The LCG Test Suites

Gilbert Grosdidier

LAL-Orsay/IN2P3/CNRS
& LCG

Talk plan, and Credits

- Suite contents and purposes
- Test S/W design
  - Configure step
  - Test Loop
  - Plug-ins
  - Definition files
  - Presenter step
- The different kinds of tests
  - more on the storms
- The CLI options
  - with an example of submission
- Result examples
  - and other useful links
- The CTB

- The current set of Testing Suites was mainly contributed by:
  - Miquel Barcelo
  - Frédérique Chollet
  - Gilbert Grosdidier
  - Andrey Kiryanov
  - Charles Loomis
  - Gonzalo Merino
  - René Météry
  - Danila Oleynik
  - Andrea Sciabà
  - Elena Slabospitskaya
- Many other people contributed to the design and ideas leading to the current suites
  - among them the INFN Testing Team

Four levels of testing required

- Installation and Configuration testing — Almost dropped
  - targets each machine/service individually
- Unit Testing — Only ~50% developped
  - targets each basic functionality of a given service independently from the rest of the TB
- Functionality Testing — Fully developped
  - for the whole TB, exercises full functionalities, from a user point of vue, but one by one
- Stress Testing — Fully developped
  - same as above, but with sophisticated jobs (several functionalities required at the same time), and with a huge number of jobs.

- The basic testing was dropped because of lack of manpower
  - Meaning Install & Config, and Unit Testing

