

SPI

Software Process & Infrastructure

Quality Assurance (QA)

<http://spi.cern.ch/qa>

QA reports generation - 22 June 2005

Johanne BENARD

johanne.benard@cern.ch

Test coverage reports

- Basics
- Some examples
- Other utilities

Savannah Quality Assurance (QA) reports

- The web interface
- Capabilities
- Some examples

- **Aim at:**
 - Showing what **percentage** of an application has been executed by the test process,
 - Measuring **effectiveness** of a system test.
- **Two different principles in GCOV:**

Statement coverage analysis:

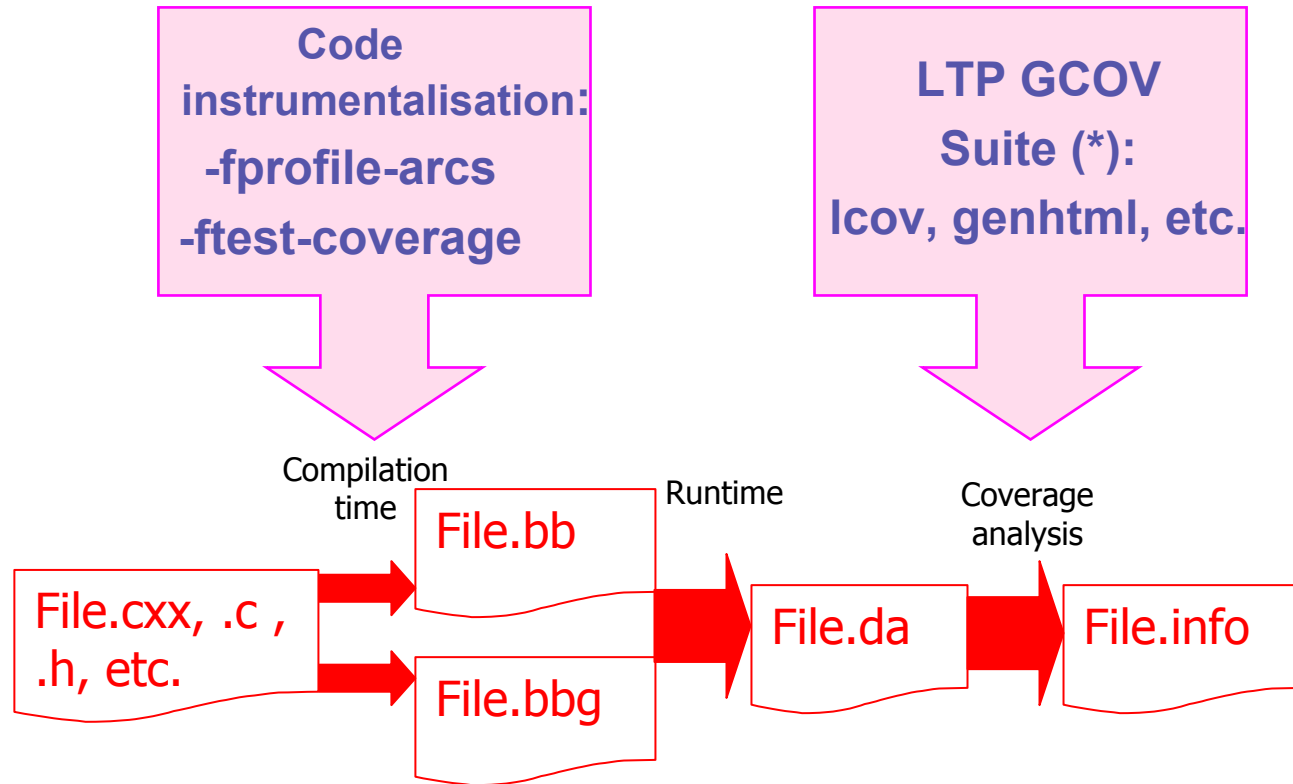
- Code break down into basic blocs,
- Block solicitations counting

Branch coverage analysis:

- Conditional possible paths
- Path usage frequency



Test coverage reports - Basics



(*) LTP: Linux Test Project

LCOV is an extension of GCOV, a GNU tool which provides information about what parts of a program are actually executed while running a particular test case.

Some examples - POOL

LTP GCOV extension - code coverage report

Current view: [directory](#)

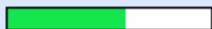











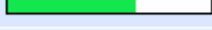
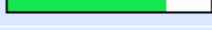
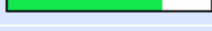
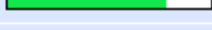

Test: [lite_test_coverage_POOL_2_0_4.info](#)

