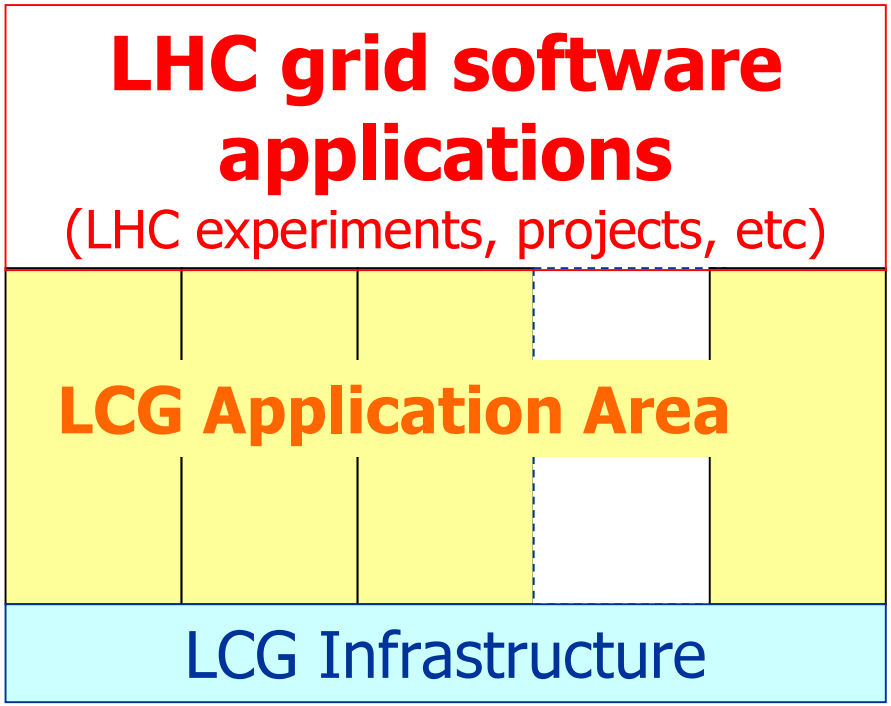
# SPI Infrastructure for LCG Software Projects

## Services Overview

**A.Aimar - CERN**

# Project context of LCG SPI




- Common services
- Similar ways of working (process)
- Tools, templates, training
- General QA, tests, integration, release

**LCG Application Area software projects**

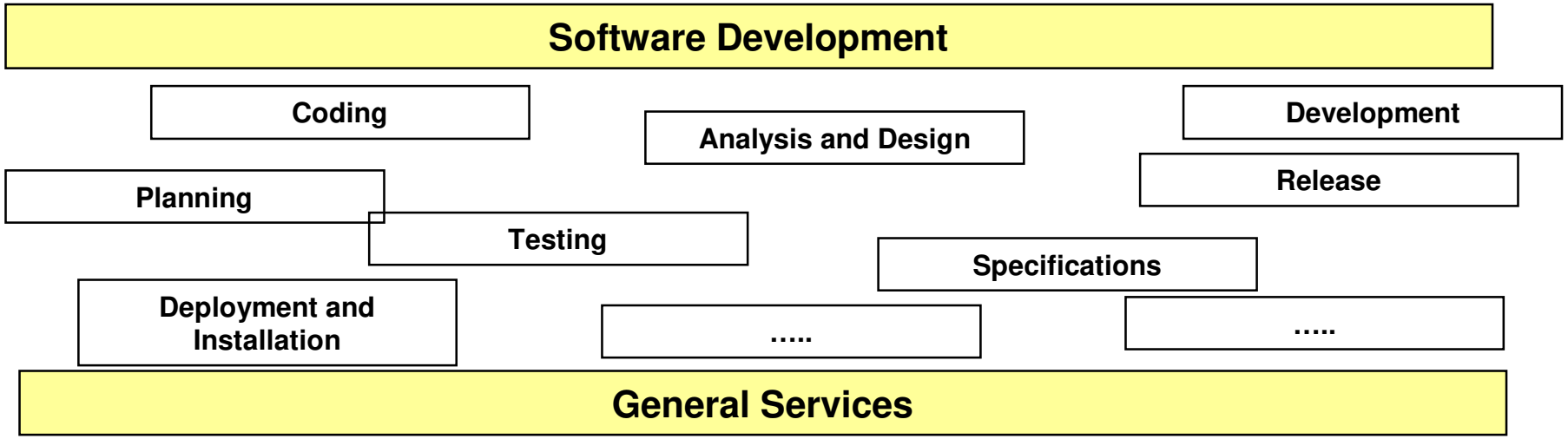
- POOL: Persistency
- SEAL: Core common software
- PI: Physics Interfaces
- SIMU: Simulation
- …etc…

**LCG SPI project**

# Project context of the LCG SPI

- "Software Management Process RTAG"
  - General recommendations
    - All LCG projects must adopt the same set of tools, standards and procedures
    - Adopt commonly used open-source or commercial software when easily available
    - Avoid "do it yourself solutions"
    - Avoid commercial software, if may give licensing problems
- If each project needs an infrastructure, many projects need it even more…
    - Tools, standards and procedures
    - Try to avoid complexity

# Infrastructure Software Development




- Keep it "simple and modular"

a. Provide general services needed by each project
   - CVS repository, Web Site, Software Library
   - Mailing Lists, Bug Reports, Collaborative Facilities

b. Provide solutions specific to the software phases
   - Tools, Templates, Training, Examples, etc.

LCG SPI - Home Page - Microsoft Internet Explorer fourni par Bluewin
File Edit View Favorites Tools Help
http://spi.cern.ch
LHC Computing Grid Project > LCG Applications Area > LCG Software Process & Infrastructure
SPI - Software Process & Infrastructure for LCG
SPI Quick Links
SPI Home
SPI Index
Savannah Portal
LCG App. Area
Home Page
LCG Agenda
MATH Project
PI Project
POOL Project
SEAL Project
SPI Project
External Links
CERN
NEWS
Updated: 29-Apr-2003 18:04
03/04/2003 Software Development Policies and more. LCG Development Policies published
24/03/2003 CHEP 2003: Presentation SPI: Software Process and Infrastructure for LCG projects
4/03/2003 SPI Services Overview presentation focusing on what is available to projects outside LCG, App Area meeting hosted by Atlas
3/03/2003 New Software Testing web pages
12/02/2003 Presentation of the External Software Service
News and updates on the SPI projects
03/02/2003 SPI provides pre-installed tools on AFS, see the External Software Service
18/12/2002 SPI Services Overview presentation
05/12/2002 LCG SPI Project portal available
04/12/2002 Presentation: Project portal, and bug tracking
25/11/2002 New SPI Index Page (please bookmark it)
02/11/2002 Talk on Profiling by Rafi Yaari
20/10/2002 talks: Code Documentation and Unit Testing
12/09/2002 Service and Components descriptions
11/09/2002 Presentation: LCG SPI Status
Search SPI web
Tips
Index page
All links useful to the users of the SPI project and the developers of LCG
Software Development Policies
Projects portal
External software service
SCRAM web site
LCG App.Area Workbook
SPI Support page
Please write there all you support requests. Or by email.
SPI project description page
Internet

# OUTLINE

## SPI Services

**LCG software**

- CVS and delivery
- Code documentation
- Testing framework
- Builds and releases
- ...

**LCG libraries**

- External software
- LCG software distrib.

**LCG project portal**

- Developers' web
- Bug reports
- FAQ, News

# OULINE → LCG repository

## SPI Services

**LCG software**

**CVS and delivery**
**Code documentation**
**Testing framework**
**Builds and releases**
**…**

**LCG libraries**

**External software**
**LCG software distrib.**

**LCG project portal**

**Developers' web**
**Bug reports**
**FAQ, News**

# Software Quality and Development Policies

- CVS Directory Structure Policy
- C++ Source Code Policy
- Build Directory Policy

- Software Testing Policies
- Version Numbers, Tagging and Release Procedure
- Installation Directory Structure

- Platform string, binary names, debug flags and more

# >>> CVS repository and Delivery Areas

## CVS repository

- A central CVS repository managed and available to all projects
- Tools for automatic clean up of locks, etc
- Systems to browse the repositories
- We developed as little as possible knowing that we will move to the IT CVS service that is being setup up for LCG

