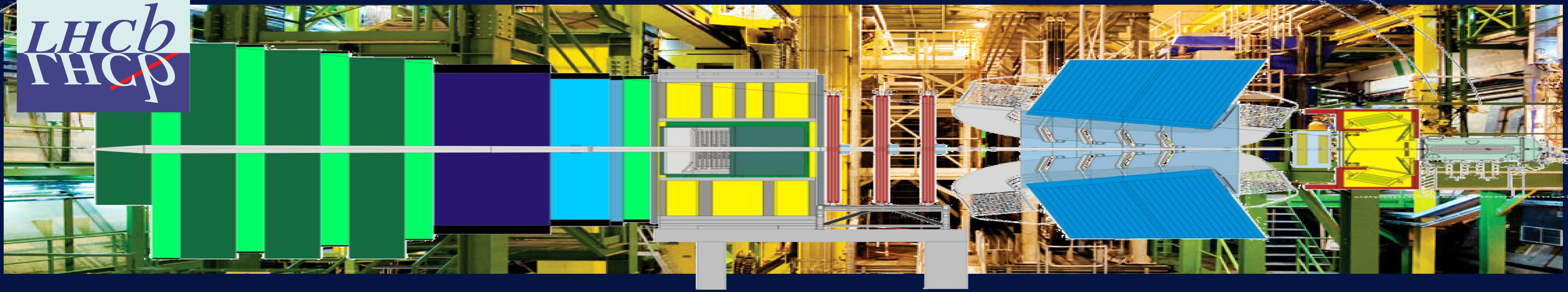

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A New Nightly Build System for LHCb

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The LHCb Experiment runs every night builds and tests of its software to ensure that changes do not introduce bugs or inconsistencies and to test new features, new platforms, new libraries, etc. We test every night ~24 combinations of ~20 projects on ~6 platforms using 8 machines (72 cores).

Features of the Old System

- configuration in 3 dimensions
  - slot (build context)
  - software project
  - platform (OS, compiler, ...)
- dynamic
  - the configuration can change every day
- flexible
  - variable size of axes

see CHEP2010
http://cern.ch/go/6pQc

Limitations of the Old System

- monolithic design
  - cannot add additional software repositories (e.g. git)
  - cannot use different build systems (e.g. CMake)
- heavy development cycle
  - full set up required to test new features

we designed a new system based on off-the-shelf open source tools

Used Open Source Tools

Jenkins
http://jenkins-ci.org/
extensible system for continuous integration builds and tests

