



# Code Documentation

## Luis Mancera

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**LCG Software Process & Infrastructure  
(CERN, 10/23/02)**



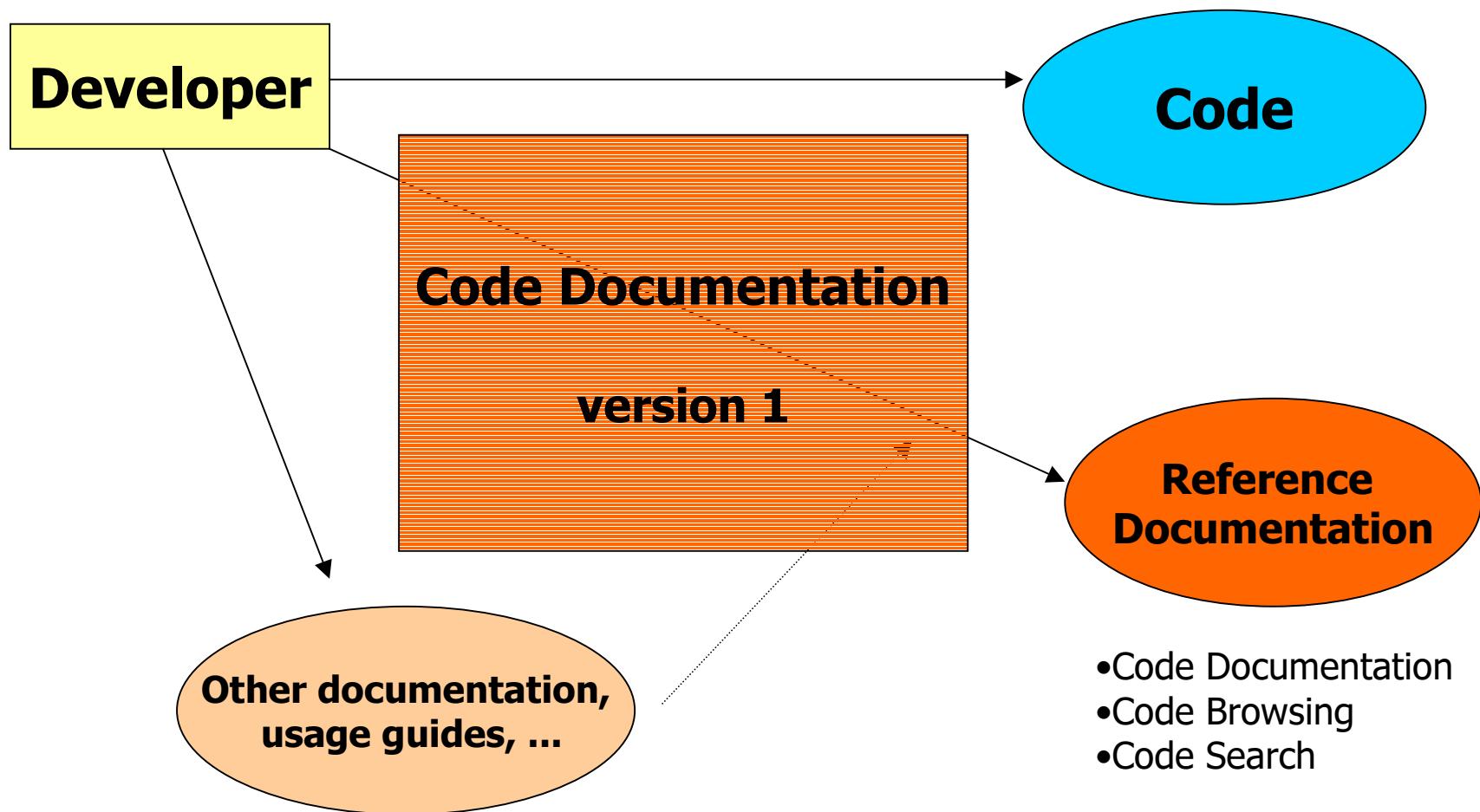
# Description of the Component

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- Analyze different Code Documentation Systems
- Decide what and how is going to be used
- Features of interest:
  - Code browsing
  - Code searching
  - Code information
  - Design diagrams
- Work in collaboration with HEP experiments and projects



# Code Documentation:





# Component Documentation

- All information about the component
  - <http://cern.ch/mancera/spi>

The screenshot shows a web browser window with the following details:

