



SPI

Software Process & Infrastructure

Project Status

<http://spi.cern.ch>

Application Area Review – 18 Sep 2006

Presentation Outline



- **SPI Services in LCG Phase II**
 - Evolution of resources
 - Overview of the SPI services
- **SPI Services: status and plans**
 - Ext. Software
 - Savannah
 - Build and Release
 - Testing and QA
 - Documentation and Training
 - New since last review
- **Summary**



SPI Services in LCG Phase II



- **Shift emphasis to servicing experiments more than AA projects**
 - What is needed, what can be improved
- **Participation from people in experiments (and projects)**
 - SPI provides a “frame” to do complex work
 - Guidelines, AFS space, web space for docs, ...
- **Coping with strong (50%) reduction of resources**
 - Optimization opportunities
 - Further optimization and automation of procedures
 - “Outsourcing” of some activities
 - Installation of specific packages (e.g. Castor)
 - Needs some initial work to (semi-)automate some activities



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Evolution of Resources



Services 2005	Responsible	%	FTE
External software, installation and distrib.	E.Poinsignon	75	5
Savannah service, bug and devel. portal	Y.Perrin	100	
LCG Librarian, Build and Configuration	A.Pfeiffer	70	
Documentation, Workbook, Policies, Web	A.Aimar	70	
Build tools, Software Distribution	Y.Patois (EGEE 4/04)	100	
QA reports and Testing Frameworks	J.Benard (EGEE 8/04)	100	
Services 2006	Responsible	%	
External software on linux/mac, RELAX	S.Roiser	20	
External software on Windows, ROOT	B.Bellenot	20	
Savannah service, bug and devel. portal	Y.Perrin	100	
QA reports and Testing Frameworks	M.Gallas	20	
LCG Librarian, Build/Conf.mgt., HyperNews, Documentation, Workbook, Policies, Web	A.Pfeiffer	70	



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SPI Services Overview



- **External Software**
 - Products from general OS community, HEP, IT, ...
- **Savannah Project Portal**
 - <http://savannah.cern.ch>
- **Build and Distribution**
 - LCG Software configuration management
 - Builds and releases
 - Software Distribution
- **Quality Assurance Service**
 - Testing frameworks
 - QA checklists and reports
- **Documentation and Training**
 - Development of LCG policies, templates
 - Code Documentation (doxygen, lxr)
 - Documentation and LCG Workbook



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External Software Service

Follow-ups of the 2005 Review
Status and new developments
Planned next improvements

Follow-ups on the 2005 review



- **Recommendations from the review:**
 - Document procedures for the selection (and lifetime) of supported packages
 - Provide “development” installations for “not-yet supported” platforms/compilers
 - Provide rules/guidelines for the installation of “unsupported” packages
 - Document support commitment for above categories rather than rely on different AFS trees to distinguish
 - Establish collaborative mechanisms with other LCG areas, especially Grid Deployment
- **Resulting actions**
 - **Created Web and Wiki pages for installation guidelines and responsible persons**
 - **Build development installations for new platforms (e.g. for osx104_ppc_gcc401)**
 - **Contacts with Grid Deployment have been established (mainly through POOL team, SPI following evolution of gLite)**



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News of the external software service



- **Windows expert available**
 - Significantly improved turn-around times in case of problems
- **Added License information for packages in use**
 - In web documentation
- **Allocation for AFS space now through web page**
 - Allows “external” people to allocate space
 - Restricted to authorized users
- **Prototype for post-build processing through web page**
 - Allows project librarians to control the full chain
 - Deployment scheduled for end Sep 2006



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External packages

- Instantiating new “model” of dealing with externals
 - Installation of three packages “outsourced” to domain experts
 - POOL Team: Database related: Oracle
 - Lorenzo: Math related: GSL
 - Other teams: Grid related: LFC, Castor, GFAL
- O(35) other packages maintained by SPI team
 - Manuel: Q/A (doxygen, CppUnit, Qmtest, valgrind)
 - Stefan: remaining packages
 - Not many needed upgrade in 2005/6
 - Mainly for porting to Mac OS X 10.4
- Some packages still need porting to windows and/or mac platforms
 - E.g. Castor-2, globusrls, ...