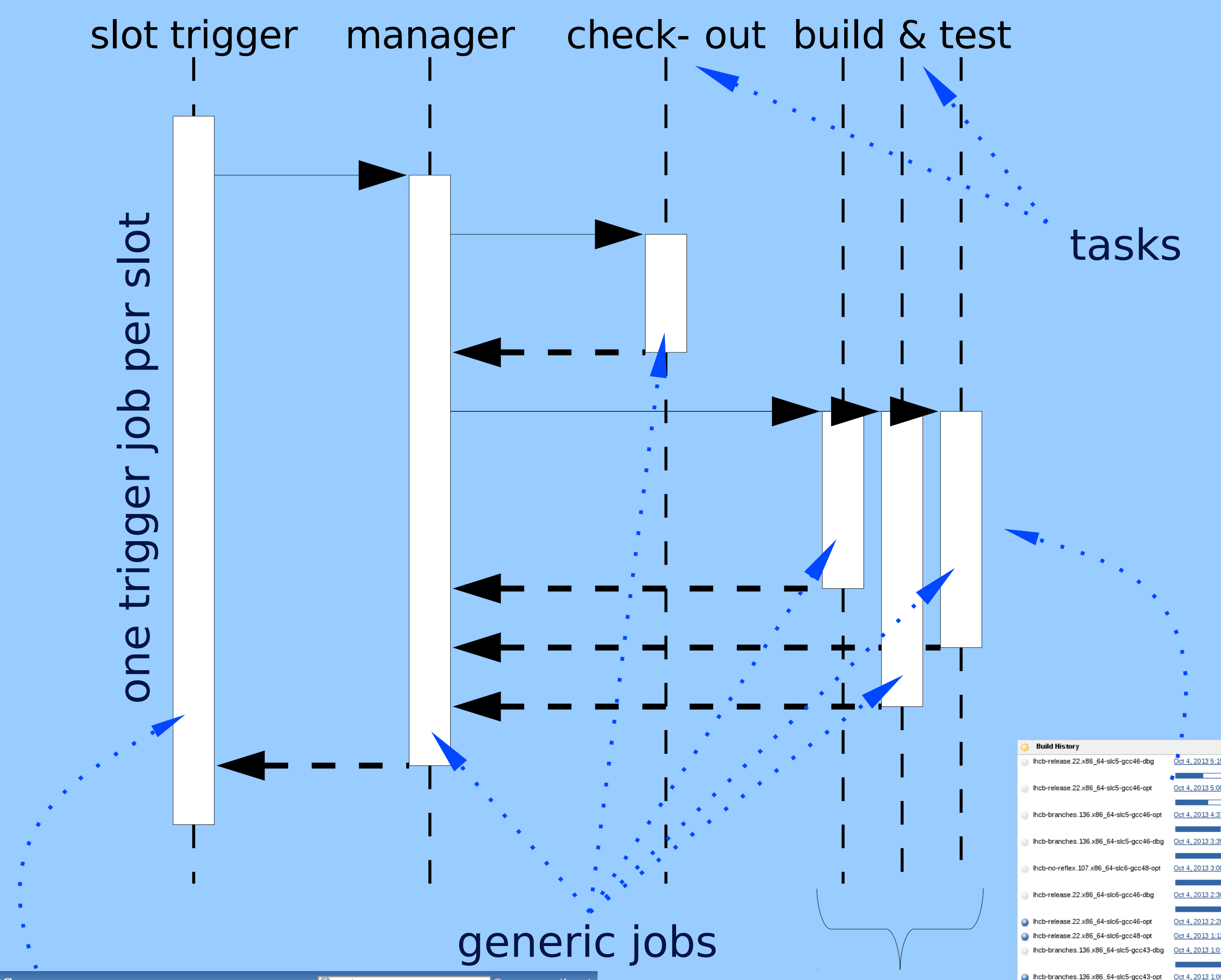
CMake Cross-platform Make
http://www.cmake.org/
build system with integrated testing facility (CTest)

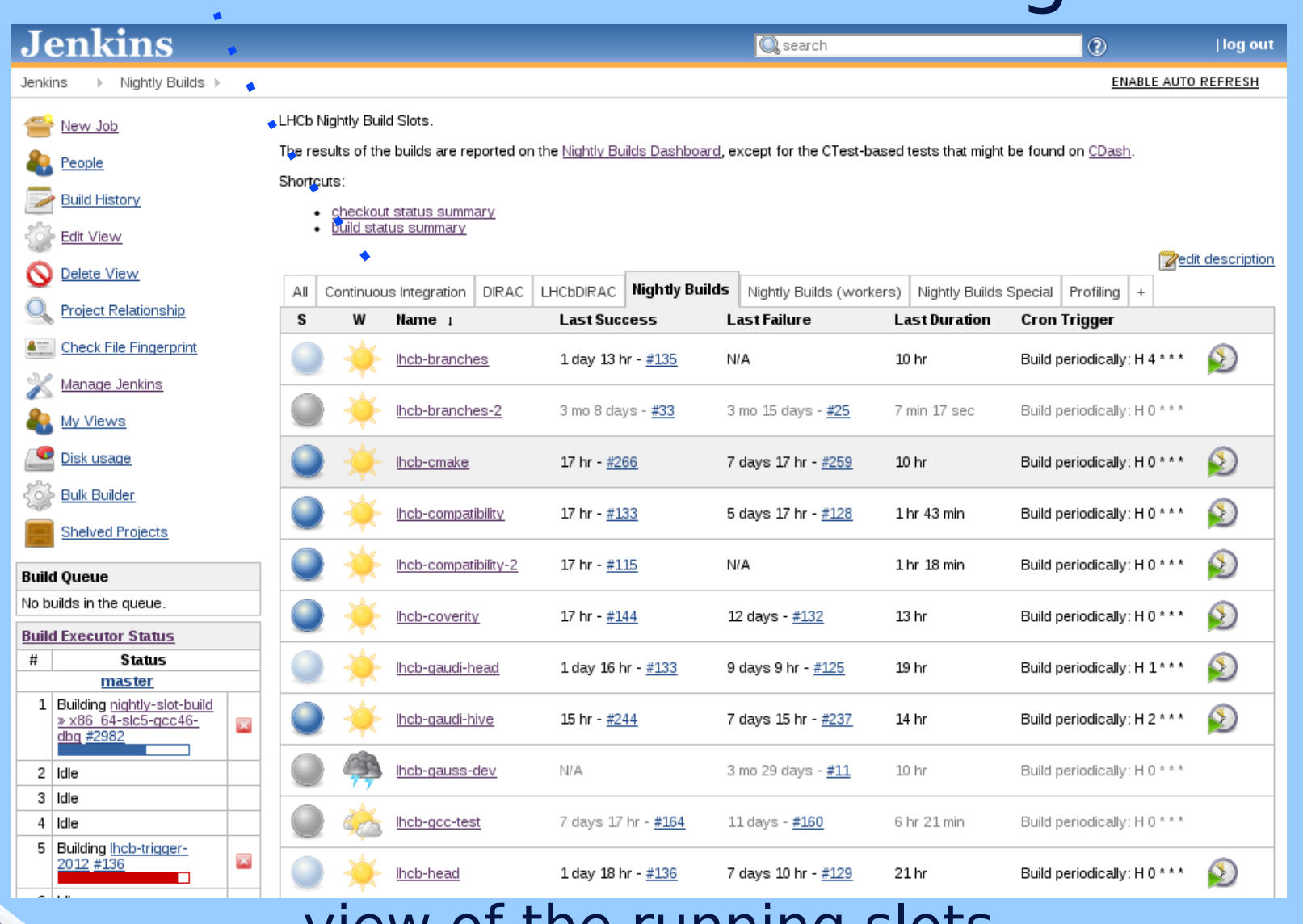
apache CouchDB relax
http://couchdb.apache.org/
scalable document database with map/reduce and embedded HTTP server