- Title Bar:** http://mancera.home.cern.ch/mancera/spi/CodeDoc-24-10-02.html - Wanadoo, L'Internet avec France Telecom
- Menu Bar:** Archivo, Edición, Ver, Favoritos, Herramientas, Ayuda
- Toolbar:** Atrás, Adelante, Detener, Actualizar, Inicio, Búsqueda, Favoritos, Historial, Correo, Imprimir, Modificar, Discutir
- Address Bar:** Dirección: http://mancera.home.cern.ch/mancera/spi/CodeDoc-24-10-02.html
- Content Area:**
  - Section:** LCG Application Area - LCG Infrastructure
  - Title:** Component: CODE DOCUMENTATION
  - Table:** Responsible persons

Responsible persons	Luis Mancera
Last Update	24-10-2002
Version	CDOC-00.09

  - Text:** Return to [index](#)
  - Note:** Note: This is the internal documentation of the component. Not the way the user will see and use what the component provides.
  - Section:** 1. Description of the component
  - Section:** 1.1 Purpose of the component
  - Text:** This component deals about the code documentation standards for the LCG projects. The points to follow will be to analyze different code documentation systems and decide what is going to be used by the LCG developers to browse, search and document the code. The idea is to...





# Main steps followed

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- Technology survey
  - Web Survey
    - ALICE, ATLAS, CMS, LHCb, LHC++, Anaphe, ROOT, Monarc, Geant 4, BaBar, Coral
    - Also surveyed some not-CERN projects
    - Main products found: Doxygen, ViewCVS, CVSweb, LXR, Internal ones,...
    - Other products: DOC++, Doc-o-matic, winCVS, Ignominy, some commercial ones...
  - Contact HEP projects and experiments
    - Gabriele Cosmo (Geant 4):
      - Use LXR, Recommend Doxygen and CVS browsers
    - Nick Sinanis (CMS):
      - Use and recommend LXR, Doxygen and ViewCVS
    - Benigno Gobbo (Coral):
      - Use and recommend Doxygen





# Main steps followed (II)

- Choose products to use
- Install and create documentation
- Wait feedback from LCG projects





# CVS Browsing: ViewCVS (I)

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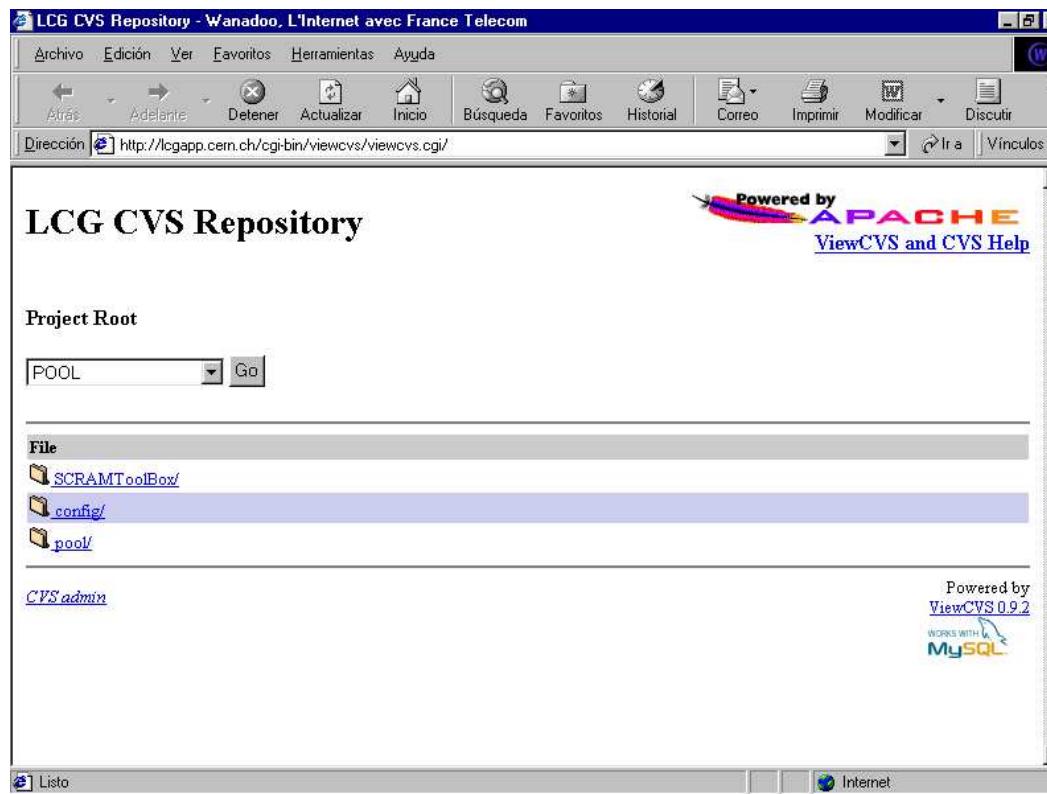
- Browse directories, change logs, and specific revisions of files.
  - Complete interaction with CVS
  - Compared to CVSSweb:
    - Easy to configure, less bugs, more features, better implemented, tarball generation
  - Widely used:
    - ATLAS, ALICE, CMS, Sourceforge,...
  - Recommended by the people contacted
    - Nick Sinanis (CMS)