Platforms for external packages

- New record of number of supported platforms: 12 !
 - - slc3_ia32_gcc323 slc3_ia32_gcc323_dbg
 - - slc3_ia32_gcc344 slc3_ia32_gcc344_dbg
 - - slc3_amd64_gcc344 slc3_amd64_gcc344_dbg
 - - slc4_ia32_gcc345 slc4_ia32_gcc345_dbg
 - - slc4_amd64_gcc345 slc4_amd64_gcc345_dbg
 - - win32_vc71_dbg
 - - (osx104_ppc_gcc401)
- Space occupied for *one* configuration (all platforms): 20 GB (LCG_46e)



Evolution of configurations

- “Configuration”: LCG AA projects and their external dependencies

Configuration	LCG_40a	LCG_46e
Released on	Jan 2006	Aug 2006
# projects	5	5
# externals	35	39
# externals changed (new or new versions)	-	18 (6 new, 2 dropped)
Volume size (in GB, all platforms)	15.2	20.8



Windows issues

- **MSI (Microsoft Installer) issues**
 - More and more packages are distributed in MSI format
 - i.e. Python
 - Very nice as long as it has to be installed in a MS world.
 - But we need to install binaries on AFS
 - Sometimes not possible to choose to install elsewhere than in a local computer path
 - Installer looking for dependencies inside registry
 - i.e. win32 extensions for Python – hard to “hack”
 - Also writes settings directly in registry
- **Runtime libraries**
 - MySQL binaries for Windows use static runtime libraries
 - Not compatible with dynamic runtime libraries used by ROOT



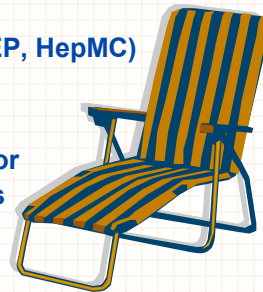
ROOT builds and installations

- Now done by Bertrand (ROOT librarian)
- ROOT builds now also available on all platforms in debug version
 - Full builds, no symbolic links anymore
- Complex build (lots of configure options: several dependent packages)
- 12 “platforms” in total
 - Including _dbg
- Some dependencies are still missing for a some platforms
 - Castor, globusrls for windows, slc3*_gcc344, osx



RELAX

- A collection of Reflex dictionaries for libraries of external packages
- Reasons for producing RELAX dictionaries
 - For “external” packages we have no control of (e.g. Qt, Boost)
 - Complementing ROOT dictionaries (e.g. stl containers of types)
 - Regenerate/rebuild ROOT (CINT) dictionaries (e.g. for (CO)RAL)
 - Other HEP projects (e.g. Geant4, CLHEP, HepMC)
 - Reducing the dependencies for ROOT
- “Build on demand”
 - Users request dictionary information for
 - new classes of existing dictionaries
 - new dictionary libraries
 - Usually built with the next release



RELAX (ctd.)

- **All LCG AA platforms supported**
 - Plus Mac OSX 10.4
- **Dictionaries contain abilities for auto-loading**
 - Rootmap files (one per library)
 - SEAL Plugin capabilities
- **Releases**
 - First version (0.1.0) built in March 2006
 - Presently version 1.1.2
 - Contains dictionaries for 500 classes in 7 libraries
- **URL - Wiki page contains**
 - General release info
 - Detailed class information of generated dictionaries
 - <http://twiki.cern.ch/twiki/bin/view/LCG/RELAX>



External Software Service: Planned next improvements

- **Contact authors (mainly IT teams) to ensure all missing platforms are built for “outsourced” packages (and their dependencies)**
 - Castor, GFAL
 - Oracle (through POOL team)
 - ...
- **Automate further the building of externals to allow more of the work done by the experts (through the web pages)**
 - Needs some more work to allow easy modifications of XML files through web browser.
- **Finish work on documentation on responsible people, lifetime and procedures**
 - Also finish docs on license for each package (requested by CMS)