Date: 2005-04-19

Code covered: 49.5 %

Instrumented lines: 24986

Executed lines: 12368

Directory name	Coverage
AttributeList/AttributeList	 57.9 % 95 / 164 lines
AttributeList/src	 69.8 % 196 / 281 lines
AuthenticationService/src	 4.7 % 6 / 127 lines
Collection/Collection	 86.9 % 93 / 107 lines
Collection/src	 30.8 % 32 / 104 lines
CollectionBase/CollectionBase	 75.0 % 9 / 12 lines
CollectionBase/src	 36.7 % 117 / 319 lines
DataSvc/DataSvc	 73.9 % 105 / 142 lines
DataSvc/src	 83.8 % 1254 / 1496 lines
FileCatalog/FileCatalog	 55.1 % 118 / 214 lines
FileCatalog/src	 47.9 % 289 / 603 lines
ImplicitCollection/src	 51.9 % 55 / 106 lines
MultiCollection/MultiCollection	 62.7 % 32 / 51 lines
MultiCollection/src	 77.9 % 183 / 235 lines
MySQLCollection/src	 76.4 % 324 / 424 lines
MySQLltCollection/src	 78.1 % 495 / 634 lines
ObjectRelationalAccess/ObjectRelationalAccess	 77.1 % 37 / 48 lines

Some examples - POOL

LTP GCOV extension - code coverage report

Current view: [directory - A](#)
Test: [lite_test_cov](#)
Date: 2005-04-19
Code covered: 69.8 %

Files

- [AttributeList.cpp](#)
- [AttributeListSpecificat](#)
- [AttributePredefined](#)
- [AttributeSpecificat](#)
- [AttributeTypes.cpp](#)
- [AttributeValueConst](#)

```
79 : //// ----- FAST CONVERTERS -----
80 :
81 : #include <stdio>
82 : #include <stdlib>
83 :
84 : namespace pool
85 : {
86 :
87 : void str_to_mem_bool(const char *c, void *mem)
88 : {
89 :     930 : bool *m = reinterpret_cast<bool*>(mem);
90 :     930 : *m = (std::atoi(c) != 0);
91 : }
92 :
93 :
94 : void str_to_mem_char(const char *c, void *mem)
95 : {
96 :     0 : char *m = reinterpret_cast<char*>(mem);
97 :     0 : *m = *c;
98 : }
99 :
100 : void str_to_mem_unsigned_char(const char *c, void *mem)
101 : {
102 :     0 : unsigned char *m = reinterpret_cast<unsigned char*>(mem);
103 :     0 : *m = std::atoi(c);
104 : }
105 :
106 : void str_to_mem_short(const char *c, void *mem)
107 : {
108 :     3630 : short *m = reinterpret_cast<short*>(mem);
109 :     3630 : *m = std::atoi(c);
110 : }
111 :
112 : void str_to_mem_unsigned_short(const char *c, void *mem)
113 : {
114 :     1800 : unsigned short *m = reinterpret_cast<unsigned short*>(mem);
115 :     1800 : *m = std::atoi(c);
```



Some examples - CLHEP

LTP GCOV extension - code coverage report

Current view: [directory](#)

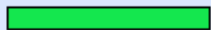










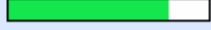





Test: [lite_CLHEP-1.9.2.0.info](#)

Date: 2005-05-26

Code covered: 68.3 %

Instrumented lines: 18780

Executed lines: 12832

Directory name	Coverage	
clhep_1920/1.9.2.0/CLHEP/Cast/src	 100.0 %	4 / 4 lines
clhep_1920/1.9.2.0/CLHEP/Evaluator/src	 72.7 %	501 / 689 lines
clhep_1920/1.9.2.0/CLHEP/Evaluator/test	 81.5 %	22 / 27 lines
clhep_1920/1.9.2.0/CLHEP/Exceptions/src	 74.3 %	136 / 183 lines
clhep_1920/1.9.2.0/CLHEP/Exceptions/test	 87.2 %	204 / 234 lines
clhep_1920/1.9.2.0/CLHEP/GenericFunctions/src	 23.0 %	155 / 675 lines
clhep_1920/1.9.2.0/CLHEP/GenericFunctions/test	 100.0 %	19 / 19 lines
clhep_1920/1.9.2.0/CLHEP/Geometry/src	 57.2 %	198 / 346 lines
clhep_1920/1.9.2.0/CLHEP/Geometry/test	 100.0 %	27 / 27 lines
clhep_1920/1.9.2.0/CLHEP/HepMC/src	 13.2 %	103 / 778 lines
clhep_1920/1.9.2.0/CLHEP/HepMC/test	 86.1 %	62 / 72 lines
clhep_1920/1.9.2.0/CLHEP/HepPDT/src	 80.0 %	798 / 998 lines
clhep_1920/1.9.2.0/CLHEP/HepPDT/test	 91.4 %	74 / 81 lines
clhep_1920/1.9.2.0/CLHEP/Matrix/src	 84.4 %	3179 / 3768 lines
clhep_1920/1.9.2.0/CLHEP/Matrix/test	 94.7 %	674 / 712 lines
clhep_1920/1.9.2.0/CLHEP/Random/src	 55.7 %	2757 / 4947 lines
clhep_1920/1.9.2.0/CLHEP/Random/test	 84.6 %	1652 / 1952 lines

Some examples - PI

LTP GCOV extension - code coverage report

Current view: [directory](#)