Scheduling Builds and Tests

Jenkins as a scheduler:

- trigger builds regularly or on demand
- chain of generic Jenkins jobs
- stand-alone scripts for the different tasks





Jenkins | search | log out
Jenkins › Nightly Builds › ENABLE AUTO REFRESH

New Job
People
Build History
Edit View
Delete View
Project Relationship
Check File Fingerprint
Manage Jenkins
My Views
Disk usage
Bulk Builder
Shelved Projects

LHCb Nightly Build Slots.

The results of the builds are reported on the Nightly Builds Dashboard, except for the CTest-based tests that might be found on CDash.

Shortcuts:

- checkout status summary
- build status summary

edit description

All | Continuous Integration | DIRAC | LHCbDIRAC | Nightly Builds | Nightly Builds (workers) | Nightly Builds Special | Profiling | +

S	W	Name ↓	Last Success	Last Failure	Last Duration	Cron Trigger
		lhcb-branches	1 day 13 hr - #135	N/A	10 hr	Build periodically: H 4 * * *
		lhcb-branches-2	3 mo 8 days - #33	3 mo 15 days - #25	7 min 17 sec	Build periodically: H 0 * * *
		lhcb-cmake	17 hr - #266	7 days 17 hr - #259	10 hr	Build periodically: H 0 * * *
		lhcb-compatibility	17 hr - #133	5 days 17 hr - #128	1 hr 43 min	Build periodically: H 0 * * *
		lhcb-compatibility-2	17 hr - #115	N/A	1 hr 18 min	Build periodically: H 0 * * *
		lhcb-coverity	17 hr - #144	12 days - #132	13 hr	Build periodically: H 0 * * *
		lhcb-gaudi-head	1 day 16 hr - #133	9 days 9 hr - #125	19 hr	Build periodically: H 1 * * *
		lhcb-gaudi-hive	15 hr - #244	7 days 15 hr - #237	14 hr	Build periodically: H 2 * * *
		lhcb-gauss-dev	N/A	3 mo 29 days - #11	10 hr	Build periodically: H 0 * * *
		lhcb-gcc-test	7 days 17 hr - #164	11 days - #160	6 hr 21 min	Build periodically: H 0 * * *
		lhcb-head	1 day 18 hr - #136	7 days 10 hr - #129	21 hr	Build periodically: H 0 * * *

Build Queue
No builds in the queue.