Savannah Project Portal

Follow-ups of the 2005 Review Status and issues Next improvements

Follow-ups on the 2005 review



- **Recommendations from the review:**
 - Create user forum (possibly mailing list) to facilitate the exchange of ideas and experience
 - Converge on means of encouraging end-user logging into Savannah
 - Productize and distribute utilities for bulk submission or migration of bugs
 - Productize and distribute utilities for retrieval and analysis of tracker data for reports, statistics etc
 - Encourage, support and facilitate adoption by Geant4 and ROOT.
- **Resulting actions**
 - **User discussion forum is planned to use HyperNews system**
 - **Bulk submission is very specific, needs to be done on a case by case basis**
 - **Export facility available since fall 2005**
 - **ROOT now has a Savannah portal for bugs**
 - since 22 Jun 2005 (623 bug reports so far, ca. 10/week)



User Forum

- **“Facilitate the exchange of ideas and experience with savannah”**
 - Use the support tracker for ideas and the like
 - Use the “cookbook” feature for “recipes”
 - For communication, use HyperNews system
 - Instance will be set up and forum will be added
 - Needs decision on scope of instance (SPI, AA, ??)
 - and some free resources
 - Use savannah for bugs, tasks and feature requests
 - :-)



The Tracker(s) Export function

- **Enables project members to collect all the information related to tracker items of their choice**
 - Without needing to access and understand the savannah database
 - Produces an xml file (plus the related xml schema file)
 - Available for all the trackers (bugs, tasks, support, patches)
 - Includes the dependencies between items (even across trackers - e.g. bugs and patches)
 - Uses the same interface query forms as the ‘browse’ to retrieve the selection criteria
 - Processed offline (too heavy for online) after submitting a request



The Cookbook

- Enables project members to build structured series of 'how to's related to the use of savannah by their project
 - Uses the common savannah tracker engine and therefore:
 - Items submitted via the usual tracker item submission form
 - Items inherit the tracker field parameterization
 - The cookbook is configurable by project admins (activation/deactivation, notifications, fields, etc)
- For management:*
- Items can be browsed and viewed as in any tracker
- For user consultation:*
- Can be viewed as user guide pages
 - Inherit the basic savannah how to's to get started



Other Consolidation

- 76 Bugs fixed
- 70 Support requests handled
- Other New features implemented:
 - Additional tracker browsing criteria
 - e.g.modified/unmodified since ...
 - Browsing filters are now per tracker
 - Voting system
 - 'Returned Notification Mail' handler



'Returned Notification' Handler

- **Every day tens of notifications do not reach the intended recipients**
 - Nobody knew about it.
- **A perl script has been developed to:**
 - **Analyze the savannah returned mails and identify:**
 - Context of the original mail (e.g. item subm/comment, cc)
 - Reason for which it was rejected (e.g. erroneous address, posting restrictions, etc)
 - Persons who ought to know about the rejection (e.g. project admins, person who added the cc, etc)
 - Attempts to make 'intelligent' suggestions
 - Send a report to the relevant persons
- **In operation since early August 2006**
 - runs as a cronjob every 15 min



SPAM to projects in savannah

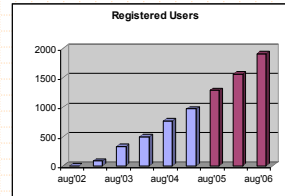
- Fortunately remains at low level for now (~3/month)**
- Went through the private item 'restricted posting' fence
- so:**
- Added code to block 'wild' posting to private items (wild = posting without fetching the form first)
- For now:**
- Restrict submission to members/reg'ed users (if you can afford it)
 - Set spammed items to 'private' (if you can afford it)
 - Mail me (Yves) so that I edit the offending comment in the database
- Later:**
- Once identified, spams will be automatically masked & won't generate notifications (november '06)
 - Interface to validate submissions through spam checkers (e.g. SpamAssassin, Razor) as a customizable option



Status (users and projects)