# CVS browsing: ViewCVS (II)

- ViewCVS 0.9.2 installed at lcgapp:
  - <http://lcgapp.cern.ch/cgi-bin/viewcvs/viewcvs.cgi/>





# CVS browsing: ViewCVS (III)

- Additional features installed by now:
  - CVSSgraph 1.3.0: Displays the tree of revisions and branches graphically
  - Enscript 1.6.1: Colorize files in the CVS repository.

The screenshot shows two side-by-side windows from Microsoft Internet Explorer. The left window displays the CVS log for the file `DataTransform.cpp`. It shows a single revision (1.4) made by user `frankb` on `Fri Oct 11 10:03:36 2002 UTC`. The right window shows a revision graph for the file `ConversionSvc.cpp`. The graph illustrates the commit history, with revisions 1.1 through 1.5 shown as nodes. Revision 1.1 is the root node, and revision 1.5 is the HEAD node. A specific commit, revision 1.1.1.1, is highlighted with a red border and labeled "arelease". The graph also shows the relationship between revisions 1.1, 1.2, 1.3, 1.4, and 1.5, with arrows indicating the flow of changes. The ViewCVS logo is visible at the bottom right of the graph window.

```
#include "pool/poolDB.h"
#include "pool/Uuid.h"
#include "pool/DataCallBack.h"
#include "pool/DataTransform.h"
#include "pool/DbTypeInfo.h"
#include "reflect/Class.h"
#include <iostream>
#include <map>

namespace pool {
    const std::string typeName(const std::type_info& typ);

    typedef std::map<pool::Guid, pool::DataCallBack*> Conversions;
    typedef std::vector<const pool::DbTypeInfo*> ShapeVector;
    typedef std::map<pool::Guid, ShapeVector> Shapes;

    namespace { // Don't clutter global namespace
        class RegInfo {
        public:
            pool::Guid defGuid;
            const pool::ObjectType* defType;
            const pool::DbTypeInfo* defShape;
    
```





# X ref. and searching: LXR (I)

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- Cross-Referencing Code
  - General hypertext cross-referencing tool
  - Powerful search tool
  - Requires no code changes
  - Easy to manage and launch
  - Widely used
    - ATLAS, CMS, Anaphe, GNOME
- Recommended by the people contacted
  - Gabriele Cosmo (Geant4), Nick Sinanis (CMS)



# X ref. and searching : LXR (II)



- Open issues:
  - Could be slow to update when the projects become big ones ☹
  - It needs its own separate copy of the code ☹
  - Bad documentation ☹
  - Maybe not needed if Doxygen can give us all LXR functionality



# X ref. and searching: LXR (III)

- LXR 0.3 installed at:
  - <http://lcgapp.cern.ch/lxr/source>

The screenshot shows a Microsoft Internet Explorer window displaying the LXR search results for the keyword "int". The address bar shows the URL <http://lcgapp.cern.ch/lxr/search?string=int>. The page title is "freetext search "int"" and it is provided by CERN. The main content area is titled "Software Cross Reference" and shows the results for the search term "int". It includes a search bar with the placeholder "Search for: int" and a "search" button. Below the search bar, there is a note: "This searchpage is powered by Glimpse". The results list various occurrences of "int" across different files and lines of code, such as "Geant 4.4.0/Configure, line 140 -- hint=\", Geant 4.4.0/Configure, line 378 -- printf(\"%s\\n\", str);", and "Geant 4.4.0/Configure, line 385 -- printf(\"%s\\n\", substr(str, i));". The left side of the screen shows the source code for MethodBuilder.cpp, specifically the constructor definition.

```
File /home/lxr/source/current//POOL_0_1_0/ReflectionBuilder/src/MethodBuilder.
1 // $Id: MethodBuilder.cpp,v 1.4 2002/10/11 18:03:03 roiser Exp $
2
3 // Include files
4 #include "reflect/ClassBuilder.h"
5 #include "reflect/MethodBuilder.h"
6
7 #include "reflect/Method.h"
8 #include "reflect/Class.h"
9 #include "reflect/Namespace.h"
10
11
12
13 //-----
14 Reflect::MethodBuilder::MethodBuilder(const std::string& name,
15                                     const std::string& desc,
16                                     const std::string& returnType,
17                                     const std::vector<std::string>& argumentTypes,
18                                     void*(vfpvs)(void*,std::vector<void*
19                                     int modifiers)
20 //-----
21 : ItemBuilder(name, desc, modifiers),
22 m_returnType(returnType),
23 m_argumentTypes(argumentTypes),
24 m_vfpvs(vfpvs),
25 m_vfps(0),
26 m_vfpv(0),
27 m_vfn(0)
```