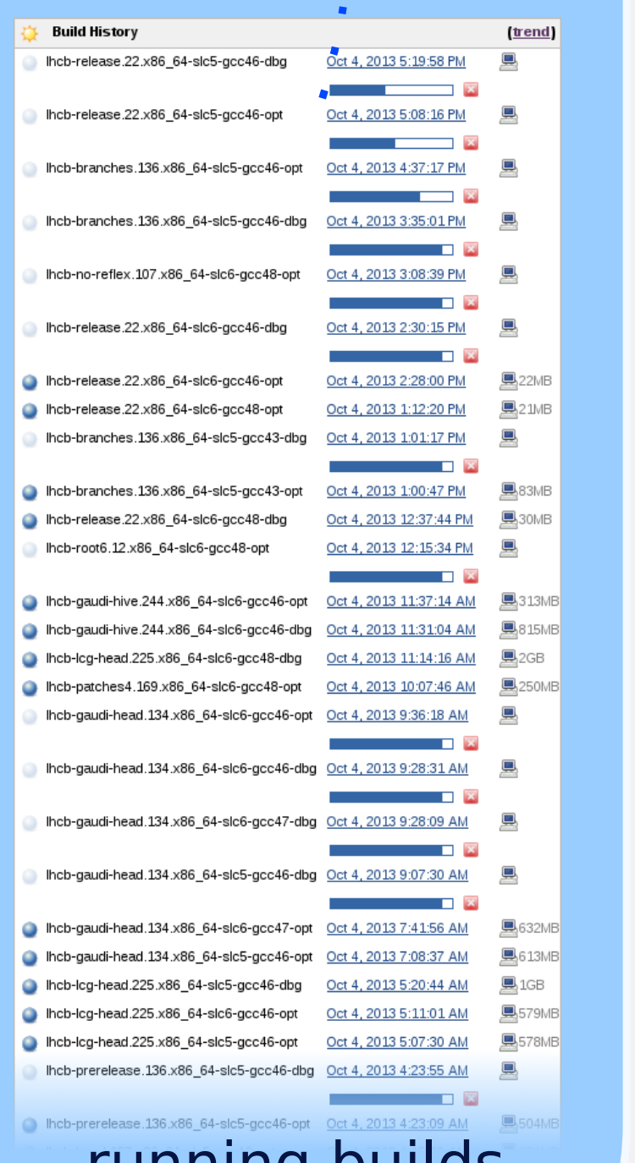
Build Executor Status

#	Status
	master
1	Building nightly-slot-build » x86_64-slc5-gcc46-dbg #2982
2	Idle
3	Idle
4	Idle
5	Building lhcb-trigger-2012 #136

view of the running slots

The new system can be used to prepare packages ready for the deployment.

The Jenkins server is used also for the integration test of other projects (e.g. DIRAC and LHCbDIRAC).



Build History (trend)