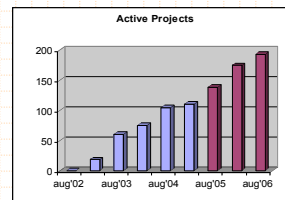
1944 users

- 1083 at last review
- + 80%



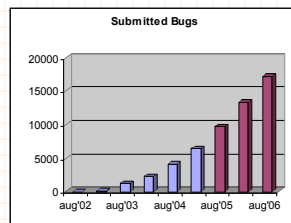
196 projects

- 122 at last review
- + 60 %

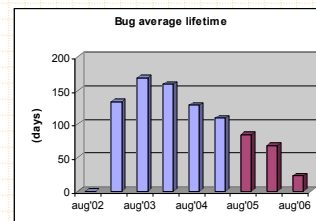
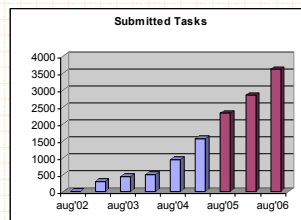


Status (project activity)

- **17819** submitted bugs



- **3539** submitted tasks



- **bug average lifetime**



Planned next improvements



- **Security and spam issues**
- **Ease of use**
 - Complement what's missing in the savannah cookbook
 - Offer the option to preserve the comments format (e.g. indentation)
 - Fix reported inconsistencies
 - Control and handling of 'mandatory' fields
 - Impossibility to cancel automatic notification after one submitted a comment
- **Maintenance and future developments**
 - Write internal documentation
 - Clean/rewrite, document the code where necessary
- **Improve savannah according to the LCG community needs (e.g.**
 - Extend the 'export' to the News handler
- **Stay in line with the open source**



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Build and Distribution

Follow-ups of the 2005 Review
Building the LCG AA projects
Improvements in procedures
Planned work

Follow-ups on the 2005 review



- **Recommendations from the review:**

- Clarify situation regarding config/make plans
- Support LCGCMT and SCRAM configuration files following tool evolution; this is especially urgent for SCRAM version 1, which has been released and adopted by CMS
- Minimize package dependencies and distinguish between intrinsic package dependencies (packages required to compile/link) and tool dependencies (packages required for e.g. testing)
- Provide different types of distributions for different needs; use LIM meeting to address requirements such as distribution granularity, build types etc
- Address LCG deployment needs
- Encourage adoption by experiments of SPI build/install/distribution scripts, tools, services; package for easy use by experiments
- Ensure representation of AA in certification discussions: Linux certification, deployment of alternative compiler etc



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Follow-ups on the 2005 review (II)



- **Resulting actions**

- **Plans to use config/make were stopped as the configuration management would introduce a significant overhead**
- **LCGCMT and scram configurations are both supported on an equivalent level**
- **Following discussions in the LIM, more granular distributions (separate src, doc, platform-binaries) were made available (since March)**
- **No special requests received from LCG deployment team**
- **AA is represented by A.Pfeiffer in the Linux certification meeting**



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Information about the configurations

- Information about the configuration of a LCG AA project and its dependencies available on the web
 - <http://spi.cern.ch/config/viewConfig.html>
 - Also for whole configurations
 - Web page still needs manual updates for new configurations
- Information about the status of directories/builds of LCG AA projects/configurations available on the web
 - <http://lcgapp.cern.ch/cgi-bin/spi/checkConfiguration.py>
 - Full matrix of packages vs. platforms available



Check of Status (LCG_46e)

Configuration and Installation Info

http://spi.cern.ch/cgi-bin/spi/checkConfig.py?platform=all&projVers=lcgaa-46e&projVers2=1