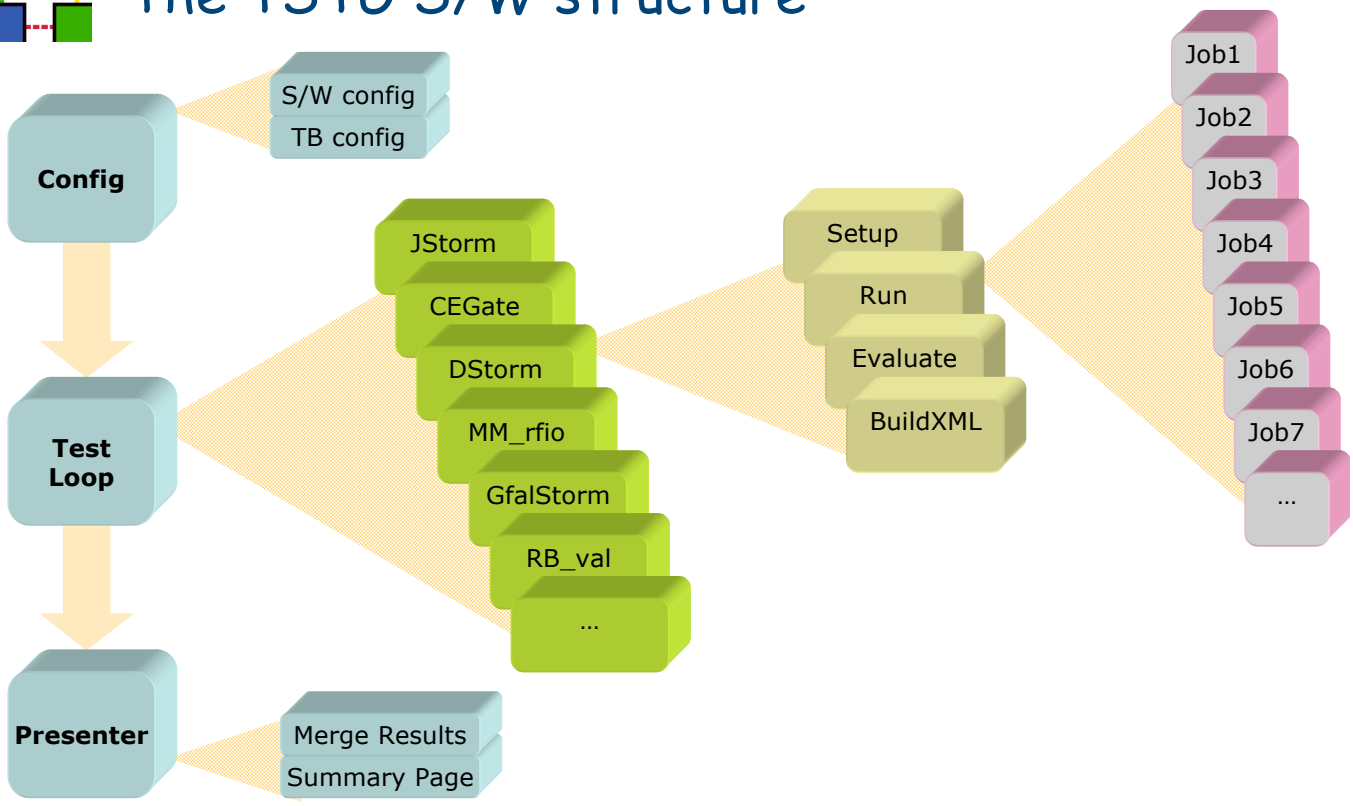
The TSTG suite Dedication

- **Site** Certification
  - initial check of the install
  - check when changes occur
  - regular re-checking (daily checks) <- this precisely implies Unit Testing
    - FS full, memory exhaustion, DB full, list full, no more inodes, hanging server(s)
- TB **Certification**
  - Basic Funtional Tests of components (services)
  - Basic Grid Functionalities, with individual tests
  - Full Grid Functionalities on a full TB, including remote sites, with global/group tests
  - Beyond (HEPCAL and Exp. Beta Testing) is outside of TSTG scope
- M/W **Validation** (Functionalities, Robustness, Stress Testing)
  - Basic Funtional Tests of components (services)
  - Basic Grid Functionalities, on a well defined/known TB, like the Cert TB
  - Full Grid Functionalities, including stress testing and group testing
  - task dedicated to performance/functionality comparisons with previous version
    - thru definition tests
    - the major requirement being then **automated running** (thru cron jobs)
      - no prompting, no passphrases

Test S/W design, & Configure Task

- It is split into 2 main parts, dedicated to 3 tasks
  - the **top level driver**, written in Perl
  - the **plug-ins**, one for each specific test
- The top level driver is responsible for these 3 tasks:
  - **Configure**: build environment (S/W libraries & configurations, TB config)
  - **Event loop**: run one or several selected tests
  - **Presenter**: merge the results and build the Web enabled summary page
- The **Configure** task
  - sets the environment for test S/W **libraries**
  - and the **testbed** configuration itself (i.e. the nodes to be tested)
  - 2 sets of **options** are available
    - the **general** options for the top level configuration
      - selecting the TB, verbosity, VO, main RB,
    - the options **specific** to each plug-in which will be run

The TSTG S/W structure



The Event Loop design

- The Event Loop (or Test loop)
  - built out of a lot of more or less independent **plug-ins**
  - more **robustness** in case of crash of one of them during the whole test
    - execution of the suite can proceed to the next one harmlessly
  - different **languages** are allowed (flexibility and openness)
    - Perl OO technique for most of them
    - but also a few of them in bash
    - Other languages are welcome (Java, C, C++, …)
  - provided they share the same **input** (CLI) and **output** (XML) **design**
    - Input requires switches to target all or some nodes only
    - Output includes: exit status, summary results printed to STDOUT, detailed results going to an XML file
  - they should be **killable** (thru the top level process)
  - they should create **no side effect** for the other tests
    - no process spinning when they are done
    - no left over jobs without being cancelled
    - no files left on the SEs whenever possible

More on the Plug-in design

- The Test phase allows to run several tens of generic tests
  - using all the same environment
    - a specific testbed for example
  - however each one is aiming at a specific kind of services
    - all the CEs of a given TB for example
  - one may select a bunch of them, or run them one at a time
- It is often required to run a whole bunch of tests where one needs to specify different targets or configurations for different tests
  - One may want to choose
    - only 3 CEs out of 7 for the RB tests
    - while using all available CEs for the SRM-SE stress test on dCache SEs
- The solution goes thru the so-called « definition files »
  - allowing for very flexible construction of test batches