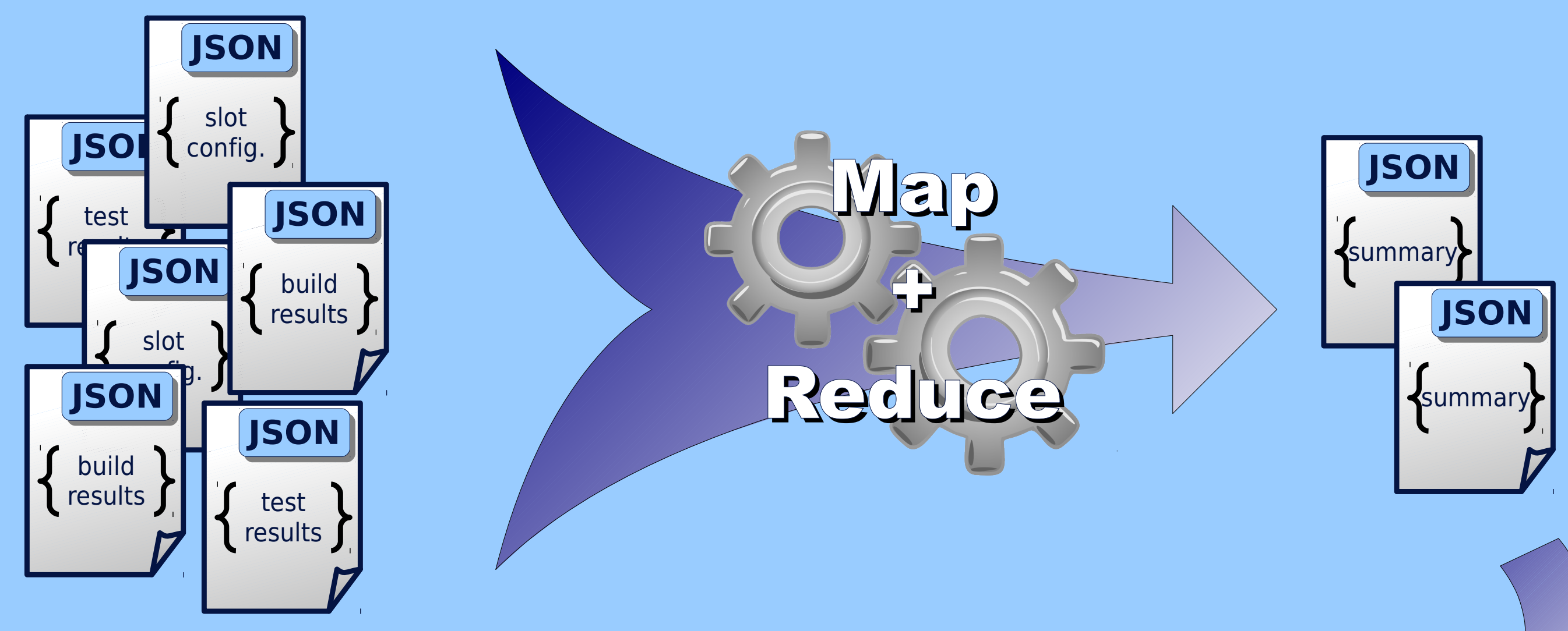
lhcb-release.22.x86_64-slc5-gcc46-dbg	Oct 4, 2013 5:19:58 PM	
lhcb-release.22.x86_64-slc5-gcc46-opt	Oct 4, 2013 5:08:16 PM	
lhcb-branches.136.x86_64-slc5-gcc46-opt	Oct 4, 2013 4:37:17 PM	
lhcb-branches.136.x86_64-slc5-gcc46-dbg	Oct 4, 2013 3:35:01 PM	
lhcb-no-reflex.107.x86_64-slc6-gcc48-opt	Oct 4, 2013 3:08:39 PM	
lhcb-release.22.x86_64-slc6-gcc46-dbg	Oct 4, 2013 2:30:15 PM	
lhcb-release.22.x86_64-slc6-gcc46-opt	Oct 4, 2013 2:28:00 PM	22MB
lhcb-release.22.x86_64-slc6-gcc48-opt	Oct 4, 2013 1:12:20 PM	21MB
lhcb-branches.136.x86_64-slc5-gcc43-dbg	Oct 4, 2013 1:01:17 PM	
lhcb-branches.136.x86_64-slc5-gcc43-opt	Oct 4, 2013 1:00:47 PM	83MB
lhcb-release.22.x86_64-slc6-gcc48-dbg	Oct 4, 2013 12:37:44 PM	30MB
lhcb-root6.12.x86_64-slc6-gcc48-opt	Oct 4, 2013 12:15:34 PM	
lhcb-gaudi-hive.244.x86_64-slc6-gcc46-opt	Oct 4, 2013 11:37:14 AM	313MB
lhcb-gaudi-hive.244.x86_64-slc6-gcc46-dbg	Oct 4, 2013 11:31:04 AM	815MB
lhcb-lcg-head.225.x86_64-slc6-gcc48-dbg	Oct 4, 2013 11:14:16 AM	2GB
lhcb-patches4.169.x86_64-slc6-gcc48-opt	Oct 4, 2013 10:07:46 AM	250MB
lhcb-gaudi-head.134.x86_64-slc6-gcc46-opt	Oct 4, 2013 9:36:18 AM	
lhcb-gaudi-head.134.x86_64-slc6-gcc46-dbg	Oct 4, 2013 9:28:31 AM	
lhcb-gaudi-head.134.x86_64-slc6-gcc47-dbg	Oct 4, 2013 9:28:09 AM	
lhcb-gaudi-head.134.x86_64-slc5-gcc46-dbg	Oct 4, 2013 9:07:30 AM	
lhcb-gaudi-head.134.x86_64-slc6-gcc47-opt	Oct 4, 2013 7:41:56 AM	632MB
lhcb-gaudi-head.134.x86_64-slc5-gcc46-opt	Oct 4, 2013 7:08:37 AM	613MB
lhcb-lcg-head.225.x86_64-slc5-gcc46-dbg	Oct 4, 2013 5:20:44 AM	1GB
lhcb-lcg-head.225.x86_64-slc6-gcc46-opt	Oct 4, 2013 5:11:01 AM	579MB
lhcb-lcg-head.225.x86_64-slc5-gcc46-opt	Oct 4, 2013 5:07:30 AM	578MB
lhcb-prerelease.136.x86_64-slc5-gcc46-dbg	Oct 4, 2013 4:23:55 AM	
lhcb-prerelease.136.x86_64-slc5-gcc46-opt	Oct 4, 2013 4:23:09 AM	504MB