Test: [lite_test_coverage_PI_1_3_3.info](#)

Date: 2005-05-31

Code covered: 62.9 %

Instrumented lines: 18827

Executed lines: 11841

Directory name	Coverage
/build/jbenard/SEAL_1_6_3/src/Dictionary/Reflection/Reflection	20.0 %
/build/jbenard/SEAL_1_6_3/src/Dictionary/ReflectionBuilder/ReflectionBuilder	31.9 %
/build/jbenard/SEAL_1_6_3/src/Dictionary/Reflex/Reflex	16.8 %
/build/jbenard/SEAL_1_6_3/src/Dictionary/Reflex/Reflex/Builder	30.0 %
/build/jbenard/SEAL_1_6_3/src/Foundation/PluginManager/PluginManager	82.2 %
/build/jbenard/SEAL_1_6_3/src/Foundation/SealBase/SealBase	8.7 %
/build/jbenard/SEAL_1_6_3/src/Foundation/SealBase/SealBase/sysapi	0.0 %
/build/jbenard/SEAL_1_6_3/src/Foundation/SealUtil/SealUtil	0.0 %
/build/jbenard/SEAL_1_6_3/src/Foundation/SealZip/SealZip	33.3 %
/build/jbenard/SEAL_1_6_3/src/MathLibs/FML/FML	44.2 %
/build/jbenard/SEAL_1_6_3/src/MathLibs/FML/FML/Util	26.1 %
AIDA_AnalysisFactory/src	80.6 %
AIDA_Annotation/AIDA_Annotation	96.3 %
AIDA_CPP/AIDA_CPP	38.5 %
AIDA_CPP/src	0.0 %
AIDA_DataPointSet_native/AIDA_DataPointSet_native	63.6 %
AIDA_DataPointSet_native/src	82.1 %



Some examples - SEAL

LTP GCOV extension - code coverage report

Current view: [directory](#)



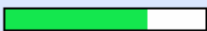


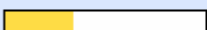
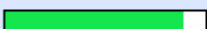
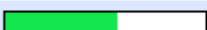
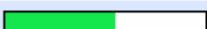

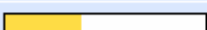
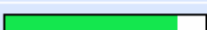




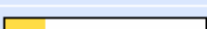
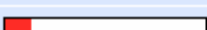
Test: [lite_test_coverage_SEAL_1_6_3.info](#)

Date: 2005-05-30

Instrumented lines: 26951

Code covered: 61.0 %

Executed lines: 16428

Directory name	Coverage
Dictionary/CMSExamples/BaseSimHit	 0.0 % 0 / 67 lines
Dictionary/CMSExamples/Dummy	 0.0 % 0 / 4 lines
Dictionary/Cintex/src	 71.2 % 682 / 958 lines
Dictionary/Reflection/Reflection	 59.6 % 56 / 94 lines
Dictionary/Reflection/src	 52.7 % 616 / 1169 lines
Dictionary/ReflectionBuilder/ReflectionBuilder	 34.5 % 71 / 206 lines
Dictionary/ReflectionBuilder/src	 88.5 % 139 / 157 lines
Dictionary/Reflex/Reflex	 56.5 % 435 / 770 lines
Dictionary/Reflex/Reflex/Builder	 54.9 % 169 / 308 lines
Dictionary/Reflex/src	 71.3 % 1118 / 1569 lines
Dictionary/SealCLHEP/dict	 37.5 % 6 / 16 lines
Dictionary/SealROOT/dict	 85.7 % 6 / 7 lines
Dictionary/SealSTL/dict	 100.0 % 37 / 37 lines
Extensions/DCacheStorage/DCacheStorage	 0.0 % 0 / 1 lines
Extensions/DCacheStorage/src	 31.0 % 44 / 142 lines
Extensions/RFIStorage/RFIStorage	 0.0 % 0 / 1 lines
Extensions/RFIStorage/src	 20.4 % 22 / 108 lines
Extensions/SealStorage/src	 12.6 % 17 / 135 lines

Some examples - ROOT

LTP GCOV extension - code coverage report

Current view: [directory](#) - matrix/src

Test: [lite_test_coverage_result_root_2005_05_31.info](#)

Date: 2005-05-31

Code covered: 32.5 %

Instrumented lines: 18540

Executed lines: 6031

Filename	Coverage		
TDecompBK.cxx		62.8 %	208 / 331 lines
TDecompBase.cxx		64.5 %	156 / 242 lines
TDecompChol.cxx		46.4 %	108 / 233 lines
TDecompLU.cxx		59.9 %	308 / 514 lines
TDecompQRH.cxx		43.7 %	131 / 300 lines
TDecompSVD.cxx		59.1 %	267 / 452 lines
TDecompSparse.cxx		0.1 %	1 / 1925 lines
TMatrixD.cxx		44.5 %	741 / 1666 lines
TMatrixDBase.cxx		47.5 %	248 / 522 lines
TMatrixDCramerInv.cxx		94.8 %	676 / 713 lines
TMatrixDEigen.cxx		66.4 %	297 / 447 lines
TMatrixDLazy.cxx		100.0 %	67 / 67 lines
TMatrixDSparse.cxx		58.2 %	866 / 1488 lines
TMatrixDSym.cxx		28.6 %	302 / 1055 lines
TMatrixDSymCramerInv.cxx		95.0 %	513 / 540 lines
TMatrixDSymEigen.cxx		92.1 %	174 / 189 lines
TMatrixDUtils.cxx		37.0 %	323 / 872 lines
TMatrixF.cxx		3.0 %	49 / 1661 lines