LCG Computing Grid - LCG App Area - SPI Home

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Updated 12-Nov-2004 16:26

Configuration of LCG software: LCG_46e

Package: lcgaa

Version: 46e

Platform: all

Listing of configuration for LCG_46e at: Fri Sep 15 11:23:40 2006

total size of volumes: 0 KB, 0.0 MB, 0.0 GB

package	version	slc2_ix32_gcc323	win32_vc71	slc4_ix32_gcc344	slc4_amd64_gcc344	slc4_ix32_gcc345	slc4_amd64_gcc345	msx64_gcc_gcc401
1	COOL	COOL_1_3_2c	OK	OK	OK	NOT OK	OK	NOT OK
2	GDAL	GDAL_1_5_3	OK	OK	OK	OK	OK	NOT OK
3	PODL	PODL_2_4_8	OK	OK	OK	OK	OK	NOT OK
4	RELAX	RELAX_1_1_2	OK	OK	OK	OK	OK	NOT OK
5	SEAL	SEAL_1_8_1	OK	OK	OK	OK	OK	NOT OK
6	Boost	1.33.1	OK	OK	OK	OK	OK	OK
7	Clang	1.8.3	OK	NA	OK	OK	OK	NA
8	CopSint	1.10.2_g2	OK	OK	OK	OK	OK	OK
9	GLS	1.6	OK	OK	OK	OK	OK	OK
10	HEPMT	1.29	OK	OK	OK	OK	OK	OK
11	HEPPOF	2.02.02	OK	OK	OK	OK	OK	OK
12	XercesC	2.7.0	OK	OK	OK	OK	OK	OK
13	aida	3.2.1	OK	OK	OK	OK	OK	OK
14	ijam	3.1.10	OK	OK	OK	OK	OK	OK
15	padis	1.0.2	OK	OK	OK	OK	OK	OK
16	passio	2.1.0-7	OK	NA	NOT OK	NOT OK	OK	NA
17	cpgeosop	2.6-1.9	OK	NA	NOT OK	NOT OK	NOT OK	NA



Building the projects

- **Presently using SCRAM V0 to build projects**
 - Except SEAL on Windows: uses CMT
- **SCRAM V0 no longer supported/maintained**
 - CMS moved to V1 around time of last review
 - LCG AA projects did not have resources to move
- **SCRAM V1 future maintenance unclear**
 - Discussed with CMS
- **Proposed alternative: move to build LCG AA projects with CMT**
 - CMS uses project s/w as “external”
 - Only one configuration to maintain for SPI (LCGCMT)
 - Projects agree
 - Planned timescale for move: Q4/2006



Automated Post-build procedure

- **Prototype of automated post-build procedure available**
 - Request through (simple) web page
 - Similar to AFS space allocation
 - Restricted to authorized users
 - Feedback through mail to requestor
 - Contains pointer to web page with log file
 - Scheduled to deploy end September



Granular tarballs for distribution



- **Granular tar balls for projects are now available**
 - One binary (+includes) for each platform
 - One src tarball
 - One doc tarball (doc, config, other)
- **Significant reduction in space**
 - E.g. POOL 2.4.6:
 - doc - 1.5MB
 - src - 2.2 MB
 - slc3_ia32_gcc323 - 6.1 MB



Build and Distribution: Planned work



- **Consolidate automated post-build procedure**
 - Deploy as scheduled
 - Add the temporary removed features back (gcov)
- **Try to offload project librarians for “rebuild-releases” (*)**
 - **Attempt to increase speed of builds**
 - **TTU: time-to-user**
 - **Possible have to limit number of tests**
- **(*) definition of release types available at:**
<http://lcgapp.cern.ch/project/mgmt/AFMinutes20060309.html>





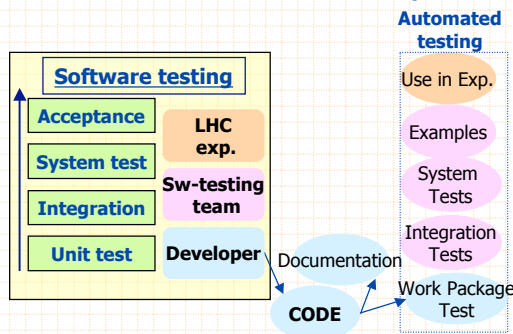
Software Testing and QA

Follow-ups of the 2005 Review
Status and new developments
Planned work

Software testing service



- Testing should be an integral part of the software development.
- Tests should be run and verified automatically as often as needed
 - development, release, QA, re-factoring, etc
- The service uses available open source tools