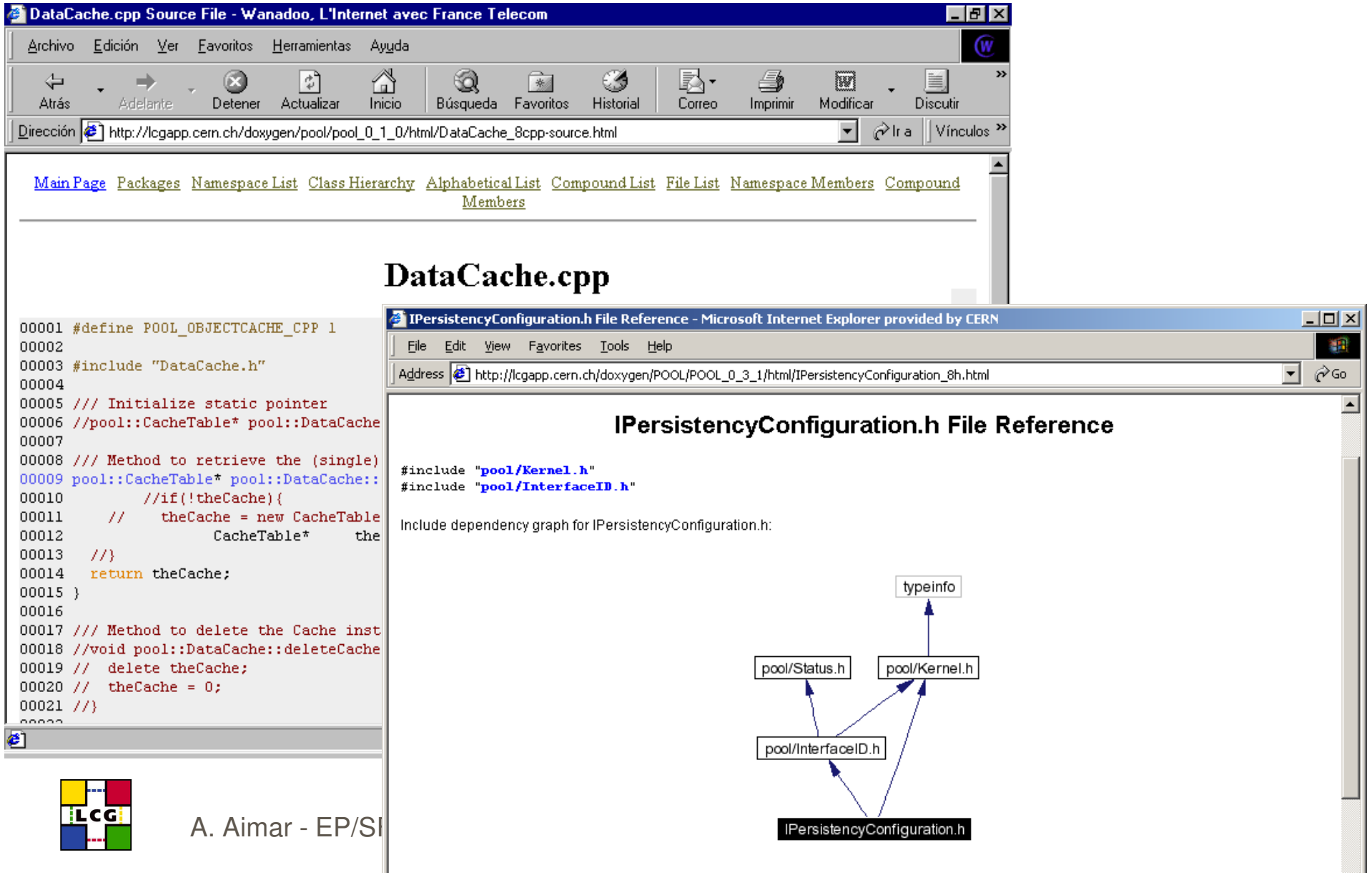
## Delivery areas

- The AFS and DFS delivery areas
  1. an area to install software of LCG application area
  2. an area for external and third party software
  3. an area for evaluation within a project
- Pre-installed software shall be in directories specifying the package name, the package version and the "OS_Compiler"

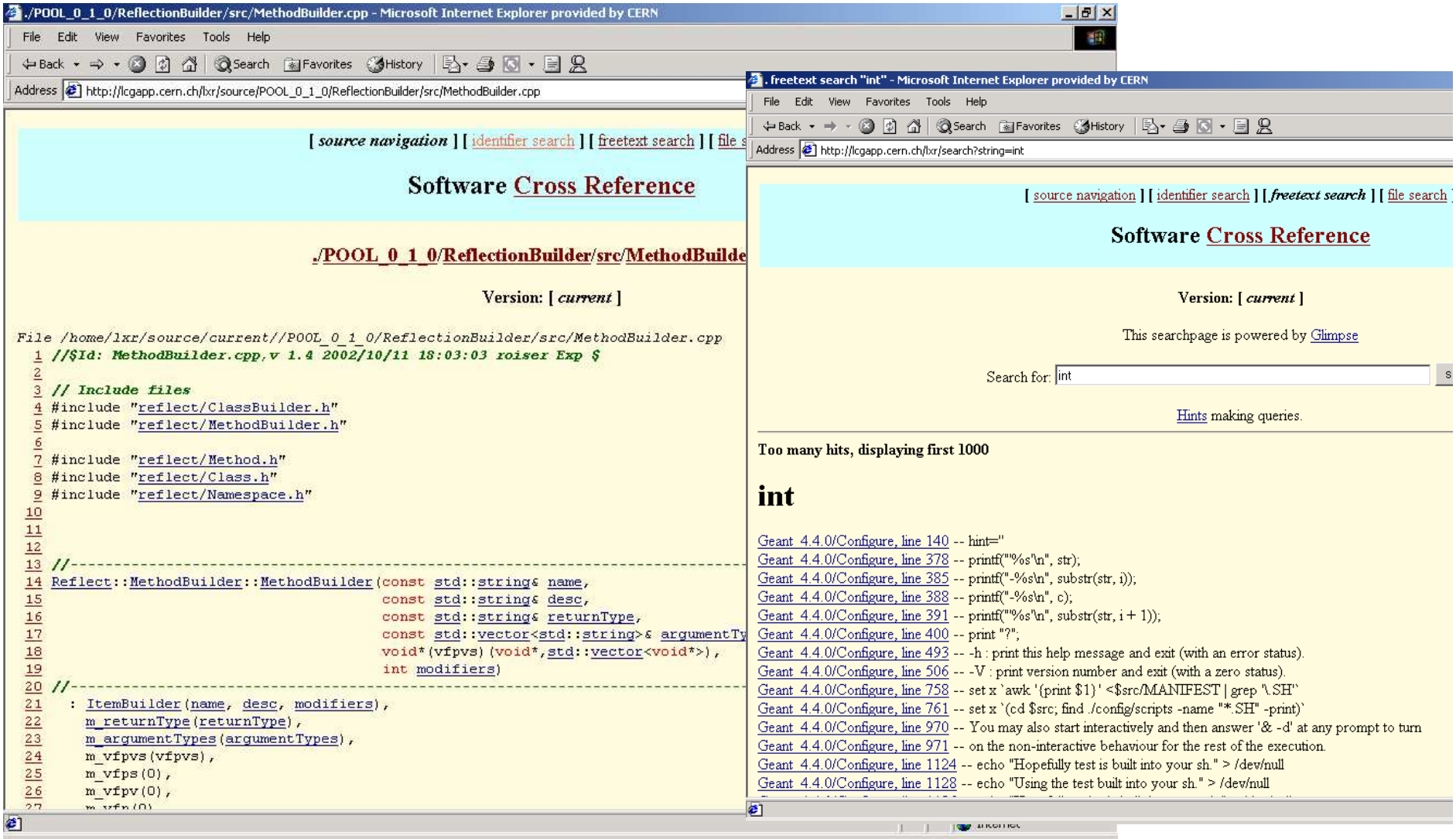
# → Code Documentation

- Features of interest:
  - Code browsing
  - Code searching
  - Code information
  - Design diagrams
- Any LCG project will have them available as part of the infrastructure
  - Doxygen
  - LXR
  - ViewCVS