- **Genhtml:**
 - Creates an **HTML view** from coverage data found in INFOFILE
- **Geninfo:**
 - **Converts** .da files into .info files
- **Genpgn:**
 - Creates an **overview image** for a given source code file of either plain text or .gcov file format
- **Gendesc:**
 - **Converts a test case** description file into a format as understood by genhtml INPUTFILE

QA Savannah Reports

QA Savannah report – Web Form

Bugs, Tasks,
Support and
Patches

Default:
Project beginning
Today

.ini file: header,
Style sheet
and options

Category,
Assigned To
Severity, etc.

Savannah QA tracker analyser

Please, read the [How To page](#) before using this form.

Tracker:

Bugs

Main options:

Project Name

Example of project name: POOL, JRA1 Middleware
Find the [project name list](#).

Start date (DD/MM/YYYY) End date (DD/MM/YYYY)

Configuration file:

1. Please either use the project configuration file, stored on AFS ([/afs/cern.ch/sw/lcg/app/spi/qa/config/savannah](#))
Use **project configuration file**
2. **Or**, fill in the following fields,

Savannah Field

(example: Category, Severity, Assigned To ...)

Submit Query

Reset

- **Potential users:** projects or experiments that actively use Savannah trackers (bugs, tasks, support, patch)
- **Current users:** JRA1 coordination, JRA1 Middleware, LCG 2 Sites
- **Ready for LCG projects:**
 - POOL,
 - PI,
 - SEAL
- **Tried on several other projects:**
 - Athena,
 - Gaudi,
 - Cobra,
 - Iguana

QA Savannah report - Capabilities

[Printable version](#)



CMS QA Report for COBRA (cobra)

```
Created: Mon Jun 20 09:26:45 2005 by apache
Command: - --config-file=/afs/cern.ch/sw/lcg/app/spi/qa/config/savannah/cobra/QA_report_config_file.ini --
tracker=bugs --no-doc --only-savannah cobra
Option values used to create the report:
Title=CMS QA Report for COBRA (cobra)
Label=Release
Project name=COBRA (cobra)
Only Savannah section is performed
Documentation not required
Quality Assurance Home Page
```

Options
used

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 - [1.2 Release : Bugs Statistics](#)
 - [1.2.1 Release: Default/Unknown](#)
 - [1.2.2 Release: 7_9_0](#)
 - [1.2.3 Release: 8_0_0](#)
 - [1.2.4 Release: 7_10_0](#)
 - [1.2.5 Release: 7_8_6](#)
 - [1.2.6 Release: 7_10_1](#)
 - [1.2.7 Release: 8_1_0](#)
 - [1.2.8 Release: 8_0_2](#)

Global
processing

Breakdown
Into
Savannah
fields

1. Savannah Web Portal

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[COBRA page in savannah](#)