The « definition file » feature

- Each line in such a file is indeed:
  - targeting only one of the generic tests
  - with very detailed specifications (thru option parameters)
    - on the target machines
    - on the conditions of the test (input, output, speed, etc…)
- In a **definition file**, the same generic test can be repeated several times
  - with different conditions or specifications
  - targeting different subsets of nodes
- This feature is used in several opportunities
  - where a preformatted bunch of tests has to be run
    - when running a cron job
    - when comparing different results is required
      - for TB certification or M/W validation
  - when building a test with an automated tool or GUI
  - when a single shot is required to launch many tests at the same time

The Presenter level

- After each step in the event loop, information is gathered about the step results:
  - exit status, output files
  - elapsed time,
  - effective options, true command line
  - nodes effectively tested, …
- When the loop is over, an **overall summary** Web page is created:
  - to merge all these informations in an « at a glance » fashion
  - to allow navigation down to detailed files to track the cause of the failures
  - to give access for each step to a documentation page gathering:
    - the description of the step
    - the way to re-issue the command
      - to reproduce the failure (conditions, options, nodes)
    - or to clone it into a different environment, or to re-use some parts of it in a different way to cross-check its (weird ;-) results

The different kinds of Test [v0.1.12]

- **Watch out**: test names are far from meaningful

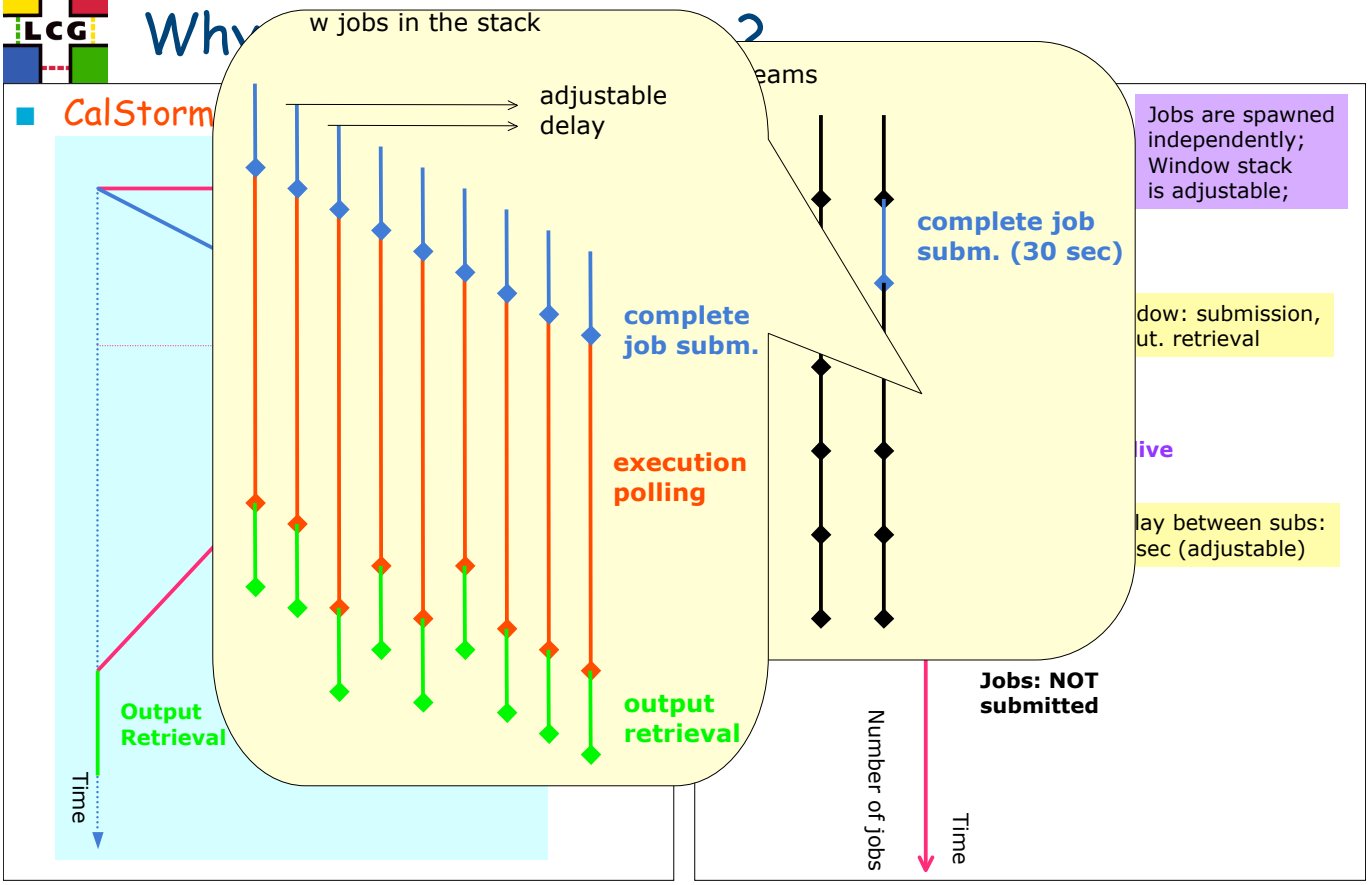
- **CEGate**: Globus Gatekeeper Unit Testing (CEs)
  - 11 tests achieved on each CE node
- **CECycle**: submit jobs to specific CEs systematically
- **UI_ST**: UI functionality tests for SiteTesting
- **FTP**: GridFTP functionality tests (RBs, CEs, SEs)
- **DNS**: reverse DNS Tests (RBs, CEs, SEs, PX)
- **RB_val**: Functionality tests for RBs (Unit testing)
  - a suite of 5 small jobs submitted through JDL files
- **SEwsCycle**: Checkup of SE setup (WP5-SEs) - does not work yet
- **RMCycle**: Checkup of RM setup (SEs, RM)
- **PXRenew**: to check Proxy Renewal from inside a WN job
  - very touchy