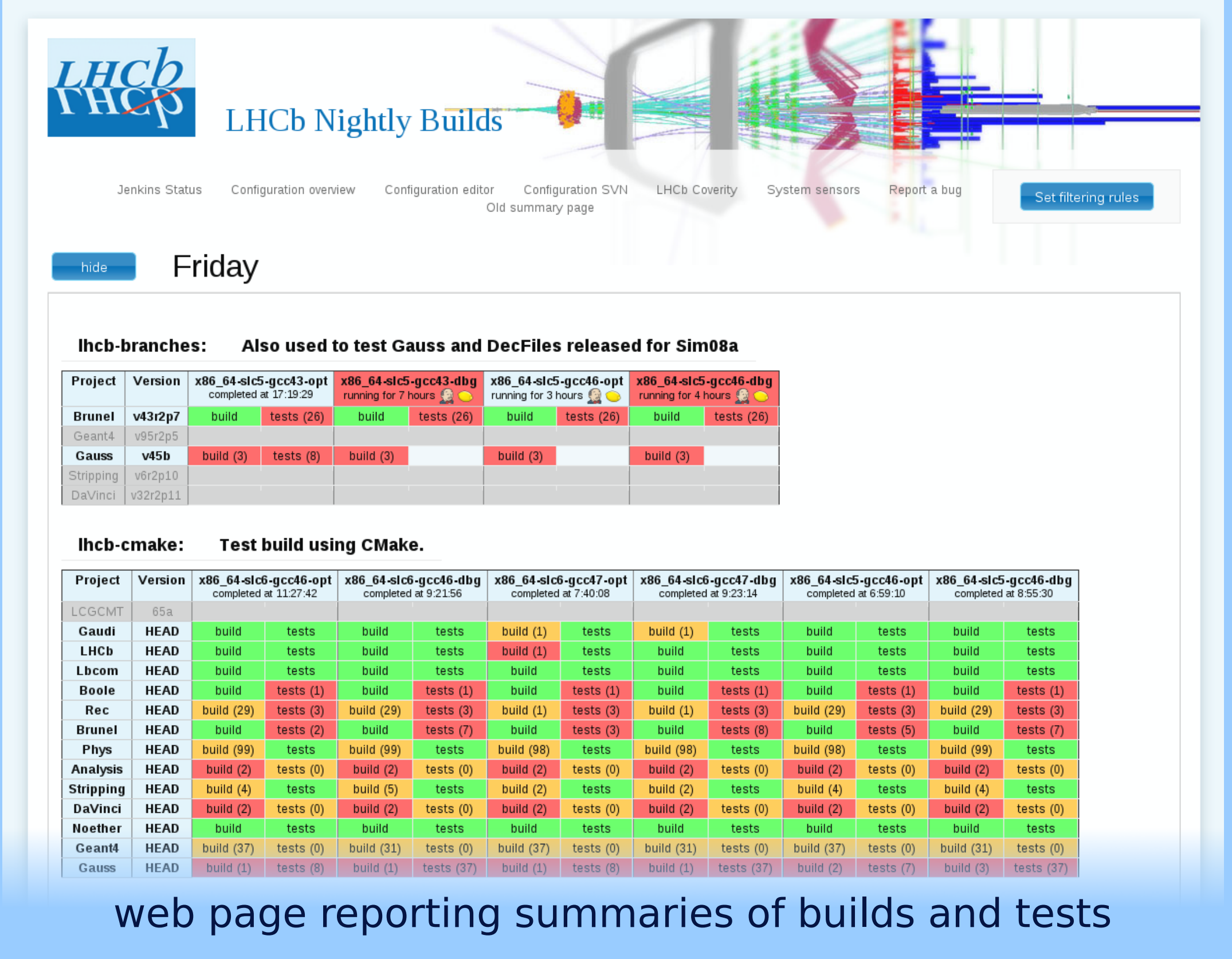
running builds

Dashboard

CouchDB Application:

- details and status of builds and tests stored as JSON documents
- map-reduce algorithms to extract and digest the informations
- HTML + jQuery + JSON, served from CouchDB





LHCb Nightly Builds

Jenkins Status | Configuration overview | Configuration editor | Configuration SVN | LHCb Coverity | System sensors | Report a bug | Old summary page | Set filtering rules

hide Friday

lhcb-branches: **Also used to test Gauss and DecFiles released for Sim08a**

Project	Version	x86_64-slc5-gcc43-opt completed at 17:19:29		x86_64-slc5-gcc43-dbg running for 7 hours		x86_64-slc6-gcc46-opt running for 3 hours		x86_64-slc5-gcc46-dbg running for 4 hours	
Brunel	v43r2p7	build	tests (26)	build	tests (26)	build	tests (26)	build	tests (26)
Geant4	v95r2p5								
Gauss	v45b	build (3)	tests (8)	build (3)		build (3)		build (3)	
Stripping	v6r2p10								
DaVinci	v32r2p11								

lhcb-cmake: **Test build using CMake.**

Project	Version	x86_64-slc6-gcc46-opt completed at 11:27:42		x86_64-slc6-gcc46-dbg completed at 9:21:56		x86_64-slc6-gcc47-opt completed at 7:40:08		x86_64-slc6-gcc47-dbg completed at 9:23:14		x86_64-slc5-gcc46-opt completed at 6:59:10		x86_64-slc5-gcc46-dbg completed at 8:55:30	
LCGCMT	65a												
Gaudi	HEAD	build	tests	build	tests	build (1)	tests	build (1)	tests	build	tests	build	tests
LHCb	HEAD	build	tests	build	tests	build (1)	tests	build	tests	build	tests	build	tests
Lbcom	HEAD	build	tests	build	tests	build	tests	build	tests	build	tests	build	tests
Boole	HEAD	build	tests (1)	build	tests (1)	build	tests (1)	build	tests (1)	build	tests (1)	build	tests (1)
Rec	HEAD	build (29)	tests (3)	build (29)	tests (3)	build (1)	tests (3)	build (1)	tests (3)	build (29)	tests (3)	build (29)	tests (3)
Brunel	HEAD	build	tests (2)	build	tests (7)	build	tests (3)	build	tests (8)	build	tests (5)	build	tests (7)
Phys	HEAD	build (99)	tests	build (99)	tests	build (98)	tests	build (98)	tests	build (98)	tests	build (99)	tests
Analysis	HEAD	build (2)	tests (0)	build (2)	tests (0)	build (2)	tests (0)	build (2)	tests (0)	build (2)	tests (0)	build (2)	tests (0)
Stripping	HEAD	build (4)	tests	build (5)	tests	build (2)	tests	build (2)	tests	build (4)	tests	build (4)	tests
DaVinci	HEAD	build (2)	tests (0)	build (2)	tests (0)	build (2)	tests (0)	build (2)	tests (0)	build (2)	tests (0)	build (2)	tests (0)
Noether	HEAD	build	tests	build	tests	build	tests	build	tests	build	tests	build	tests
Geant4	HEAD	build (37)	tests (0)	build (31)	tests (0)	build (37)	tests (0)	build (31)	tests (0)	build (37)	tests (0)	build (31)	tests (0)
Gauss	HEAD	build (1)	tests (8)	build (1)	tests (37)	build (1)	tests (8)	build (1)	tests (37)	build (2)	tests (7)	build (3)	tests (37)

web page reporting summaries of builds and tests

Apache is used as reverse proxy for security and performance.

More applications using the database are under development (RSS, stats., ...).

Summary and Considerations

The Nightly Build System we set up is based on widely available open source tools and can be easily adapted to other projects with the same requirements as LHCb.

Jenkins proved to be extremely easy to use for *standard* projects, but a lot of work was required to accommodate the LHCb requirements using only existing plugins. The development of a custom plugin would make the configuration of Jenkins straight forward and we may decide to work on it for a future version.

The implementation of the CouchDB database for the Nightly Builds Dashboard was trivial (including the development of the required map+reduce functions). What took most of the time was the development of the web interface, mainly because hosting the web application on CouchDB requires that any change must be deployed to a development instance of the database to be tested.