# Code documentation: Doxygen

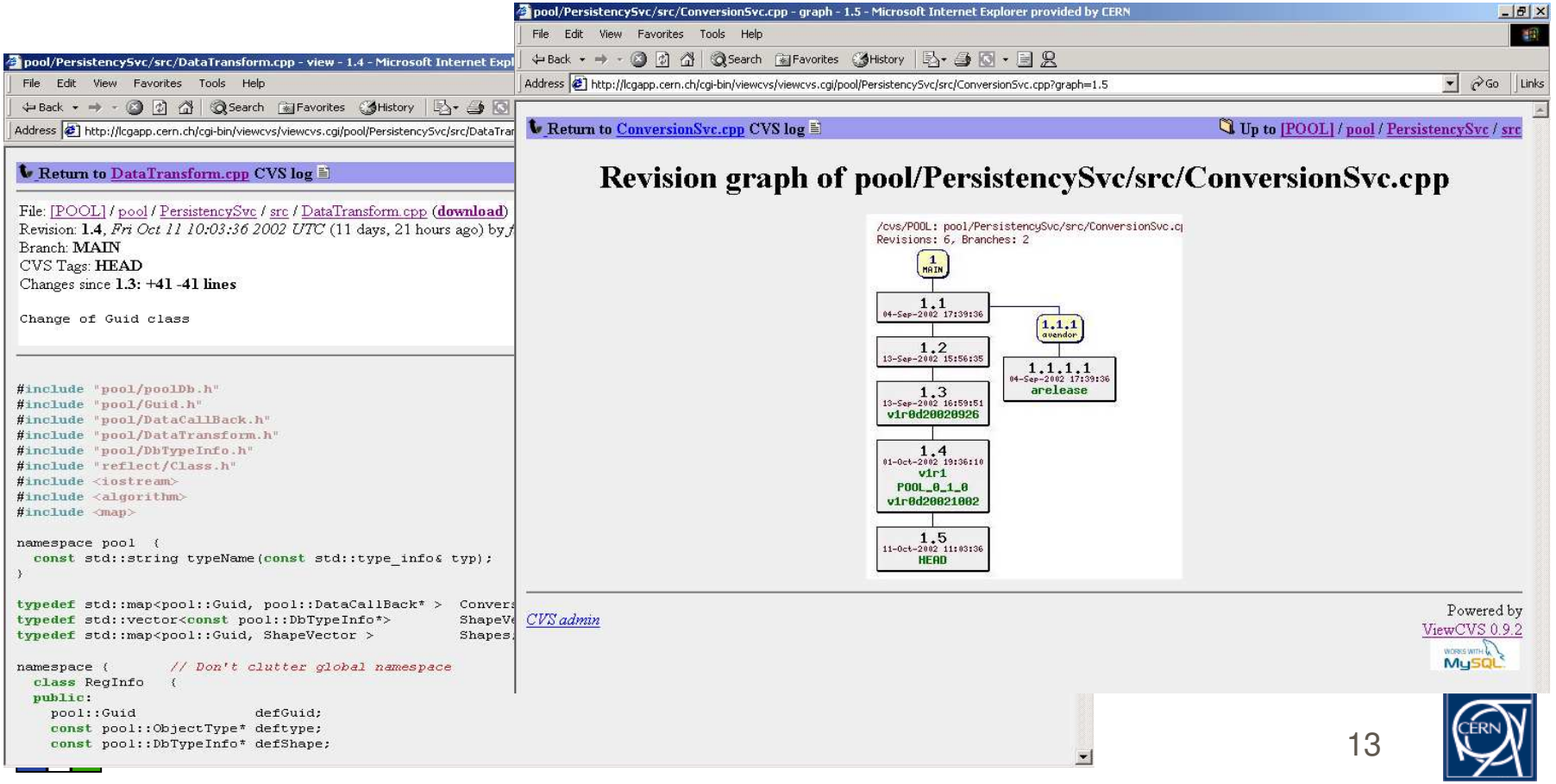


# Code documentation: LXR



# Code documentation: ViewCVS

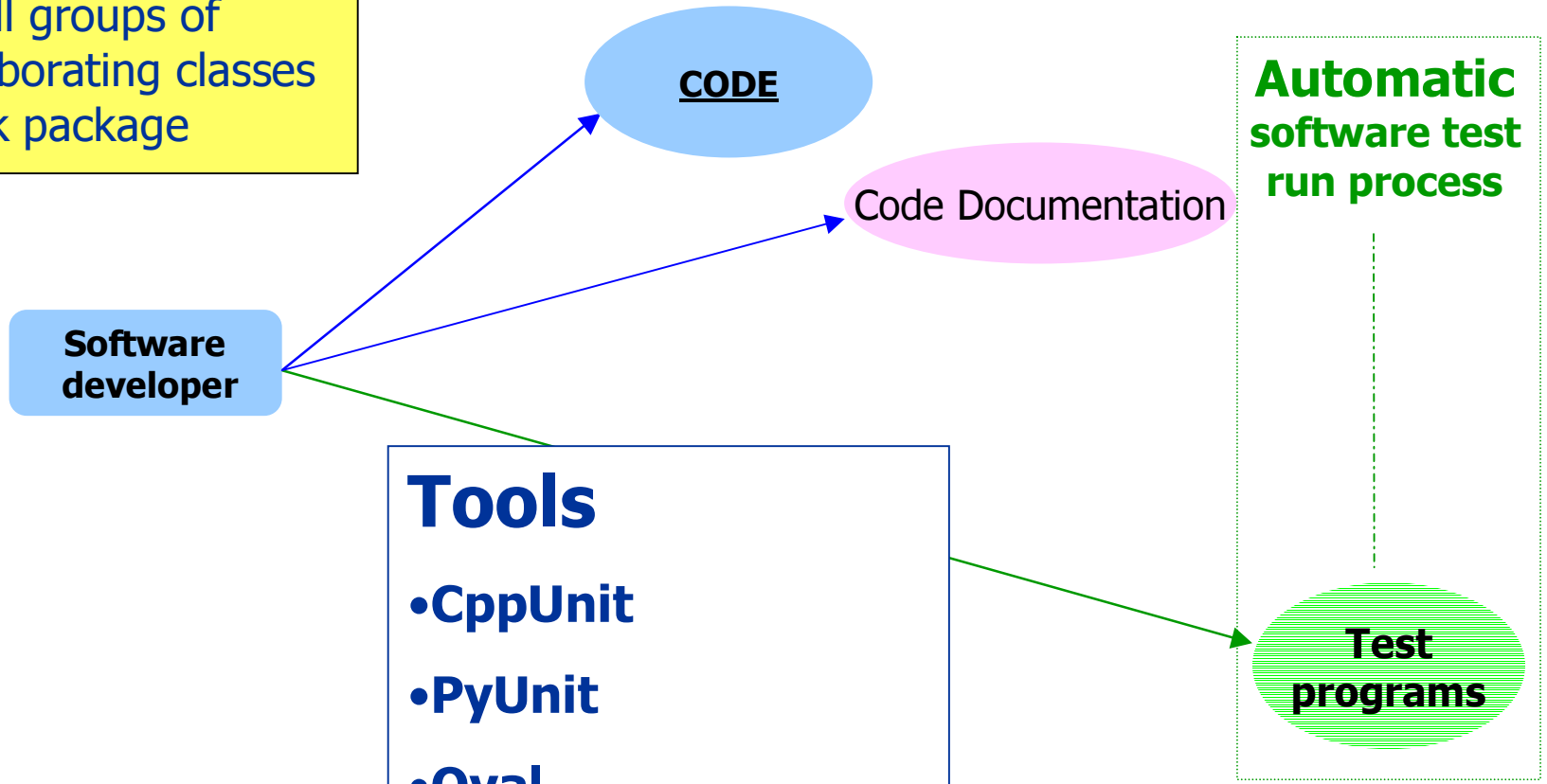
- CVSgraph: Displays the tree of revisions and branches graphically
- Enscript: Colorize files in the CVS repository.



# >>> Software Testing

Tests of classes

- individual class
- small groups of collaborating classes
- work package

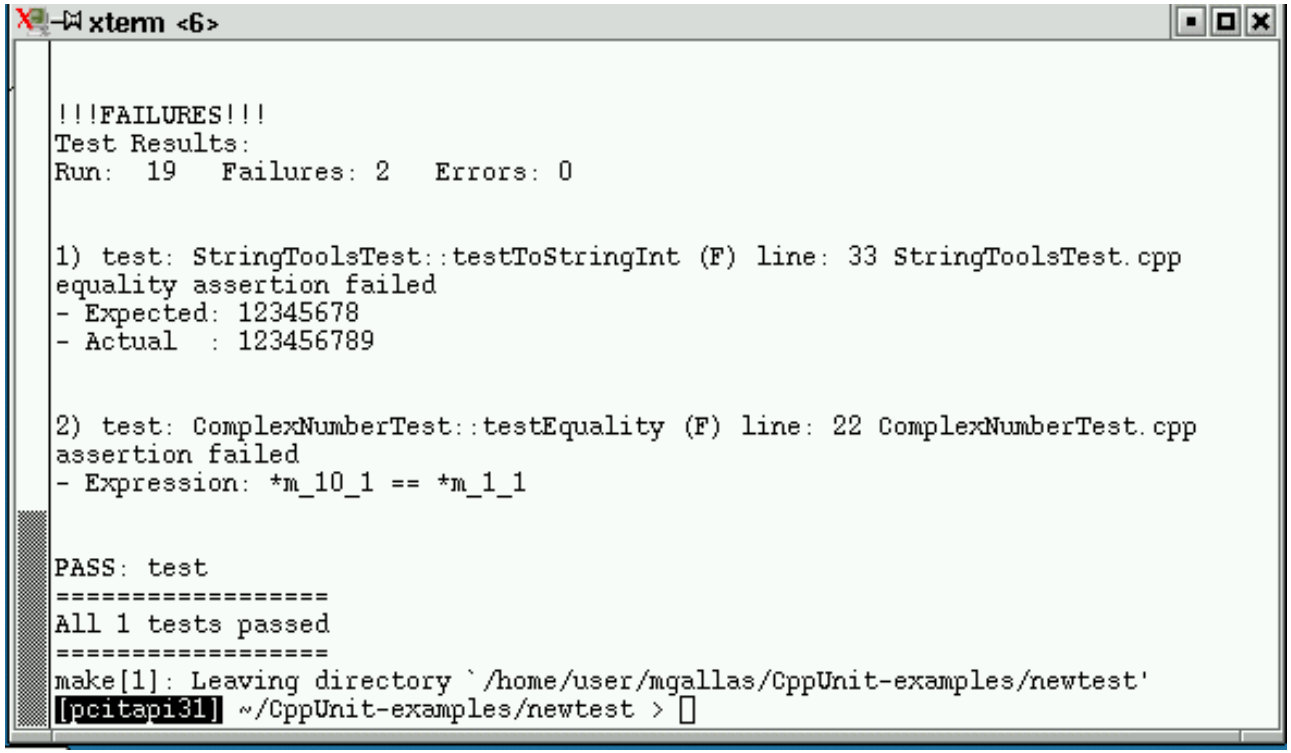


# Test frameworks: CppUnit

Similar tools: Junit, PerlUnit, PyUnit, QtUnit

Output in XML, compiler or text

Windows version for MVC++




A simple test

1. Subclass the TestCase CppUnit class
2. Override the method runTest().
3. call CPPUNIT_ASSERT

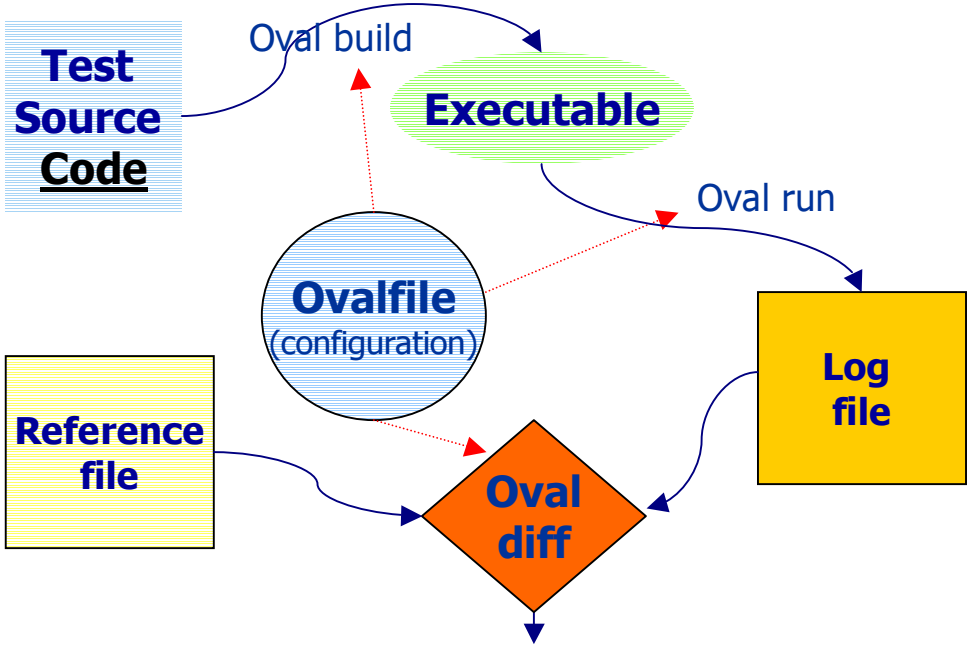
# Test frameworks: Oval

**Oval:**
- validation
- regression

Was used for used for Unit-test but is a framework that can run and compare any test output