SPI provides:

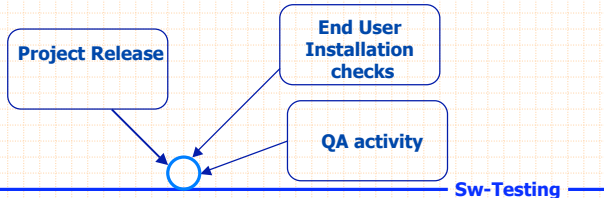
- Test frameworks
- Test support (user HowTo)
- Test policies & documentation

In use by:

- LCG App projects since 2002
- EGEE
- LHC experiments



Software testing service: framework view



Top layer

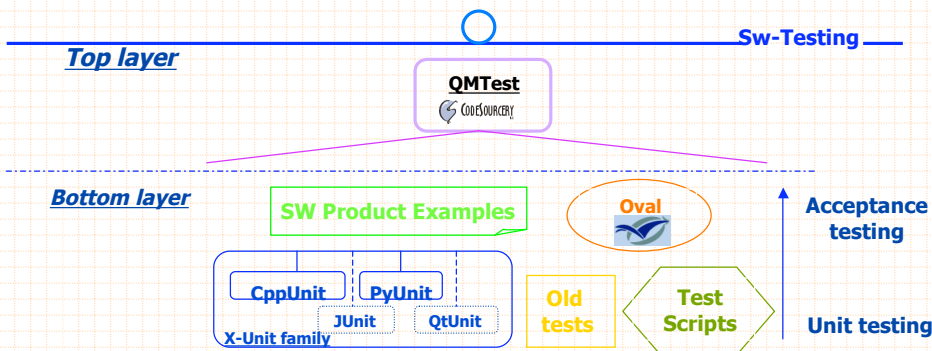
- Integrates different ways to test.
- Common environment to run the tests and to access the test results.



- Uses GUI for creating and running tests
 - also in batch
- Can run tests in parallel
 - supports execution of single test
 - Or many at once
 - Test-cases & test-suites
- Organizes tests hierarchically
- Records dependencies among tests



Software testing service: framework view



- Adaptable to the programming language and developer
- Prepared to be run in automatic way



Software testing service: news



- **CppUnit and QMTest latest versions available for all supported platforms**
 - All production and development platforms
- **QMTest design allows for user-extensions**
 - customize it to specific testing activities and domains
 - SPI has explored this and made available this possibility
- **SPI provides an extension example**
 - Compare the output of a test executable with respect to a log file
 - Only compare those lines with a given “tag”
- **Instructions of are provided**
 - how to create QMTest extensions and register them with the central QMTest installation



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Quality Assurance Service



- **GOAL: help projects to assess and improve the quality of their software and procedures:**
 - **Central QA checklist on each release of LCG AA projects:**
 - Statistics from savannah (bug/task/requests/patches tracker analyser, configurable trough web form)
 - Statistics on tests (number/type, failures reported by qmtest)
 - Test Code coverage (LTP lgcov +gcov)
 - Code Inventory (number of code lines, SLOC)
 - Documentation and Examples inventory
 - Automated procedure to generate reports
 - At every release
 - Published on the SPI web site
- **Evaluation and usage of external tools**
 - E.g. RuleChecker, Logiscope



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QA example (ROOT project)