1.1. Bugs statistics: full project history (the beginning of the project to 20 Jun 2005 (today))

QA Savannah report - Capabilities

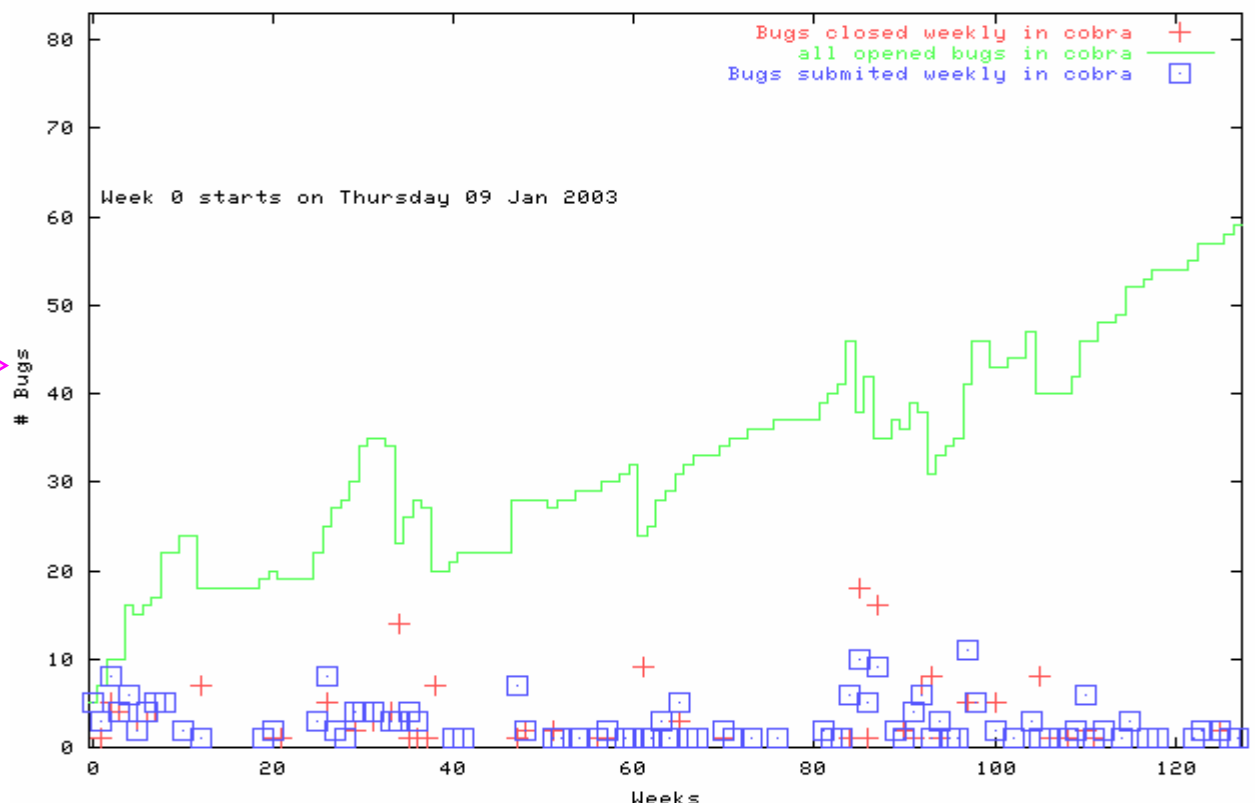
Period: from the beginning of the project to 20 Jun 2005 (today)

Statistics on a given period

First bugs report on: 09 Jan 2003
Last bugs report on: 17 Jun 2005
Number of bugs reports (ND): 226
Number of closed bugs reports (NCD): 167
Number of open bugs reports (NOD): 59
Number of users: 43
Mean time to solve: 2209 hours (+3381) -- i.e 13 weeks 1 day 1 hour
Max/Min to solve: 16801/0 hours -- i.e 100 weeks 1 hour
Bugs per week: 1
Number of weeks: 127

Translated into graph

Project cobra
Bugs tracker statistics
Thursday 09 Jan 2003 -- Friday 17 Jun 2005



Some examples – LCG 2 Sites

[Printable version](#)



QA Report for LCG2 sites (lcg2sites)

Created: Mon Jun 20 09:44:15 2005 by apache
Command: - --label=Assigned%To --tracker=t.
Option values used to create the report:
Title=QA Report for LCG2 sites (lcg2sites)
Label=Assigned To
Project name=LCG2 sites (lcg2sites)
Only Savannah section is performed
Documentation not required
[Quality Assurance Home Page](#)

1.2.4. Assigned to: Default/Unknown

Project lcg2sites
Task tracker statistics
Monday 09 Aug 2004 -- Monday 14 Mar 2005