It is possible to set different run environments

Can run external scripts and external binaries



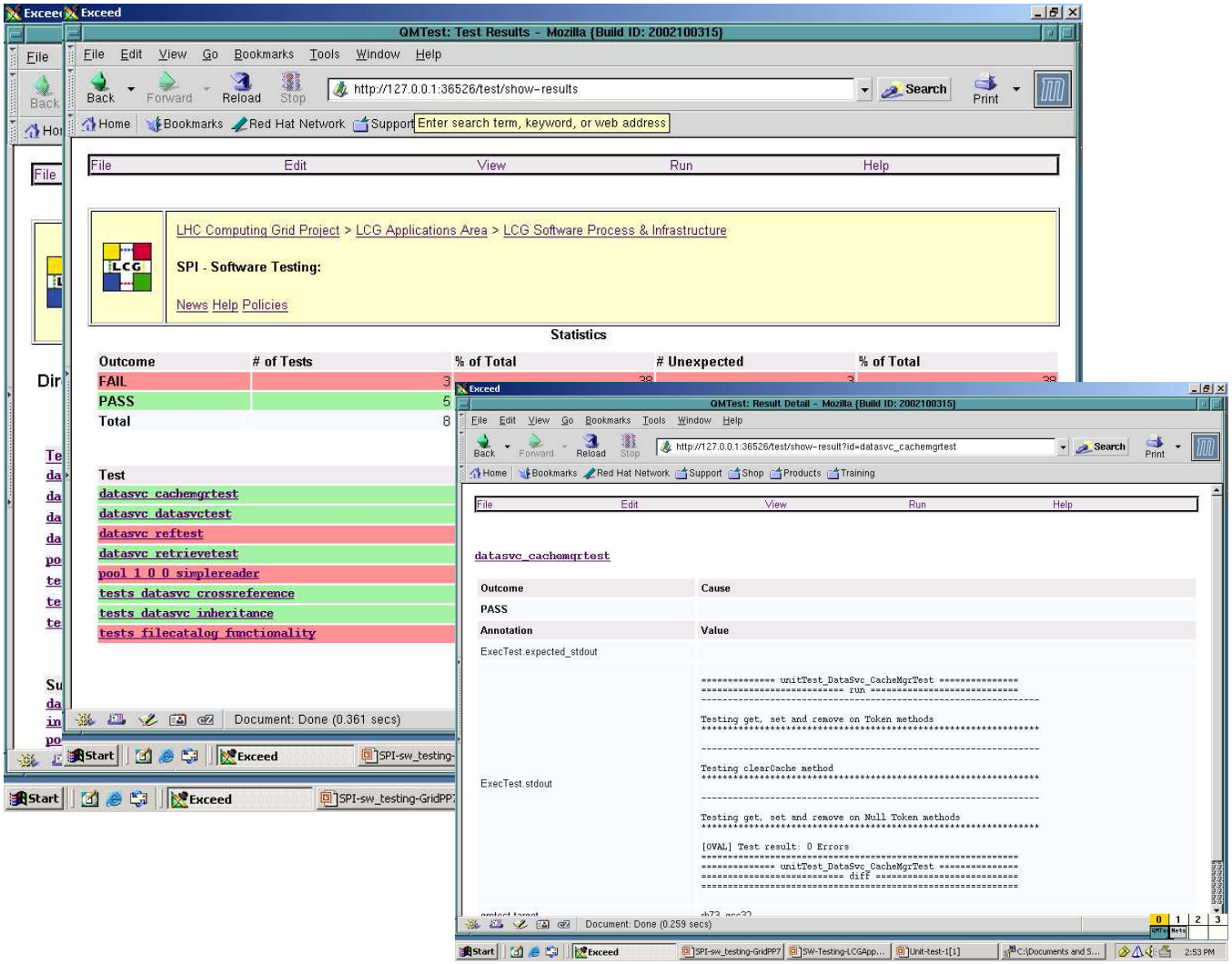

```
xterm <6>
[pcitapi31] ~/OVAL-examples/subtest1 > oval p
Prog1: build, run, diff.
Prog2: build, run, diff (DIFFS).
xterm <6>
[pcitapi31] ~/OVAL-examples/subtest1 > oval diff Prog2
========================== diff ==========================
(DIFFS)
=== log #29 !~ ref #65 (>15%)
log: [OVAL] result = 1.2
---
ref: [OVAL] result = 1
==========================================================
[pcitapi31] ~/OVAL-examples/subtest1 >
```

# Test FrameWorks: QMTest

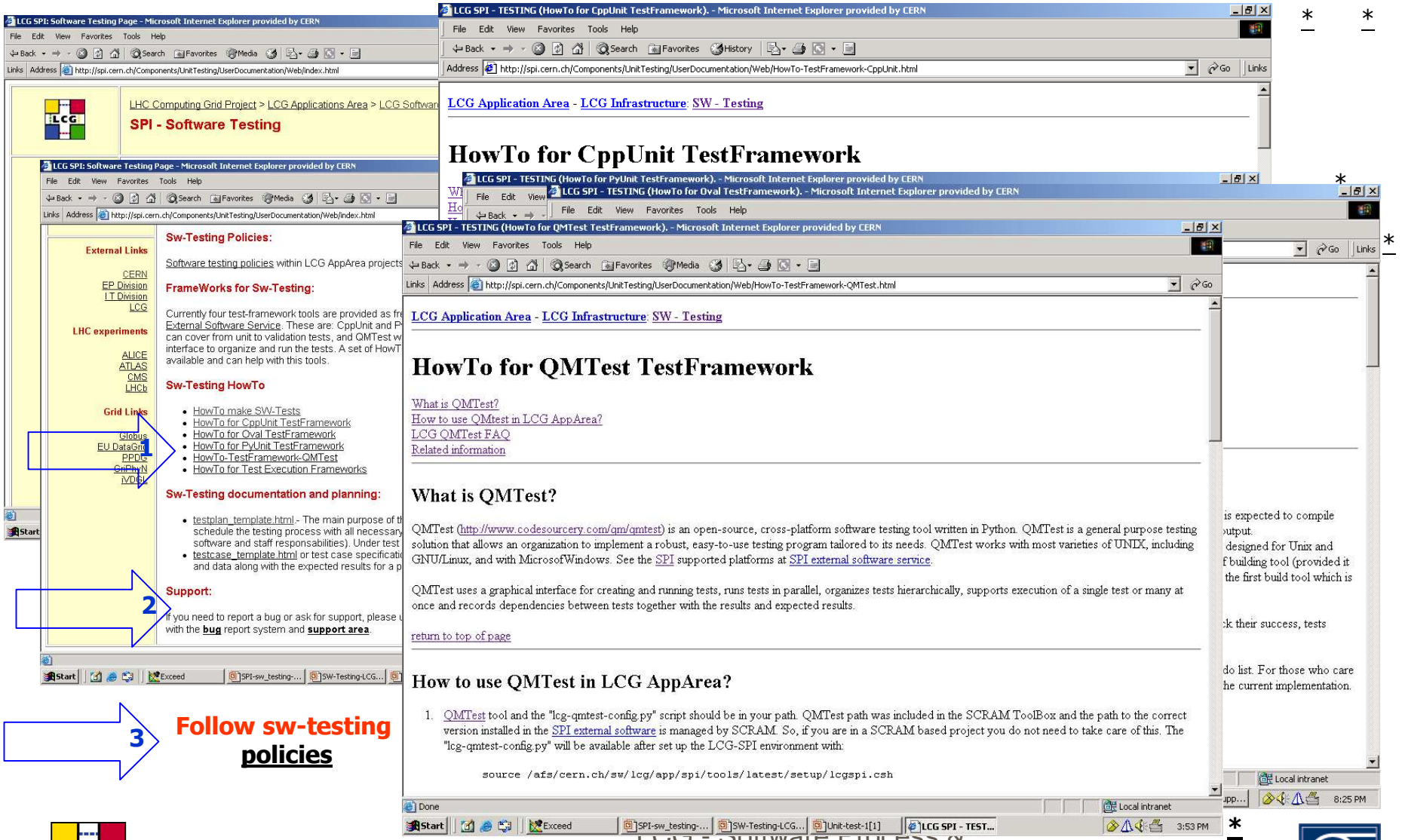
**QMTest**

CodeSourcery

- Uses a graphical interface for creating and running tests
- Runs tests in parallel
- Organizes tests hierarchically
- Supports execution of a single test or many at once
- Records dependencies between tests
- Can be run in batch mode -> easy integration with the Nightly-Building systems



# User support: How-To



# Many components available

- Build and release tool → Scram
- Memory Leaks → Valgrind
- Coding guidelines → RuleChecker
- Standard directory structures → SPI policies
- Automatic Builds → Nicos

- Software distribution
- Developers workbook
- Software documentation, templates, etc

# OUTLINE → LCG Software Library

**SPI Services**

**LCG software**

CVS and delivery
Code documentation
Testing framework
Builds and releases
...