The different kinds of Test (2)

- **The Storms** (All components, Global & Stress testing):

- **JStorm**: Job Storm
  - **Simple** jobs with InpOut sandbox transfers, and check of output contents
  - --batchSleep option also available
- **CStorm**: Copy Storm
  - Achieves random **GridFTP** transfers from jobs running on **WNs**
- **RStorm**: Replica Storm
  - Broadcasts files thru RM from the UI,
  - and checks for availability on SEs from the **WNs**
- **KStorm**: Checksum Storm
  - Achieves **big file** sandbox transfers, with both end checksums
- **UStorm**: User Storm
  - Where the **user** may provide his own **JDL** xor **Script** files

- **CalStorm**: the storm engine is a different one
  - this allows sending more jobs in a row, and is more stressful for the submit phase
  - usually, the jobs are 10sec. sleepers
  - but 50-100min sleepers aim to check load balance on CEs



Similarities and Differences

- CalStorm
  - polling adjustable
  - retrycount adjustable
  - myproxyhost selectable
- JobStorm
  - timeout adjustable
  - retrycount adjustable
  - possible to resubmit a failed job
  - CE can be selected
  - can work with several RBs in turn
  - possibility to clean all ghost jobs
    - previous to the storm
- Similarities
  - a very simple Hello script is sent for execution on WNs
    - a sleep time option is available
  - the polling period is adjustable (however does not mean the same thing)
  - resources can be specified
    - ranking, CPU, other classAD requests, CE selection, …
  - RB can be selected

The different kinds of Test (3)

- **More Storms:** the Data Storms now

- **DStorm**: Data Storm
  - Replica (RM) file transfers from the **WNs**, and check for contents on UI
  - Currently testing either of Classic/Castor/dCache SRM SEs
- **HStorm**: David's Storm
  - same as above, but using file names with metadata contents
  - this allows to spot when a job mistakenly ran several times
    - RB or Condor-G debugging
- **GfalStorm**: is a special Data Storm
  - Uses GFAL lib to write/read/stat/unlink/close a file from a WN on a remote SE
    - thru a small C application
  - Currently testing either of Classic/Castor/dCache SRM SE

- The storms, when used for submitting few jobs, are also extremely powerful to spot configuration or M/W failures on many components
  - they exercise many distributed parts of the M/W, and allow for fine grain debug

The different kinds of Test (4)

- **MM**: MatchMaking Test for RB
  - exercising either of **(file)/gridftp/rfio/gsidcap** protocols
  - one of the most important and sophisticated one
- **RLS**: Basic functionality Test for RMC/LRC/RLS
- **SEs**: GridFTPUmask checks for SEs (should be merged with ?)