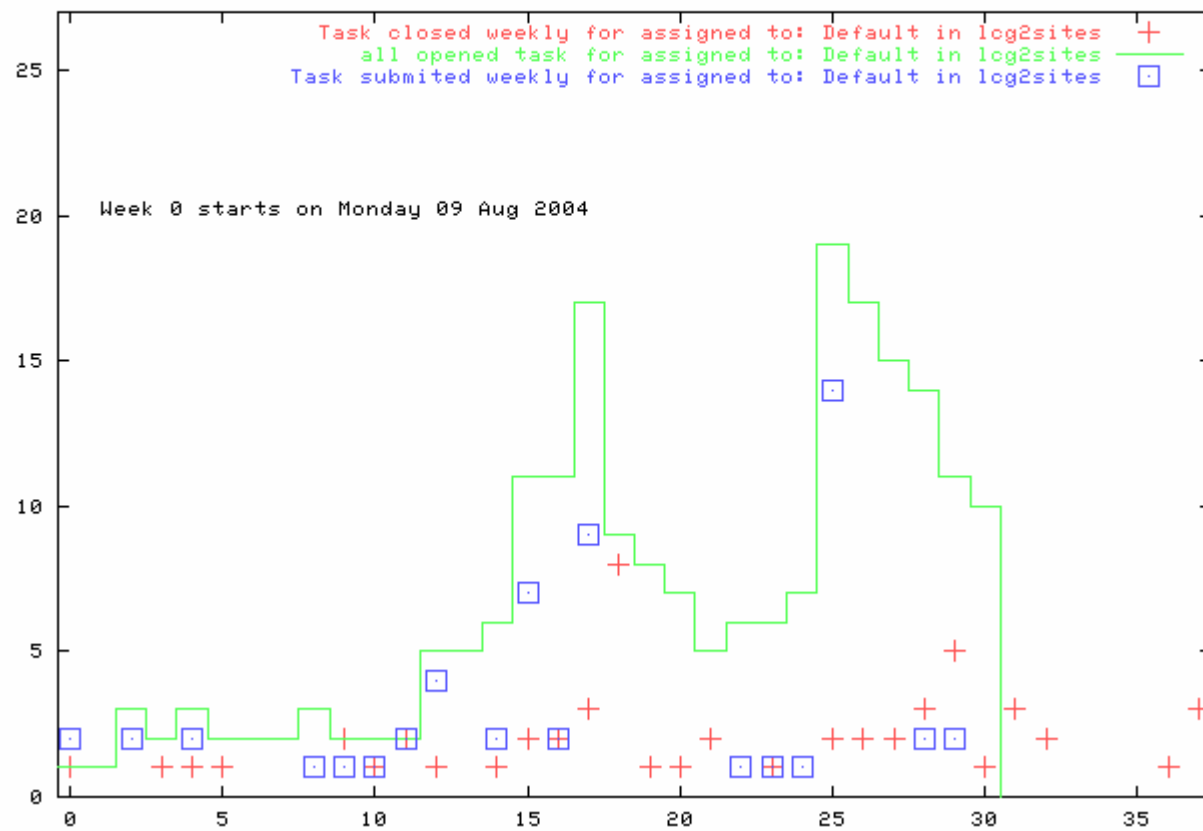


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 - [1.2.1 Assigned to: Italian ROC](#)
 - [1.2.2 Assigned to: markus schulz](#)
 - [1.2.3 Assigned to: Piotr Nyczyk](#)
 - [1.2.4 Assigned to: Default/Unknov](#)
 - [1.2.5 Assigned to: Markus Schulz](#)
 - [1.2.6 Assigned to: ROC South-Ea](#)
 - [1.2.7 Assigned to: Judit Novak](#)
 - [1.2.8 Assigned to: Sophie Lemaitr](#)
 - [1.2.9 Assigned to: ROC UK/I at R](#)
 - [1.2.10 Assigned to: Steve Traylen](#)
 - [1.2.11 Assigned to: ROC France](#)
 - [1.2.12 Assigned to: ROC Central](#)
 - [1.2.13 Assigned to: ROC German](#)
 - [1.2.14 Assigned to: Alessandro C:](#)
 - [1.2.15 Assigned to: Oliver Koehle](#)

Some examples – JRA1 Middleware

[EGEE Home](#) | [Intranet Home](#) | [Search](#) | [EDMS Documents](#) | [People](#) | [Calendar](#) | [Agenda maker](#) | [Glossary](#)



EGEE QA Report for JRA1 Middleware (jralmdw)



[Tools](#)

[Testing](#)

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[Data
Management](#)

[Security](#)

[Management](#)

[JRA1 Home](#) | [Mandate](#) | [Meetings](#) | [Presentations](#) | [Savannah](#) | [EDMS](#)

Created: Mon Jun 20 09:48:45 2005 by apache

Command: - --config-file=/afs/cern.ch/sw/lcg/app/spi/qa/config/savannah/jralmdw/QA_report_config_file.ini --
tracker=bugs --no-doc --only-savannah jralmdw

Option values used to create the report:

Title=EGEE QA Report for JRA1 Middleware (jralmdw)

Header file=/afs/cern.ch/sw/lcg/app/spi/qa/config/savannah/QA_EGEE_header.html

Label=category_id

Project name=JRA1 Middleware (jralmdw)

Only Savannah section is performed

Documentation not required

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 - [1.2.3 Category: Unknown](#)
 - [1.2.4 Category: gLite Middleware](#)
 - [1.2.5 Category: org.glite.alien.modules](#)

Some examples - POOL



LCG QA report for POOL (pool)

Created: Mon Jun 20 18:21:17 2005 by apache
Command: - --config-file=/afs/cern.ch/sw/lcg/app/spi/qa/config/s
tracker=bugs --no-doc --only-savannah pool
Option values used to create the report:
Title=LCG QA report for POOL (pool)
Header file=/afs/cern.ch/sw/lcg/app/spi/qa/config/savannah/QA_LC
Label=category_id
Project name=POOL (pool)
Only Savannah section is performed
Documentation not required