**LCG libraries**

**External software**
**LCG software distrib.**

**LCG project portal**

Developers' web
Bug reports
FAQ, News

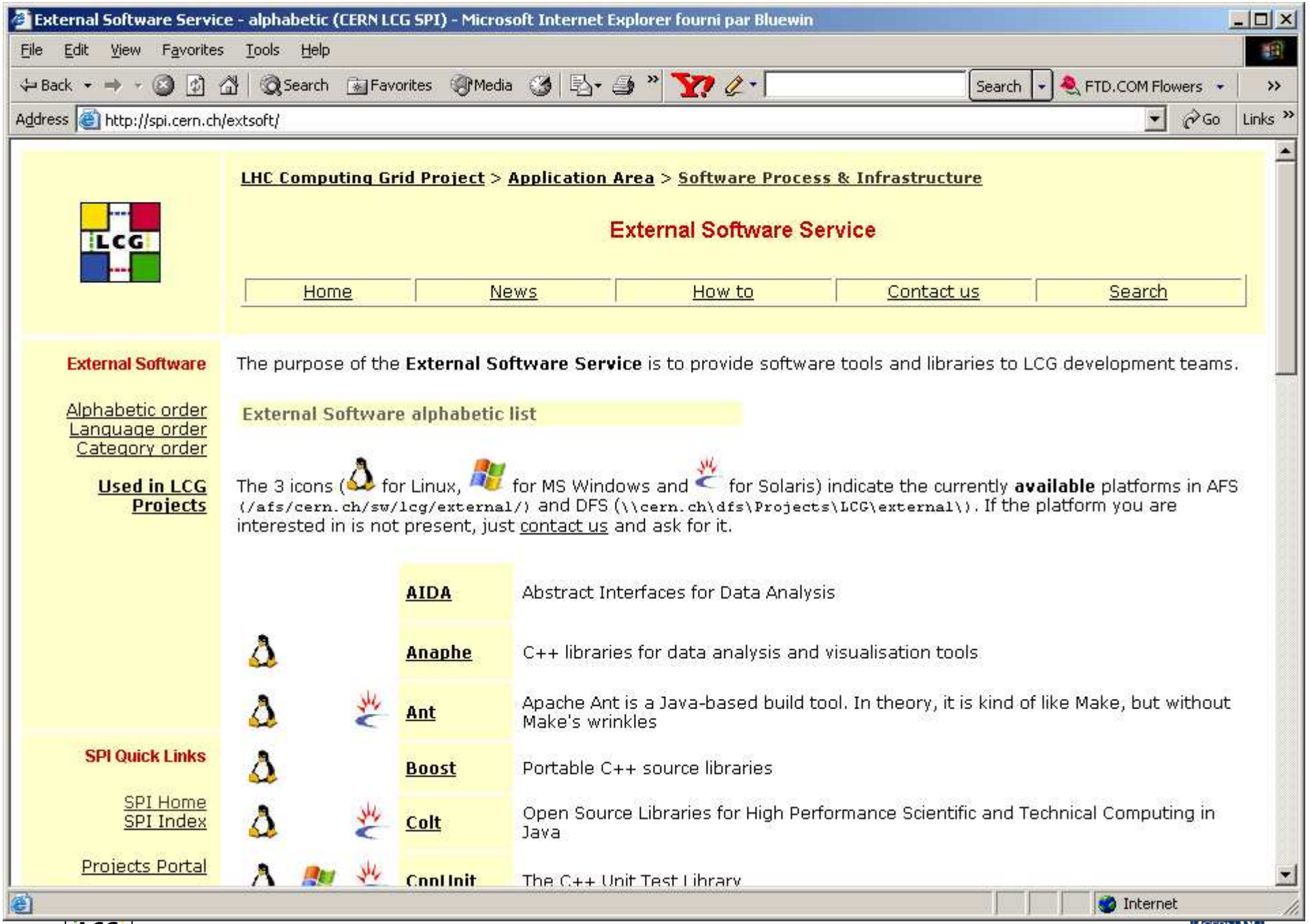
# Service: Software Library

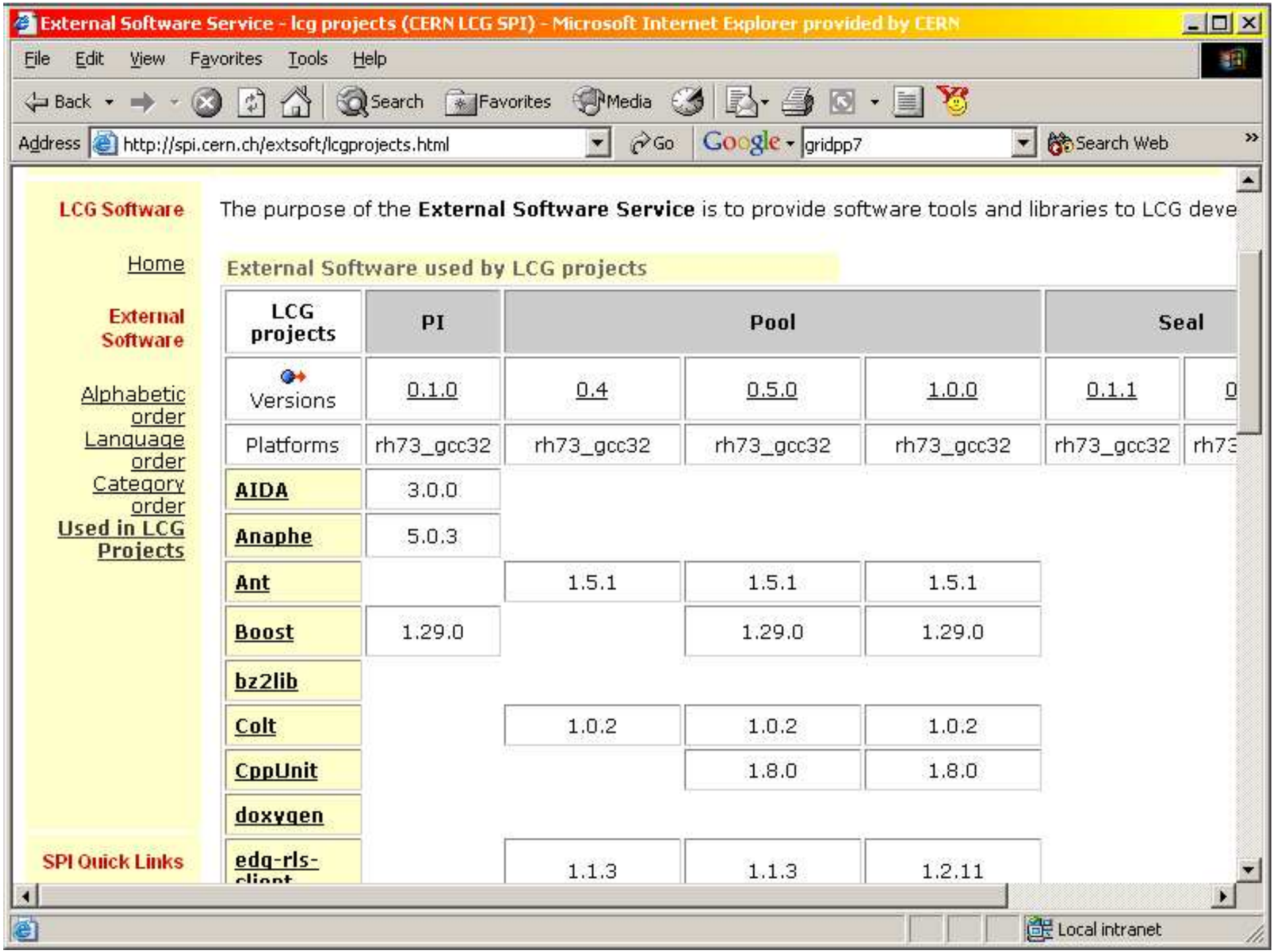
- Limited to LCG projects needs
- All software needed by more than one LCG projects shall be installed in common areas
- Available for several compilers and operating systems
- Maintained centrally with support and help to the user
- External documentation available
- Contact with the authors if the software is developed in HEP or LCG
- Distribution and pre-installation to all LCG user

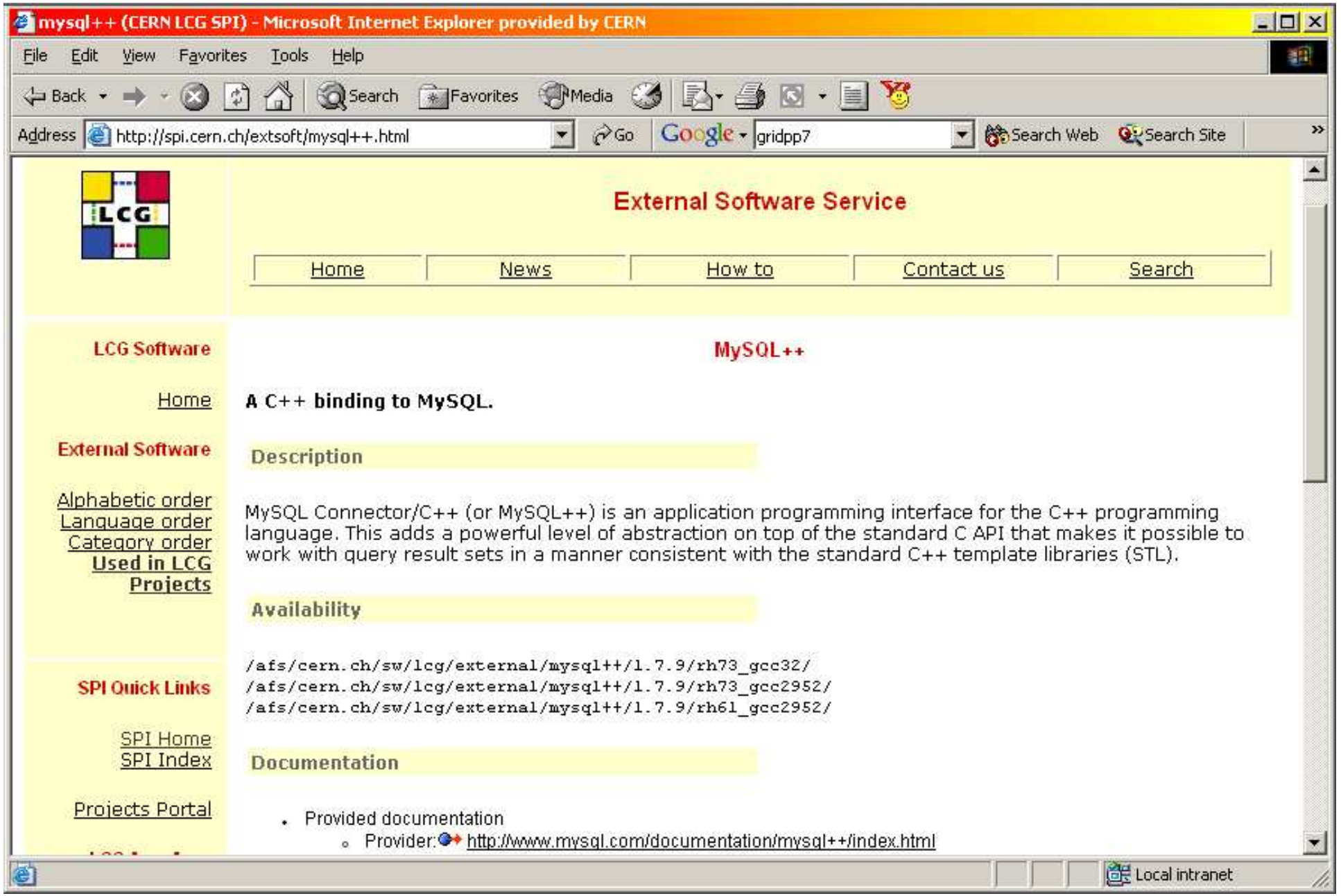
# Current status

- Central installation of HEP or open source software needed by LCG related projects or following their requests in term of version and platforms (Linux, Windows and Solaris, when needed).
- Standard installation & location
- Availability
  - AFS: /afs/cern.ch/sw/lcg/external/
  - DFS: \\cern.ch\dfs\project\lcg\external\ (just started)

```
sundev005 /afs/cern.ch/user/l/lcgspi [87]> ls
/afs/cern.ch/sw/lcg/external/
Ant/                JACE/               Python/             edg-rls-client/
png-lib/            valgrind/
Boost/              JDK/                TJDO/               expat/
root/               wxPython/
CMake/              JDORI/              XalanJ/             gccxml/
scripts/
Colt/               Log4J/              XercesC/            mysql/
tarFiles/
CppUnit/            MMMySQL/            XercesJ/            mysql++/
test.html*
GSL/                Oval/               doxygen/            packages/
uuid/
```


