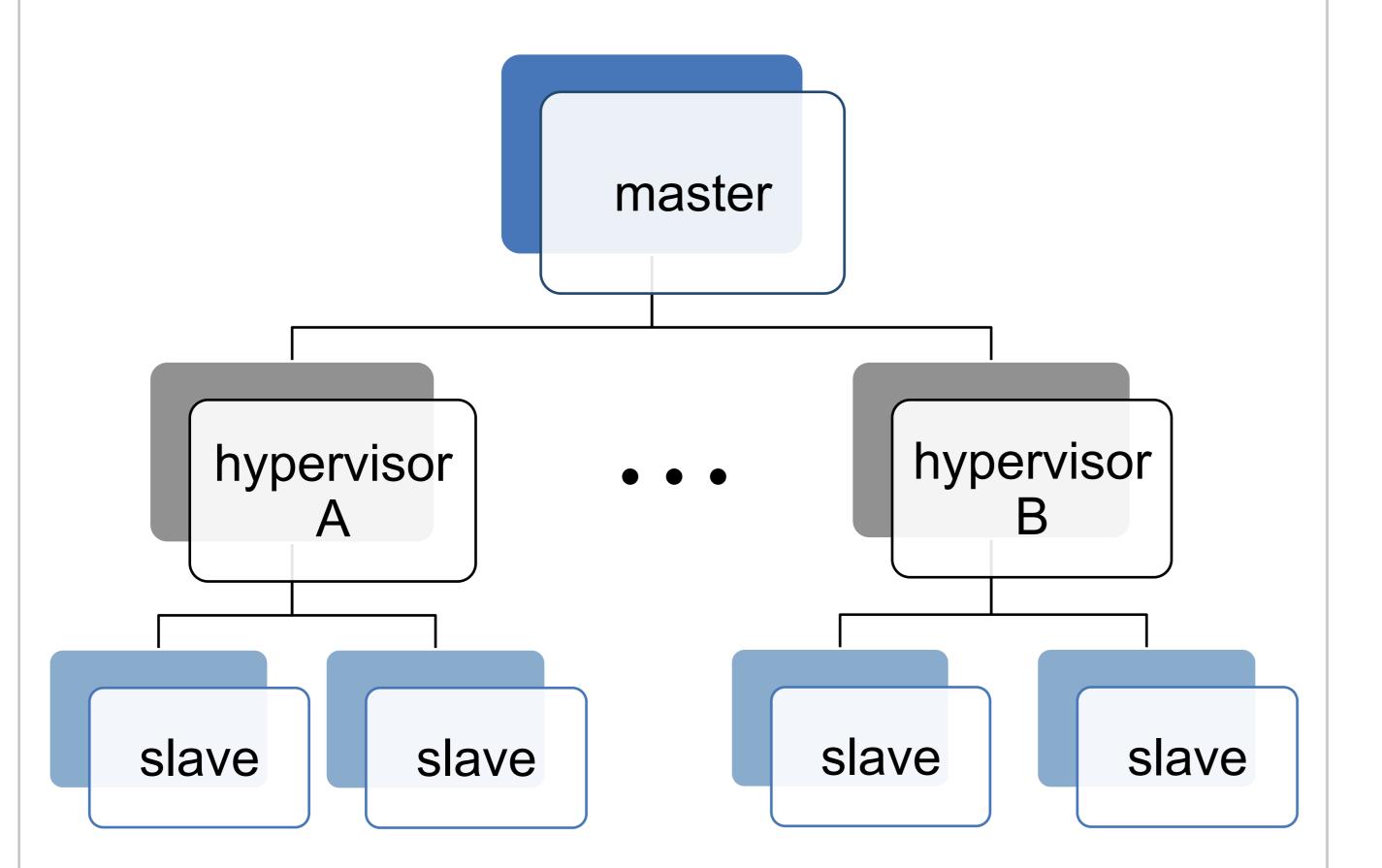
- Test suite has 3 main stages: initialization, run, and finalization
- The "run" stage executes test cases, which are also divided into initialization, run and finalization



• We do not necessarily have the resources for a large physical setup

2. A Solution

- We can use virtualization to help us
 - libvirt virtualization API
- We use a 3-layer hierarchy, comprised of one master, one or more hypervisors, and multiple slaves



- Each stage is synchronized across all slaves, so no stage is run before the previous has finished on all slaves
- Everything happens via templated shell scripts which are delivered to each slave
- Detailed output from each stage is recorded and lacksquaredisplayed together with historical runs via web interface provided by the master
- Test suites are version controlled using git repositories

- Slaves are virtual machines (kvm/qemu)
- Hypervisors are real machines, which start/stop/ configure the slaves, using libvirt
- The master is a real machine, which sends

 The framework automatically acts on changes in the repsitories

4. Status and outlook

- We currently have a working prototype running at CERN
- In the short term we plan to use it to test all the XRootD builds coming from the continuous integrations system and, possibly, other projects within the group

| commands to the hypervisors (e.g. "start a particular cluster", "run test suite X") | XRootD Testing Framework | Dashboard > Test Suites > Run History : ts_pyx | | Currently active cluster: cluster_pyxrootd on hypervisor dssbuild3.cern.ch Currently running test suite: ts_pyxrootd Run Now Cancel Run |
|--|---|---|--|---|
| Slaves are connected to form a cluster using a virtualized network | Test Suites • ts_pyxrootd Clusters Hypervisors | 1 I2-08-2013 14:30:10 I I2-08-2013 14:24:17 I I2-08-2013 17:42:57 | Run started: Thu 04-04-2013 17:42:57 Suite Initialization Image: Transport of the start | 2 Successful Run(s) 1 Failed Run(s) |
| Flexible machine and network configuration possible through simple definition files Disks (number, size, mount point) CPU architecture Memory size Network topology Load-balancing IP aliases | Copyright © CERN | | client4.xrd.test client2.xrd.test client7.xrd.test client5.xrd.test client5.xrd.test client6.xrd.test client8.xrd.test client8.xrd.test client1.xrd.test client1.xrd.test | <pre>arting ity, xrd version v20130402-967044a test initialization started. etc/xrootd/xrd_cluster_pyxrootd.cf ons restricted to 65536 irrootd protocol 2.9.7 version v20130402-967044a tion started. be exported. of specified; strong authentication disabled! started. ion started. iluster_pyxrootd.cf oss configuration: 36 300 keep 1200 3272 nodread nomig norcreate nopurge nostage xattr ion completed. iluster_pyxrootd.cf ofs configuration: 36 5 300 logdir /tmp/client4/.ofs/posc.log ization completed. gdir' not specified; prepare tracking disabled.</pre> |



http://cern.ch/it-dss

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(CHEP 2013, 14th – 18th October, Amsterdam, The Netherlands)