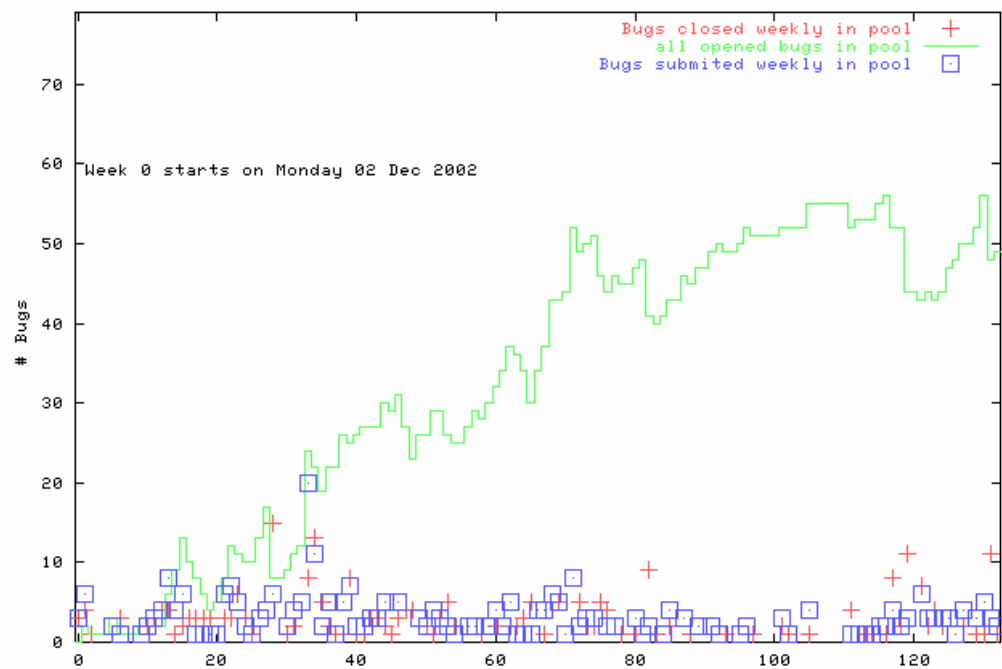
[Quality Assurance Home Page](#)

First bugs report on: 02 Dec 2002
Last bugs report on: 15 Jun 2005
Number of bugs reports (ND): 318
Number of closed bugs reports (NCD): 269
Number of open bugs reports (NOD): 49
Number of users: 57
Mean time to solve: 1216 hours (+-2206) -- i.e 7 weeks 1 day 16 hours
Max/Min to solve: 15027/0 hours -- i.e 89 weeks 3 days 3 hours
Bugs per week: 2

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 - [1.2.6 Category: Collections](#)
 - [1.2.7 Category: Documentation](#)
 - [1.2.8 Category: Reflection](#)
 - [1.2.9 Category: Persistency Service](#)
 - [1.2.10 Category: Common services](#)
 - [1.2.11 Category: Meta Data](#)
 - [1.2.12 Category: External Packages](#)

Project pool
Bugs tracker statistics
Monday 02 Dec 2002 -- Wednesday 15 Jun 2005



Some examples - SEAL



QA Report for SEAL (seal)

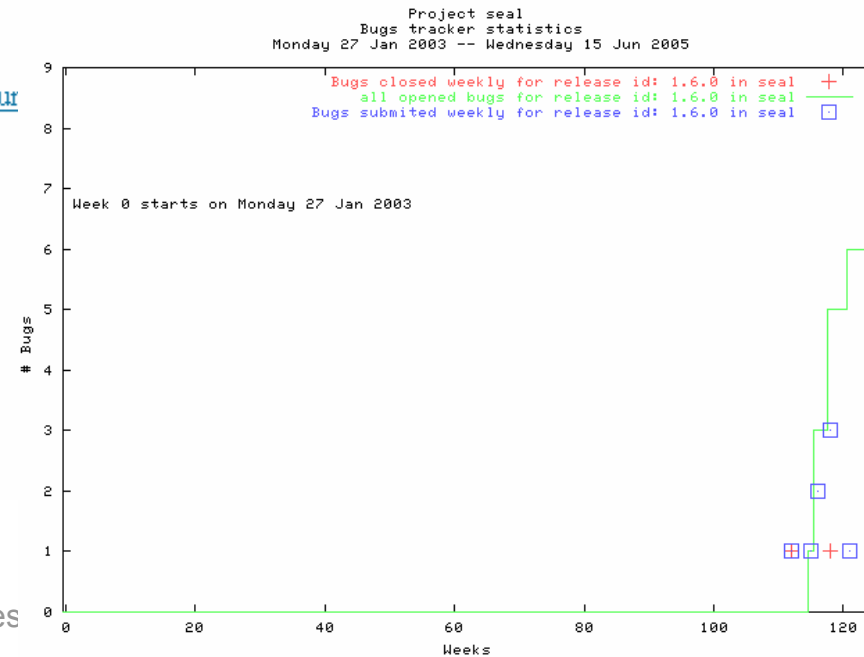
Created: Mon Jun 20 18:25:52 2005 by apache
Command: - --label=Release --tracker=bugs --no-doc --only-savannah seal
Option values used to create the report:
Title=QA Report for SEAL (seal)
Label=Release
Project name=SEAL (seal)
Only Savannah section is performed
Documentation not required
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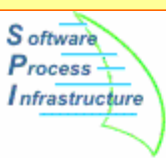
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 - [1.2.3 Release: 1.1.0](#)
 - [1.2.4 Release: 1.3.0](#)
 - [1.2.5 Release: 1.2.0](#)
 - [1.2.6 Release: 1.3.3](#)
 - [1.2.7 Release: 1.4.0](#)
 - [1.2.8 Release: 1.5.0](#)
 - [1.2.9 Release: 1.6.0](#)