External Software Service - alphabetic (CERN LCG SPI) - Microsoft Internet Explorer fourni par Bluewin
File Edit View Favorites Tools Help
Back Search Favorites Media
Address http://spi.cern.ch/extsoft/
Go Links
LHC Computing Grid Project > Application Area > Software Process & Infrastructure
External Software Service
Home News How to Contact us Search
External Software
Alphabetic order
Language order
Category order
Used in LCG Projects
SPI Quick Links
SPI Home
SPI Index
Projects Portal
The purpose of the External Software Service is to provide software tools and libraries to LCG development teams.
External Software alphabetic list
The 3 icons ( for Linux, for MS Windows and for Solaris) indicate the currently available platforms in AFS (/afs/cern.ch/sw/lcg/external/) and DFS (\\cern.ch\dfs\Projects\LCG\external\). If the platform you are interested in is not present, just contact us and ask for it.
AIDA Abstract Interfaces for Data Analysis
Anaphe C++ libraries for data analysis and visualisation tools
Ant Apache Ant is a Java-based build tool. In theory, it is kind of like Make, but without Make's wrinkles
Boost Portable C++ source libraries
Colt Open Source Libraries for High Performance Scientific and Technical Computing in Java
CppUnit The C++ Unit Test Library
Internet


External Software Service - lcg projects (CERN LCG SPI) - Microsoft Internet Explorer provided by CERN
File Edit View Favorites Tools Help
Back Search Favorites Media
Address http://spi.cern.ch/extsoft/lcgprojects.html
Go Google gridpp7 Search Web
LCG Software
Home
External Software
Alphabetic order
Language order
Category order
Used in LCG Projects
SPI Quick Links
The purpose of the External Software Service is to provide software tools and libraries to LCG deve
External Software used by LCG projects
LCG projects | PI | Pool | | | Seal | |
Versions | 0.1.0 | 0.4 | 0.5.0 | 1.0.0 | 0.1.1 | 0
Platforms | rh73_gcc32 | rh73_gcc32 | rh73_gcc32 | rh73_gcc32 | rh73_gcc32 | rh73
AIDA | 3.0.0
Anaphe | 5.0.3
Ant | 1.5.1 | 1.5.1 | 1.5.1
Boost | 1.29.0 | 1.29.0 | 1.29.0
bz2lib
Colt | 1.0.2 | 1.0.2 | 1.0.2
CppUnit | 1.8.0 | 1.8.0
doxygen
edg-rls-client | 1.1.3 | 1.1.3 | 1.2.11
Local intranet


mysql++ (CERN LCG SPI) - Microsoft Internet Explorer provided by CERN
File Edit View Favorites Tools Help
Back Search Favorites Media
Address http://spi.cern.ch/extsoft/mysql++.html
Go Google gridpp7 Search Web Search Site
LCG
External Software Service
Home News How to Contact us Search
LCG Software
Home
External Software
Alphabetic order
Language order
Category order
Used in LCG Projects
SPI Quick Links
SPI Home
SPI Index
Projects Portal
MySQL++
A C++ binding to MySQL.
Description
MySQL Connector/C++ (or MySQL++) is an application programming interface for the C++ programming language. This adds a powerful level of abstraction on top of the standard C API that makes it possible to work with query result sets in a manner consistent with the standard C++ template libraries (STL).
Availability
/afs/cern.ch/sw/lcg/external/mysql++/1.7.9/rh73_gcc32/
/afs/cern.ch/sw/lcg/external/mysql++/1.7.9/rh73_gcc2952/
/afs/cern.ch/sw/lcg/external/mysql++/1.7.9/rh6l_gcc2952/
Documentation
Provided documentation
Provider: http://www.mysql.com/documentation/mysql++/index.html
Local intranet

# OUTLINE → LCG project portal

**SPI Services**

**LCG software**

CVS and delivery
Code documentation
Testing framework
Builds and releases
…

**LCG libraries**

External software
LCG software distrib

**LCG project portal**

**Developers' web**
**Bug reports**
**FAQ, News**

# Project Portal and Bug Tracker

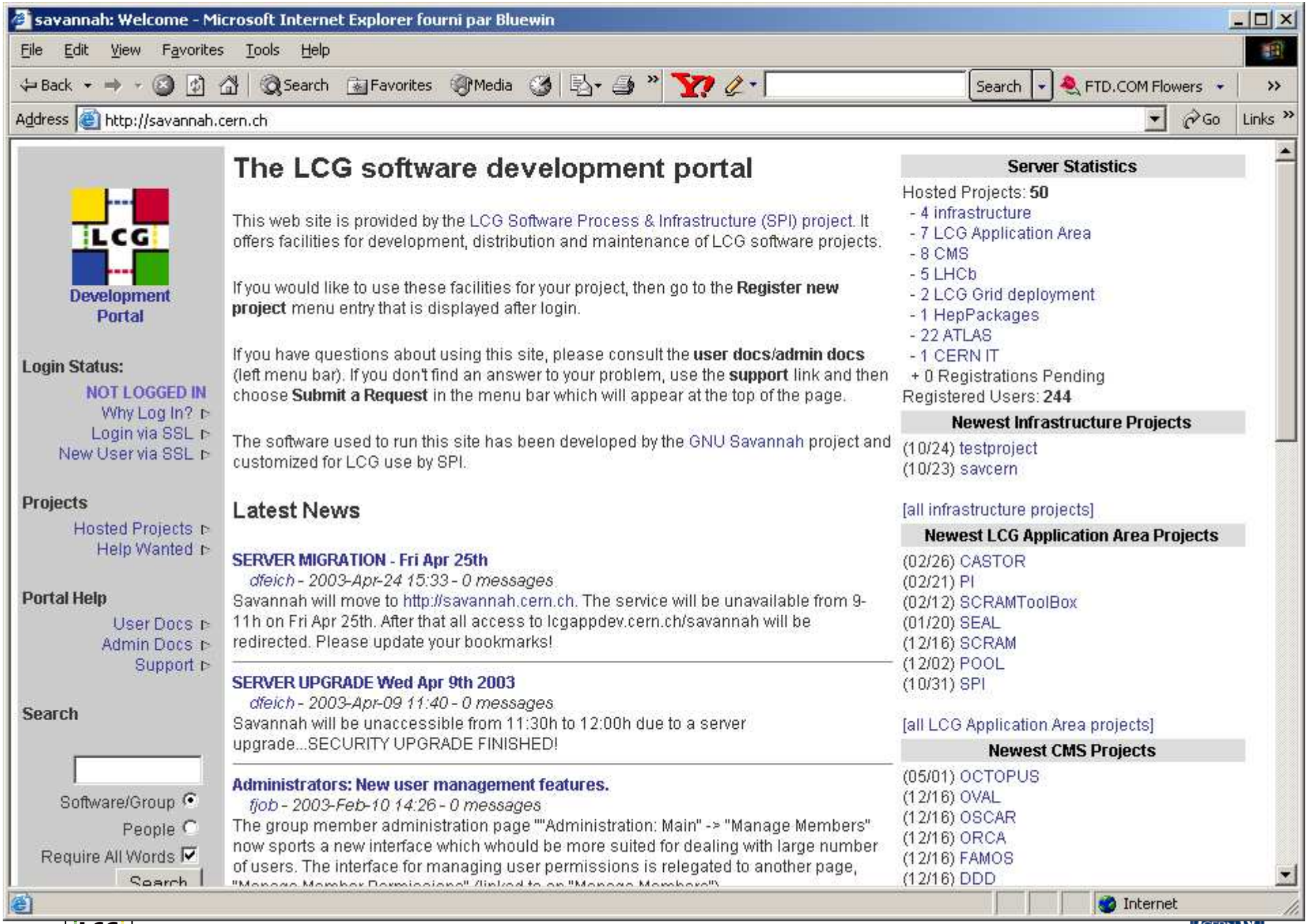
## Project Portal

- The development front-end of every project
- With all features needed, configured and integrated
  - News and Faq
  - Task management
  - Mailing lists access
  - Bug tracking access
  - Download area
  - Access to the CVS repository
- We have customized "Savannah" from GNU