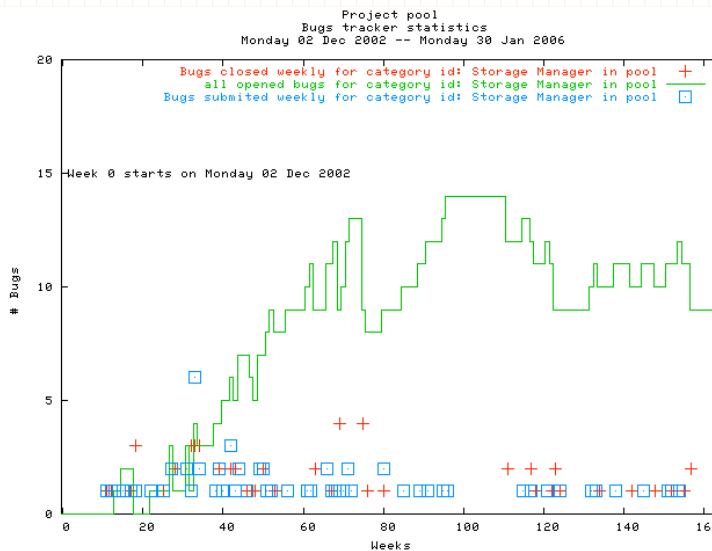
LTP GCOV extension - code coverage report

Current view: directory
 Test: lite_test_coverage_result_root_2005_05_31.info
 Date: 2005-05-31
 Code covered: 31.2 %
 Instrumented lines: 271892
 Executed lines: 84849

Directory name	Coverage	Executed lines	Total lines
asimage/src	3.3 %	91	2790 lines
base/src	43.4 %	8011	18449 lines
build/rmkdepend	72.1 %	570	791 lines
cint/lib/gcc3strm	11.3 %	6	53 lines
cint/main	100.0 %	2	2 lines
cint/src	44.8 %	20943	46737 lines
clib/src	6.7 %	210	3154 lines
cont/src	57.4 %	3055	5324 lines
g3d/src	3.0 %	129	4370 lines
geom/src	27.5 %	5936	21579 lines
gpad/src	21.0 %	1364	6495 lines
graf/src	17.6 %	2375	13488 lines
gui/src	18.2 %	4075	22386 lines
hist/src	15.3 %	3348	21878 lines
histpainter/src	22.5 %	1680	7454 lines
html/src	9.1 %	2	2718 lines
include	38.8 %	3045	7852 lines
main/src	50.0 %	3	6 lines
matrix/src	32.5 %	6031	18540 lines
meta/src	67.9 %	3846	5666 lines



QA example (POOL project)





Documentation and Training

Follow-ups of the 2005 Review
Planned work

Follow-ups on the 2005 review



- **Recommendations from the review:**
 - As planned, include automated documentation building in release
 - Include cross-referencing between projects
 - Provide versioned documentation for external software, for instance CLHEP and AIDA, for which the API is important for the users
 - Training should become an SPI responsibility
 - The highly successful Python course must be continued and extended with examples from recent developments (e.g. Geant4 Python interface)
- **Resulting actions**
 - **PostBuild procedure includes building of doxygen and LXR**
 - **Cross-referencing between projects is established**
 - **Doxygen documentation build for each CLHEP, AIDA and ROOT release (manually so far)**
 - **Training issues not followed due to lack of resources**



Documentation: Planned work

- Consolidate Web and Wiki pages
- Create/update pages for lifetime, procedures and responsible persons for external packages
- Automate creation of Doxygen for HEP packages (CLHEP, Root, ...)



→ New since last review

- HyperNews discussion system
 - Request from experiments in fall 2005
 - Prototype set up in Oct 2005
 - In production since early 2006
 - Atlas, CMS first users, others starting “now”

LHC Computing Grid > LCG App Area > SPI Home

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SPI Quick Links

[SPI Home](#)
[SPI Index Page](#)

[SPI Workbook](#)
[SPI Wiki](#)

SPI Services Links

[LCG Workbook](#)
[Savannah Portal](#)
[External Software](#)
[Software Testing](#)

[Build servers](#)
Software Configuration

[Software Download](#)
Quality Assurance

Statistics for HyperNews installation as of Thu Sep 14 08:41:34

expt.	regUsers	fora	total msgs	maxMsgs	in forum
Alice	64	7	39	12	mooDiscussion
Atlas	934	82	8174	1184	Prelimbugs
CMS	978	91	33150	7741	pkgAnnounce
LHCb	50	10	256	101	core-soft
TOTEM	10	5	19	8	hnTest