For Release = 1.6.0 there are 9 reported defects

Number of bugs reports (ND): 8
Number of closed bugs reports (NCD): 2
Number of open bugs reports (NOD): 6
Number of users: 5
Mean time to solve: 26 hours (+21) -- i.e 1 day 2 hours
Max/Min to solve: 47/6 hours -- i.e 1 day 23 hours
Bugs per week: 0
Number of weeks: 124



Some example - PI



QA Report for PI (pi)

Created: Mon Jun 20 18:34:27 2005 by apache
Command: - --label=Assigned%To --tracker=bugs --no-doc --only-se
Option values used to create the report:
Title=QA Report for PI (pi)
Label=Assigned To
Project name=PI (pi)
Only Savannah section is performed
Documentation not required
[Quality Assurance Home Page](#)

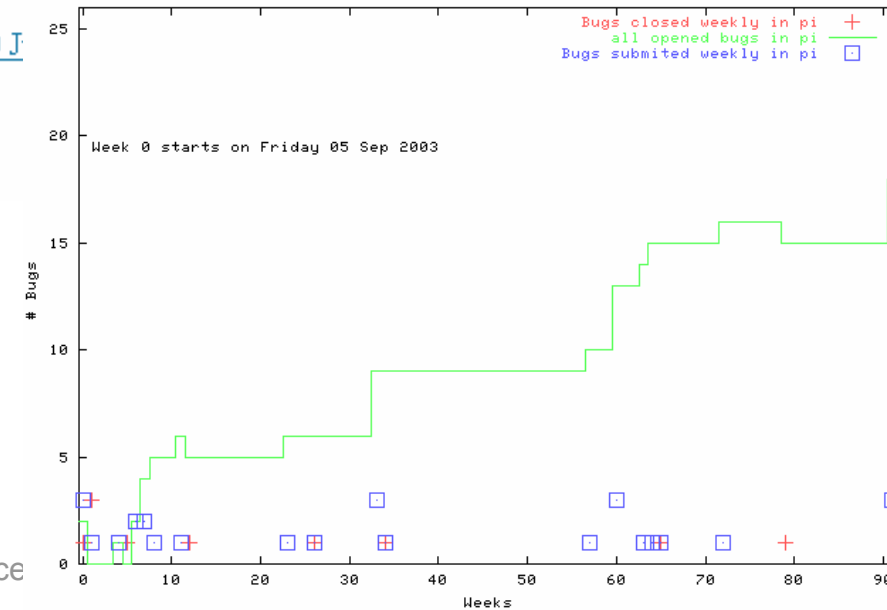
Period: from the beginning of the project to 20 Jun 2005 (today)

First bugs report on: 05 Sep 2003
Last bugs report on: 10 Jun 2005
Number of bugs reports (ND): 28
Number of closed bugs reports (NCD): 10
Number of open bugs reports (NOD): 18
Number of users: 11
Mean time to solve: 1112 hours (+2743) -- i.e 6 weeks 4 days 8 hours
Max/Min to solve: 9310/48 hours -- i.e 55 weeks 2 days 22 hours
Bugs per week: 0
Number of weeks: 91

Table of Contents

- [1 Savannah Web Portal](#)
 - [1.1 Bugs statistics: full project history \(the beginning of the project to 20 J](#)
 - [1.2 Assigned to : Bugs Statistics](#)
 - [1.2.1 Assigned to: Lorenzo Moneta](#)
 - [1.2.2 Assigned to: Default/Unknown](#)

Project pi
Bugs tracker statistics
Friday 05 Sep 2003 -- Friday 10 Jun 2005



SPI

Quality Assurance



[LHC Computing Grid](#) > [LCG App Area](#) > [SPI Home](#)

SPI - Software Process & Infrastructure

Updated
21-Apr-2005 16:21



SPI Quick Links

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SPI Services Links

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LCG App. Area

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[PI Project](#)
[POOL Project](#)
[SEAL Project](#)
[Simulation Project](#)
[SPI Project](#)

External Links

Quality Assurance

Interactive QA report generation

LCG Application Area	SEAL: bugs / POOL: bugs / PI: bugs / SPI: bugs
LCG Deployment	LCG2 sites: tasks by "Assigned To" / LCG2 sites: tasks by "Submitted By"
Atlas groups:	Athena: bugs
CMS groups:	Cobra: bugs / Iguana: bugs
LHCb groups:	Gaudi: bugs
EGEE groups	JRA1 Middleware: bugs / JRA1 Coordination: tasks by "Category"

If you want a project added to the table above [contact us](#).

Find the Web form [here](#). Find the other QA reports [here](#).

Test Coverage reports

SEAL project	Latest / Other reports & comments
POOL project	Latest / Other reports & comments
PI project	Latest / Other reports & comments



- **Proposed services:**
 - To **generate customized** test coverage reports
 - To **set parameters** for Savannah QA reports
 - To **repeat this talk** for projects / experiments

Thank you for your attention!

Question?