  http://savannah.gnu.org

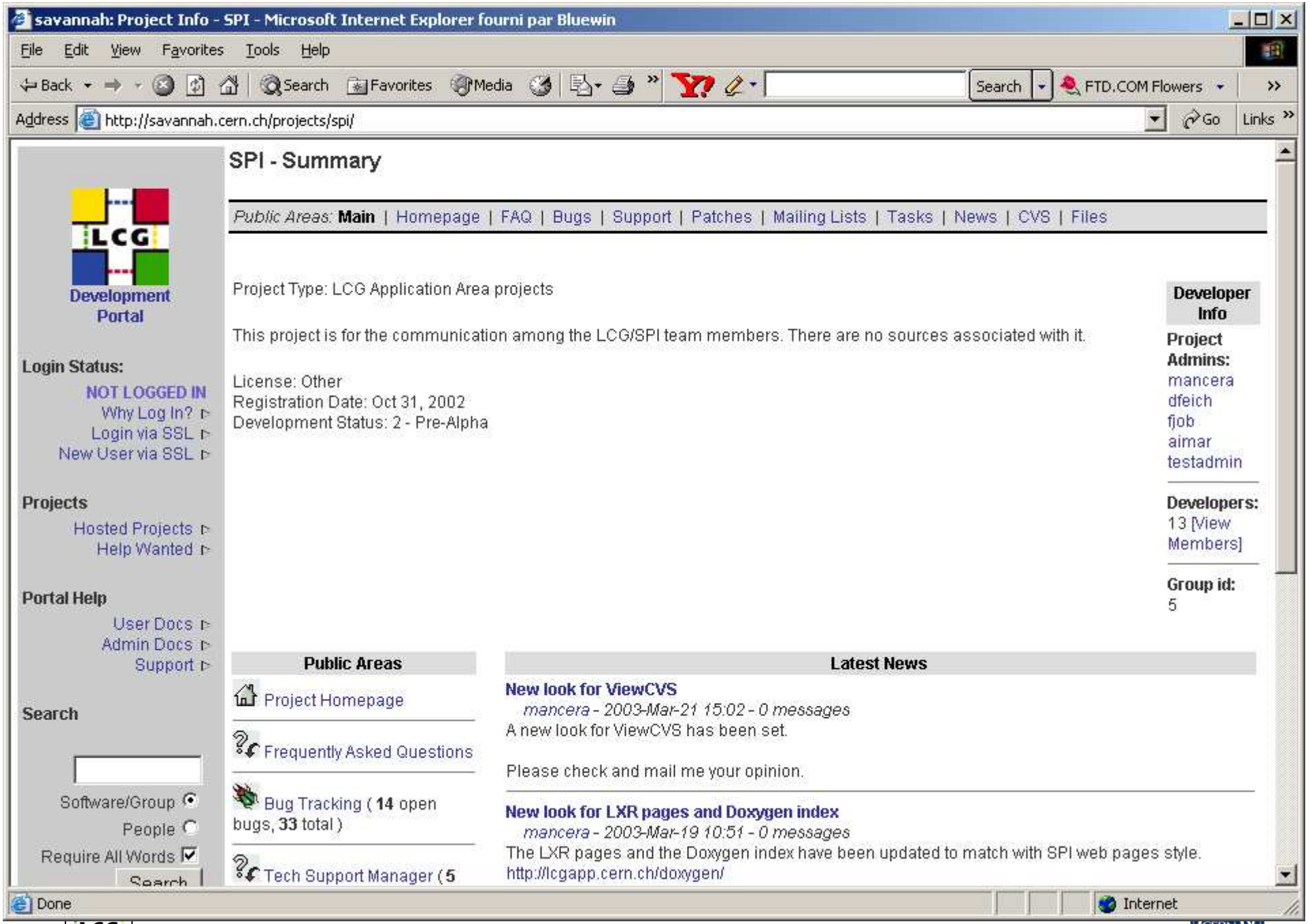
## Bug Tracker

- A central installation so that each project has an available bug tracker system
- Centrally managed but customizable for different needs
- Easier to post bug if projects use similar systems
- No work of maintenance and upgrade on the projects
- Web based


savannah: Welcome - Microsoft Internet Explorer fourni par Bluewin
File Edit View Favorites Tools Help
Back Search Favorites Media Search FTD.COM Flowers
Address http://savannah.cern.ch
Go Links
Development Portal
Login Status:
NOT LOGGED IN
Why Log In?
Login via SSL
New User via SSL
Projects
Hosted Projects
Help Wanted
Portal Help
User Docs
Admin Docs
Support
Search
Software/Group
People
Require All Words
Search
The LCG software development portal
This web site is provided by the LCG Software Process & Infrastructure (SPI) project. It offers facilities for development, distribution and maintenance of LCG software projects.
If you would like to use these facilities for your project, then go to the Register new project menu entry that is displayed after login.
If you have questions about using this site, please consult the user docs/admin docs (left menu bar). If you don't find an answer to your problem, use the support link and then choose Submit a Request in the menu bar which will appear at the top of the page.
The software used to run this site has been developed by the GNU Savannah project and customized for LCG use by SPI.
Latest News
SERVER MIGRATION - Fri Apr 25th
dfeich - 2003-Apr-24 15:33 - 0 messages
Savannah will move to http://savannah.cern.ch. The service will be unavailable from 9-11h on Fri Apr 25th. After that all access to lcgappdev.cern.ch/savannah will be redirected. Please update your bookmarks!
SERVER UPGRADE Wed Apr 9th 2003
dfeich - 2003-Apr-09 11:40 - 0 messages
Savannah will be unaccessible from 11:30h to 12:00h due to a server upgrade...SECURITY UPGRADE FINISHED!
Administrators: New user management features.
fjob - 2003-Feb-10 14:26 - 0 messages
The group member administration page ""Administration: Main" -> "Manage Members" now sports a new interface which whould be more suited for dealing with large number of users. The interface for managing user permissions is relegated to another page,
Server Statistics
Hosted Projects: 50
- 4 infrastructure
- 7 LCG Application Area
- 8 CMS
- 5 LHCb
- 2 LCG Grid deployment
- 1 HepPackages
- 22 ATLAS
- 1 CERN IT
+ 0 Registrations Pending
Registered Users: 244
Newest Infrastructure Projects
(10/24) testproject
(10/23) savcern
[all infrastructure projects]
Newest LCG Application Area Projects
(02/26) CASTOR
(02/21) PI
(02/12) SCRAMToolBox
(01/20) SEAL
(12/16) SCRAM
(12/02) POOL
(10/31) SPI
[all LCG Application Area projects]
Newest CMS Projects
(05/01) OCTOPUS
(12/16) OVAL
(12/16) OSCAR
(12/16) ORCA
(12/16) FAMOS
(12/16) DDD
Internet

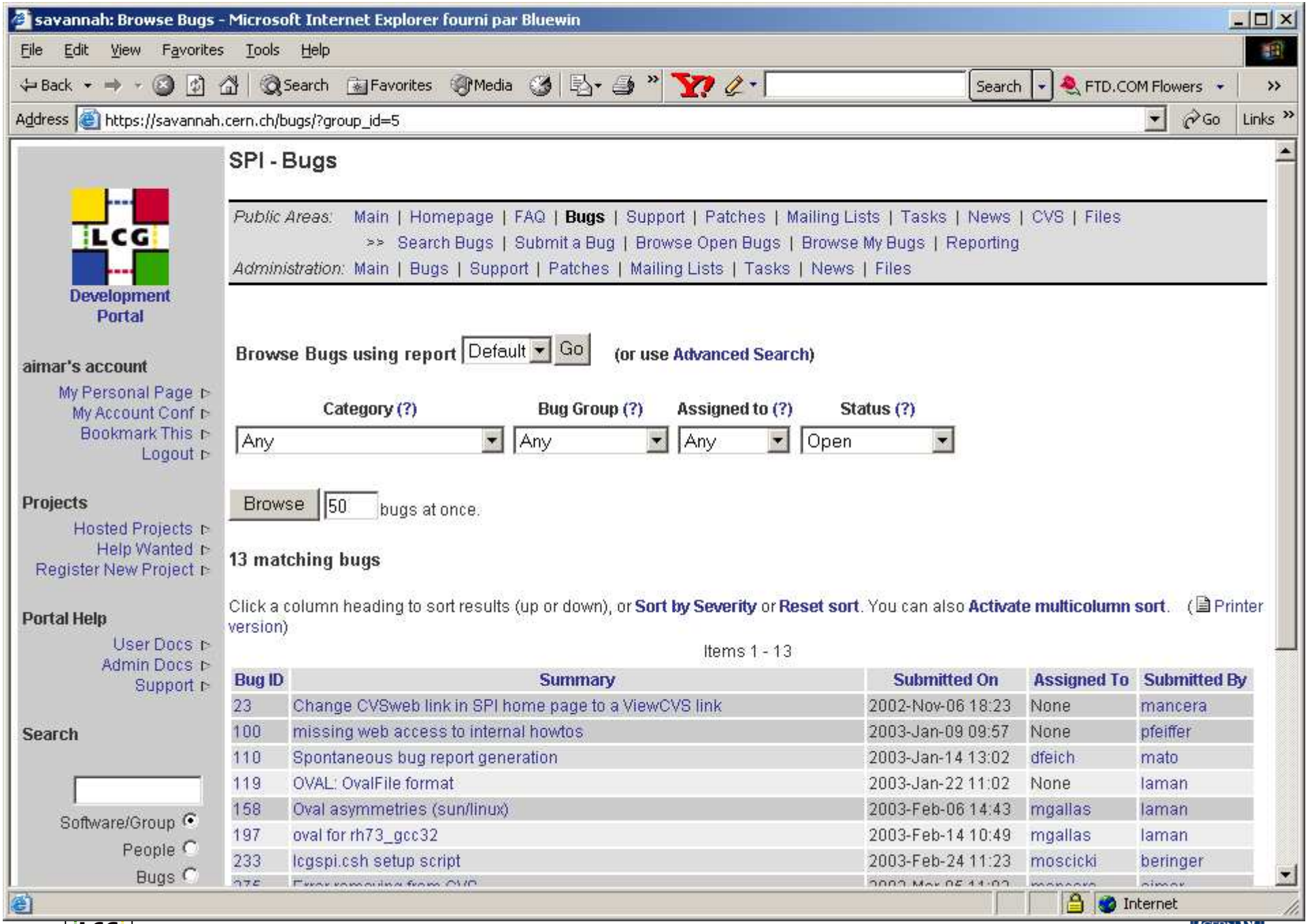
# Benefits

- Totally web based
- Single entry point to project(s)
- Uniform access to project information
- Set up common web infrastructure for a project without coding


savannah: Project Info - SPI - Microsoft Internet Explorer fourni par Bluewin
File Edit View Favorites Tools Help
Back Search Favorites Media Search FTD.COM Flowers
Address http://savannah.cern.ch/projects/spi/
Go Links
LCG
Development Portal
Login Status:
NOT LOGGED IN
Why Log In?
Login via SSL
New User via SSL
Projects
Hosted Projects
Help Wanted
Portal Help
User Docs
Admin Docs
Support
Search
Software/Group
People
Require All Words
Search
SPI - Summary
Public Areas: Main | Homepage | FAQ | Bugs | Support | Patches | Mailing Lists | Tasks | News | CVS | Files
Project Type: LCG Application Area projects
This project is for the communication among the LCG/SPI team members. There are no sources associated with it.
License: Other
Registration Date: Oct 31, 2002
Development Status: 2 - Pre-Alpha
Developer Info
Project Admins:
mancera
dfeich
fjob
aimar
testadmin
Developers:
13 [View Members]
Group id:
5
Public Areas
Project Homepage
Frequently Asked Questions
Bug Tracking ( 14 open bugs, 33 total )
Tech Support Manager ( 5
Latest News
New look for ViewCVS
mancera - 2003-Mar-21 15:02 - 0 messages
A new look for ViewCVS has been set.
Please check and mail me your opinion.
New look for LXR pages and Doxygen index
mancera - 2003-Mar-19 10:51 - 0 messages
The LXR pages and the Doxygen index have been updated to match with SPI web pages style.
http://lcgapp.cern.ch/doxygen/
Done
Internet

