

# Subversion Tutorial

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CERN - LHCb

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# Outline

## Introduction

Motivation

Subversion

Tools

## Subversion in LHCb

Repository Structure

Common Operations

## The Working Copy

Getting Informations

The Base Version

## Migration



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# Why migrate to Subversion?

## What's wrong with CVS?

- General arguments
  - Subversion was developed to replace CVS overcoming its limitations (see [Subversion's History](#))
  - Stable and mature product (started in 2000)
- CERN IT arguments
  - Some HEP projects started to use it (ROOT)
  - Lot of requests to have a Subversion service
  - People working on CVS service about to retire
  - No manpower to maintain two services

# Why migrate to Subversion?

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# Subversion Philosophy

From the Subversion F.A.Q.

## Interface to the repository

[...] Subversion's repository interface [...] is a "**versioned filesystem**" in the sense that it stores a directory tree whose state is remembered from revision to revision. [...] this particular filesystem doesn't lose data when written to; **old tree states can be retrieved as easily the most recent state**.

## Tags and branches

[...] **branches and tags are conventions** built on top of copies, instead of being basic concepts built into Subversion itself [...]



# Main Features

- Subversion remembers
  - files
  - directories
  - meta-data (properties)
  - copies
- Atomic commits (transactional)
  - no partial commits in case of failure
- Support for binary files
  - binary diffs
- Simplified conflicts resolution
- Quick diff/status (without network)
- Extreme flexibility
- No built-in concept of tag
- Constant-time *tagging* and *branching*



# Revision Numbers and Commits

- The repository is a **versioned filesystem**
  - changes in the whole repository
  - copies and move/rename
  - meta-data/properties for files and directories
    - symbolic links
    - execution bit
    - ...
  - one revision number for the whole repository
- Each commit is an increment of the global revision number
  - it is a set of changes on a set of files and directories
  - the history of a file shows only the revision where it was modifies
  - from a revision number you see all the files that changed at the same time (e.g. a `.h` and a `.cpp`)

# Tags and Branches

**Forget tags and branch tags:** they do not exist.

- No built-in concept of tag and branch
- How can we *tag* or *branch*?
  - we have a versioned filesystem that tracks copies
  - let's make copies
- Conventional structure to support tags
  - 3 main directories
    - **trunk**: main line of development
    - **tags**: copies that we want to keep stable
    - **branches**: copies that we want to modify
  - no restriction on names or structure
- Side effect
  - check out a *tag* is not equivalent to check out a revision along the main trunk: it is a different location in the repository.

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# Configuration

- See [CERN SVN How-To](#)
- Same as the configuration needed for CVS
  - ssh access without password (kerberos or ssh key)
  - have a client installed
  - minor changes in `$HOME/.ssh/config`



# The command line client

svn

- Similar to the `cv`s command
  - accepts **actions**
  - same name for most common **actions**
- Different from the `cv`s command
  - no positional options
  - **no tag** actions
  - **copy**, **move** and **mkdir** actions
- Get help with `svn help <command>` or `svn -h`

# Web interface

- Two web interfaces available:
  - WebSVN: <http://svnweb.cern.ch/world/wsvn/lhcb>
  - Trac: <https://svnweb.cern.ch/trac/lhcb/browser>
- Similar functionalities
  - History, changesets, RSS feeds
- Some differences
  - Trac shows properties, better browsing, integrated twiki and issue tracker

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# Organization of the Repository

## From Gaudi twiki: Rationale

Our development model requires the necessity to have **package level tags** and branches. At the same time, we need something that can be used as a **tag on the whole project**. Moreover, LHCb unique CVS **repository** is **hosting many CMT projects** and a global tag is pointless, but we can profit from the possibility of check out a complete tagged project in one command.

- Project/trunk/cmt
- Project/trunk/[Hat/]Package
- Project/tags/[Hat/]Package/version
- Project/tags/PROJECT/PROJECT\_version/cmt
- Project/branches/[Hat/]Package/branch\_id

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# Check-out

Note: check out a *tag* is not equivalent to

- `svn checkout URL[@REV]...[PATH]`
- URL = `svn+ssh://svn.cern.ch/repos/lhcb/...`
- e.g.  
`svn co $REPOS/Project/tags/Package/version \`  
`Package`  
`svn co $REPOS/Proj/trunk/Package`

Easier with `getpack`

- `getpack Package version`

`REPOS=svn+ssh://svn.cern.ch/repos/lhcb`

## Comparison

`svn diff` is a complex command with several possibilities.  
The simplest cases:

- Compare local changes with base version
  - `svn diff`
- Compare local copy with latest revision in repository
  - From a check out of the trunk:
 

```
svn diff -r HEAD
```

- Compare two tags

```
svn diff \  
$REPOS/Project/tags/Package/version1 \  
$REPOS/Project/tags/Package/version2
```

- Cannot compare local with with another remote path

`REPOS=svn+ssh://svn.cern.ch/repos/lhcb`

# Manipulate Working Copy

- Always use `svn` actions
  - `svn rm`
  - `svn cp`
  - `svn mv`
  - `svn mkdir`

More details about the working copy later

# Commit

- Essentially identical to the commit in CVS

## svn help ci

commit (ci): Send changes from your working copy to the repository.

usage: commit [PATH...]