- Deprecated (to be reactivated):
- **ProXyf**: Security Test for RB (stealing proxies - better if failing)
- **MDS**: Consistency tests for MDS + BDII (2 tests in sequence)

The general purpose Options

- . MainScript **--TList**="test1 test2 ..."
  - testX = CEGate CECycle FTP DNS RB SEwsCycle RMCycle
    - also: MDS RLS MM UI_ST
    - and storms: JStorm CStorm RStorm KStorm DStorm UStorm GfalStorm...
- . "MainScript **--List**" :
    - Prints the List of available Tests.
- . "MainScript **--help**" :
    - Prints this README file, plus the full option List.
- . "MainScript **--MDebug**" :
    - Prints some Variable values from inside the MainScript.
- . "MainScript --TList="test" **--fullHelp**" :
    - To Force printing of a detailed Help about the selected Tests.
- . "MainScript --TList="test" **--showME**" :
    - To Force printing of option values and machine names for the selected Tests.

More specific top level Options

- Many other options, meaningful only at individual test level, are available
  - though all of them may NOT be available for some specific tests (use --showME option)

- . MainScript --TList="test" **--forcingTB**= "yourTB"
    - To Force a TB other than "CertTB". This option is mandatory.
- . MainScript --TList="test" **--addOptionList**="--opt1=val1 --opt2=val2 ..."
    - To Provide a list of additionnal Options to the Tests to be achieved.
- . MainScript --TList="test" **--forceMachineList**="node1 node2"
    - To Provide a list of Machines to be used in the tests, overriding the default
- . MainScript --TList="test" **--addMachineList**="node1 node2 ..."
    - To Provide a list of Machines to be used in the tests, adding them to the default ones
- . MainScript --TList="test" **--forcingRB**="fullRBname"
    - To Provide an alternate RB to work with, overriding the default one provided on the UI
- . MainScript --TList="test" **--forcingVO**="otherVO"
    - To Force a VO other than "dteam". Useful in most of the tests now.

- These are only some of them ...

The CLI: an Example

- An actual example of a test submission command
  - although the test name is a dummy one :-)

```
MainScript --forcingTB=CertTB --verbose --forcingVO=atlas \
--forcingRB=lxshare0240.cern.ch --TList=DummyStorm \
--addOptionList="--reqLapse=1 --maxStack=50 --singleSubmit --maxSubs=20 \
--pollingPeriod=60 --keepTempDir --circular --useCEList --serie=11022 \
--selectNodes='lxshare0277.cern.ch lxshare0290.cern.ch' "  \
--forceMachineList="lxshare0236.cern.ch lxshare0278.cern.ch"
```

- In this case, the generic command was:

```
MainScript --TList=DummyStorm \
--addOptionList="--reqLapse=2 --maxStack=25 --maxSubs=2 --pollingPeriod=30"
```

  - it was submitting jobs to all available **CEs**
  - it was acting on all **SEs** of the site, by default.

Detailed example, and other links

- A detailed example of a recent Result Web page, produced on the CertTB (15/05/04, morning) is available in the LCG/TSTG area:
  - 040515-040505 RTest
    - http://grid-deployment.web.cern.ch/grid-deployment/tstg/validation/040515-040505_RTest

- This presentation is available in:
  - EdinburghTSTG [ppt], [pdf].
    - http://grid-deployment.web.cern.ch/grid-deployment/tstg/docs/EdinburghTSTG.ppt

- Install help for TSTG RPMs and Tarball:
  - Install URL
    - http://grid-deployment.web.cern.ch/grid-deployment/tstg/docs/LCG—Certification-help

Certification & Testing Testbed