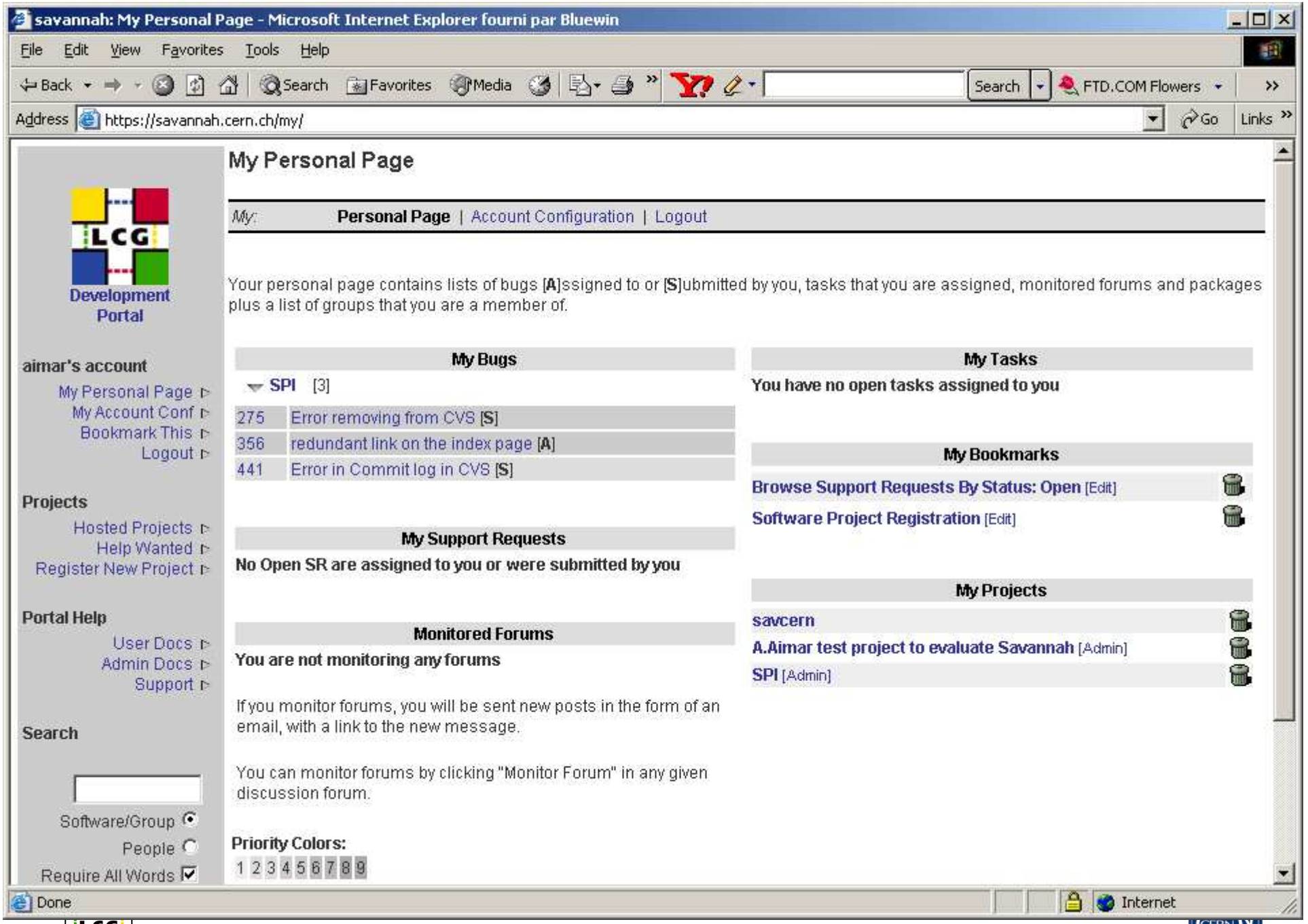
# Bug tracker

- Fields customizable for each project
- File uploads
- Audit trail
- Full text searches
- Cc forwarding


savannah: Browse Bugs - Microsoft Internet Explorer fourni par Bluewin
File Edit View Favorites Tools Help
Back Search Favorites Media Search FTD.COM Flowers
Address https://savannah.cern.ch/bugs/?group_id=5
Go Links
LCG
Development Portal
aimar's account
My Personal Page
My Account Conf
Bookmark This
Logout
Projects
Hosted Projects
Help Wanted
Register New Project
Portal Help
User Docs
Admin Docs
Support
Search
Software/Group
People
Bugs
SPI - Bugs
Public Areas: Main | Homepage | FAQ | Bugs | Support | Patches | Mailing Lists | Tasks | News | CVS | Files
>> Search Bugs | Submit a Bug | Browse Open Bugs | Browse My Bugs | Reporting
Administration: Main | Bugs | Support | Patches | Mailing Lists | Tasks | News | Files
Browse Bugs using report Default Go (or use Advanced Search)
Category (?) Bug Group (?) Assigned to (?) Status (?)
Any Any Any Open
Browse 50 bugs at once.
13 matching bugs
Click a column heading to sort results (up or down), or Sort by Severity or Reset sort. You can also Activate multicolumn sort. (Printer version)
Items 1 - 13
Bug ID | Summary | Submitted On | Assigned To | Submitted By
23 | Change CVSweb link in SPI home page to a ViewCVS link | 2002-Nov-06 18:23 | None | mancera
100 | missing web access to internal howtos | 2003-Jan-09 09:57 | None | pfeiffer
110 | Spontaneous bug report generation | 2003-Jan-14 13:02 | dfeich | mato
119 | OVAL: OvalFile format | 2003-Jan-22 11:02 | None | laman
158 | Oval asymmetries (sun/linux) | 2003-Feb-06 14:43 | mgallas | laman
197 | oval for rh73_gcc32 | 2003-Feb-14 10:49 | mgallas | laman
233 | lcgspi.csh setup script | 2003-Feb-24 11:23 | moscicki | beringer
Internet

# Personalize web page

- A logged in user gets
  - a customizable personal entry page
  - display of current work status
    - User's bugs, tasks, ...
    - Monitored news threads
    - Bookmarks


savannah: My Personal Page - Microsoft Internet Explorer fourni par Bluewin
File Edit View Favorites Tools Help
Back Search Favorites Media Search FTD.COM Flowers
Address https://savannah.cern.ch/my/
Go Links
Development Portal
aimar's account
My Personal Page
My Account Conf
Bookmark This
Logout
Projects
Hosted Projects
Help Wanted
Register New Project
Portal Help
User Docs
Admin Docs
Support
Search
Software/Group
People
Require All Words
My Personal Page
My: Personal Page | Account Configuration | Logout
Your personal page contains lists of bugs [A]ssigned to or [S]ubmitted by you, tasks that you are assigned, monitored forums and packages plus a list of groups that you are a member of.
My Bugs
SPI [3]
275 Error removing from CVS [S]
356 redundant link on the index page [A]
441 Error in Commit log in CVS [S]
My Support Requests
No Open SR are assigned to you or were submitted by you
Monitored Forums
You are not monitoring any forums
If you monitor forums, you will be sent new posts in the form of an email, with a link to the new message.
You can monitor forums by clicking "Monitor Forum" in any given discussion forum.
Priority Colors:
1 2 3 4 5 6 7 8 9
My Tasks
You have no open tasks assigned to you
My Bookmarks
Browse Support Requests By Status: Open [Edit]
Software Project Registration [Edit]
My Projects
savcern
A.Aimar test project to evaluate Savannah [Admin]
SPI [Admin]
Done
Internet

# And much more…

- News system
- Task manager
- Consolidate project links
  - ViewCVS (, Doxygen, LXR, Bonzai, ...)
  - Project homepage
  - Mailing lists (subscribe/unsubscribe)
- FAQ system (user/admin documents)
- Support manager
- Download area
- Patch manager
- Projects administrators can choose what to use for each project

# Specific implementations

- General bug fixing and improvements
- Implemented bulk user registration
  - Get a list of users and add/remove them all without registering them one by one
- Integration with AFS authentication
  - Added a PAM module to verify a login against the AFS authentication
  - The user can still define a password not using the AFS password
- Sending back to Savannah our changes, patches and fixes
- **More than 50 projects LCG, LHC experiments, and other projects at CERN**
- **http://savannah.cern.ch**

# Conclusions

- Homogeneity is important for the LCG and for its projects
  - Help people to move from project to project or work across projects
    → common structure, same tools, etc
  - Common services are avoiding many annoying tasks to projects
    → software library, repository
  - A single users/developers entry for multiple projects
    → projects portal

- SPI's address is → http://spi.cern.ch