Summary of planned work (I)



- **Consolidate ongoing work**
 - **Documentation, Web and Wiki pages**
 - **Lifetime, procedures and responsible persons for external packages**
 - **Further automate build of external packages**
 - **Such that experts of “outsourced” packages can easily use it**
 - **Consolidate automated post-build procedure**
 - **Add back missing features (gcov builds)**
 - **Improve information flow (feedback/results on web page)**
 - **Move to CMT as main configuration and build system**
 - **Only one configuration to maintain**



Summary of planned work (II)



- **Continue to improve Savannah and HyperNews services**
 - **SPAM control**
 - **In line with mainstream development**
- **Create HyperNews installation for SPI/AA**
 - **“Cross-link” users from experiment installations to easy navigation**
 - **no additional registration needed if you are already HN member in an experiment**
 - **Open to all existing HN users in experiments and LCG AA teams**
- **Try to offload project librarians for rebuild-releases**
 - **Attempt to increase speed (TTU: time-to-user)**



Summary



- **SPI moved from “project centric” to “experiment centric”**
 - Prepared for LCG Phase II
 - Had to cope with major reduction in resources
- **Worked to improve the services provided**
 - External software service
 - Build and distribution service
 - Q/A and Testing service
 - Savannah portal service
 - HyperNews service (new)
- **Concentrating on automating the services as far as possible**
 - Scripts run by cron-jobs
 - Web pages for “external” contributors



More information



- **SPI portal page:**
<http://spi.cern.ch>
- **SPI Wiki portal:**
<https://twiki.cern.ch/twiki/bin/view/SPI/WebHome>
- **Savannah:**
<http://savananh.cern.ch>
- **Testing and QA:**
<http://spi.cern.ch/testing> <http://spi.cern.ch/QA>
- **HyperNews:**
<https://hypernews.cern.ch>





Additional Slides

Other issues



- **Though not “strictly SPI”:**
 - **CERNLIB beyond 2007**
 - **Seems to be still in use**
 - **Only by the (Fortran based) generators ?**
 - **What are the experiments’ plans ?**



Recommendations of 2005 review (I)



- **External software**
 - Document procedures for the selection (and lifetime) of supported packages
 - Provide “development” installations for “not-yet supported” platforms/compilers
 - Provide rules/guidelines for the installation of “unsupported” packages
 - Document support commitment for above categories rather than rely on different AFS trees to distinguish
 - Establish collaborative mechanisms with other LCG areas, especially Grid Deployment
- **Bug tracking**
 - Create user forum (possibly mailing list) to facilitate the exchange of ideas and experience
 - Converge on means of encouraging end-user logging into Savannah
 - Productize and distribute utilities for bulk submission or migration of bugs
 - Productize and distribute utilities for retrieval and analysis of tracker data for reports, statistics etc
 - Encourage, support and facilitate adoption by Geant4 and ROOT.



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Recommendations of 2005 review (II)



- **Build and distribution**
 - Clarify situation regarding config/make plans
 - Support LCGCMT and SCRAM configuration files following tool evolution; this is especially urgent for SCRAM version 1, which has been released and adopted by CMS
 - Minimize package dependencies and distinguish between intrinsic package dependencies (packages required to compile/link) and tool dependencies (packages required for e.g. testing)
 - Provide different types of distributions for different needs; use LIM meeting to address requirements such as distribution granularity, build types etc
 - Address LCG deployment needs
 - Encourage adoption by experiments of SPI build/install/distribution scripts, tools, services; package for easy use by experiments
 - Ensure representation of AA in certification discussions: Linux certification, deployment of alternative compiler etc



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Recommendations of 2005 review (III)



- **Documentation**
 - As planned, include automated documentation building in release
 - Include cross-referencing between projects
 - Provide versioned documentation for external software, for instance CLHEP and AIDA, for which the API is important for the users
- **Training**
 - Training should become an SPI responsibility
 - The highly successful Python course must be continued and extended with examples from recent developments (e.g. Geant4 Python interface)