# Code Doc: Doxygen (I)

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- Documentation system for C++, C, Java, IDL and PHP.
- Generates on-line documentation browser (html)
- Generates off-line reference manual (latex)
- Other output formats: RTF, Postscript, PDF, compressed HTML, Unix man pages





# Code doc: Doxygen (II)

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- Complete: Code browsing (cross referenced), code reference, search, code structure, diagrams,...
- Flexible
- Well documented
- It can be used to create normal documentation (.dox)
  - Adds every .dox file under <project>/doc
- Widely used
  - CMS, Anaphe, BaBar, Coral, ...
- Recommended by the people contacted
  - Gabriele Cosmo (Geant4), Nick Sinanis (CMS), Benigno Gobbo (Coral)





# Code doc: Doxygen (III)

- Common doxygen 1.2.18 area created at lcgapp:
  - <http://lcgapp.cern.ch/doxygen/>

The screenshot shows a web browser window displaying the Doxygen-generated documentation for the `DataCache.cpp` source file. The browser is a classic Mac OS X style, titled "DataCache.cpp Source File - Wanadoo, L'Internet avec France Telecom". The main content area shows the C++ code for `DataCache.cpp` with line numbers and syntax highlighting. Above the code, there is a navigation bar with links like Main Page, Packages, Namespace List, Class Hierarchy, etc. Below the code, the title "DataCache.cpp" is displayed. To the right of the code, there is a "POOL Documentation" section with the version "0\_1\_0" and a note about the generation date: "Generated at Mon Oct 21 10:09:20 2002 for POOL by doxygen 1.2.8.I written by Dimitri van Heesch, © 1997-2001". The browser's status bar at the bottom indicates "Internet".

```
00001 #define POOL_OBJECTCACHE_CPP 1
00002
00003 #include "DataCache.h"
00004
00005 // Initialize static pointer
00006 //pool::CacheTable* pool::DataCache::theCache = 0;
00007
00008 // Method to retrieve the (single) Cache instance
00009 pool::CacheTable* pool::DataCache::getCache() {
00010     //if(!theCache){
00011         //    theCache = new CacheTable();
00012         CacheTable* theCache = new CacheTable();
00013     //}
00014     return theCache;
00015 }
00016
00017 // Method to delete the Cache instance
00018 //void pool::DataCache::deleteCache() {
00019 //    delete theCache;
00020 //    theCache = 0;
00021 //}
```





# Code doc: Doxygen (IV)

- doxygen 1.2.18 documentation placed lcgapp:
  - <http://lcgapp.cern.ch/doxygen/doc/>

A screenshot of a Microsoft Internet Explorer window displaying the Doxygen documentation. The title bar reads "http://lcgapp.cern.ch/doxygen/doc/ - Microsoft Internet Explorer provided by CERN". The main content area shows the large "doxygen" logo with a gradient from yellow to red, followed by the text "Version: 1.2.18". Below the logo is a section titled "Introduction". It states: "Doxygen is a documentation system for C++, C, Java, IDL (Corba, Microsoft, and KDE-DCOP flavors) and to some extent PHP. It can help you in three ways: 1. It can generate an on-line documentation browser (in HTML) and/or an off-line reference manual (in L<sup>A</sup>T<sub>E</sub>X) from a set of documented source files. There is also support for generating output in RTF (MS-Word), PostScript, hyperlinked PDF, compressed HTML, and Unix man pages. The documentation is extracted directly from the sources, which makes it much easier to keep the documentation consistent with the source code. 2. Doxygen can be configured to extract the code structure from undocumented source files. This can be very useful to quickly find your way in large source distributions. The relations between the various elements are be visualized by means of include dependency graphs, inheritance diagrams, and collaboration diagrams, which are all generated automatically. 3. You can even 'abuse' doxygen for creating normal documentation (as I did for this manual).". At the bottom of the page, it says: "Doxygen is developed under Linux, but is set-up to be highly portable. As a result, it runs on most other Unix flavors as well. Furthermore, executables for Windows 9x/NT and Mac OS X are available." and "This manual is divided into three parts, each of which is divided into several sections." and "The first part forms a user manual." The status bar at the bottom of the browser window shows "Done" and "Internet".



# To do

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- Finalize ViewCVS features installation
- Include Doxygen search functionality
- Move into a fully automatic update system for LXR and Doxygen
- Create good user documentation
- Interacting with POOL for review and changes
- Component in production soon