A log message must be provided, but it can be empty. If it is not given by a --message or --file option, an editor will be started.

...

- Executed in a transaction
  - either all the changes are applied or none of them

# Commit messages

We may get rid of `release.notes` if we use the commit messages

```
lxplus5 > svn log svn+ssh://svn.cern.ch/repos/lhcb/LHCb/trunk/Det/DetCond
```

```
-----  
r5730 | cattanem | 2010-01-20 15:46:11 +0100 (Wed, 20 Jan 2010) | 2 lines
```

```
v12r9 tag
```

```
-----  
r5716 | marcocle | 2010-01-19 14:13:20 +0100 (Tue, 19 Jan 2010) | 3 lines
```

```
Fixes to the first implementation of task #13270.
```

```
https://savannah.cern.ch/task/?13270
```

```
-----  
r5679 | marcocle | 2010-01-12 20:06:29 +0100 (Tue, 12 Jan 2010) | 3 lines
```

```
Completed task #13270: Block access to conditions in ONLINE partition if  
                        validity interval is not closed
```

```
https://savannah.cern.ch/task/?13270
```

```
-----  
r5650 | cattanem | 2009-12-11 14:39:28 +0100 (Fri, 11 Dec 2009) | 2 lines
```

```
v12r8
```

```
-----  
r5624 | dgolubko | 2009-12-05 15:39:20 +0100 (Sat, 05 Dec 2009) | 2 lines
```

```
add python interface to access histogram parameters of the Condition
```

# Commit From Many Packages

- After a `getpack` of several packages, it is not possible to do a single commit on all of them
- There is a trick:

```
getpack Det/DetCond head
getpack Tools/CondDBUI head
svn co -N svn+ssh://svn/repos/lhcb Det
svn co -N svn+ssh://svn/repos/lhcb Tools
svn co -N svn+ssh://svn/repos/lhcb .
svn ci Det/DetCond Tools/CondDBUI
```

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svn ci Det/DetCond Tools/CondDBUI
```

# Tag

Tags are conventions

- Tag the head of a package

```
svn cp \  
  $REPOS/Project/trunk/Package \  
  $REPOS/Project/tags/Package/version
```

or

```
tag_package Package version
```

- Tag the head of a project

(cmt/project.cmt)

```
svn mkdir \  
  $REPOS/Project/tags/PROJECT/PROJECT_vers
```

```
svn cp \  
  $REPOS/Project/trunk/cmt \  
  $REPOS/Project/tags/PROJECT/PROJECT_vers
```

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Motivation

Subversion

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The Base Version

## Migration

# Getting Informations

- `svn info`  
(tag example)

```
Path: .  
URL: svn+ssh://svn.cern.ch/repos/lhcb/LHCb/tags/Det/DetCond/v12r9  
Repository Root: svn+ssh://svn.cern.ch/repos/lhcb  
Repository UUID: 4525493e-7705-40b1-a816-d608a930855b  
Revision: 5863  
Node Kind: directory  
Schedule: normal  
Last Changed Author: cattanem  
Last Changed Rev: 5731  
Last Changed Date: 2010-01-20 15:50:36 +0100 (Wed, 20 Jan 2010)
```

# Getting Informations

- `svn info`

(trunk example)

Path: .

URL: `svn+ssh://svn.cern.ch/repos/lhcb/LHCb/trunk/Det/DetCond`

Repository Root: `svn+ssh://svn.cern.ch/repos/lhcb`

Repository UUID: `4525493e-7705-40b1-a816-d608a930855b`

Revision: 5863

Node Kind: directory

Schedule: normal

Last Changed Author: cattanem

Last Changed Rev: 5730

Last Changed Date: 2010-01-20 15:46:11 +0100 (Wed, 20 Jan 2010)

# Getting Informations

- `svn status`
  - check the status of the working against the base version
  - no network connection required
- `svn status -u`
  - check the status of the working copy against the latest version in the repository
  - network connection required
  - limited to the path of the working version

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# Re-basing the Working Copy

As with `cvs update`

- Move back and forth on the same path (`svn update`)

```
lxplus5 > svn help up  
update (up): Bring changes from the repository into the working copy.  
usage: update [PATH...]  
...
```

- Change the path of the base (`svn switch`)

```
lxplus5 > svn help switch  
switch (sw): Update the working copy to a different URL.  
usage: 1. switch URL [PATH]  
       2. switch --relocate FROM TO [PATH...]  
  
1. Update the working copy to mirror a new URL within the repository.  
   This behaviour is similar to 'svn update', and is the way to  
   move a working copy to a branch or tag within the same repository.  
...
```



## Example of switch

```
lxplus5 > getpack Det/DetCond v12r8
```

• • •

• • •

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```

```
...
```

```
Checked out revision 5863.
```

```
Processed packages:
```

```
    Det/DetCond      v12r8
```

```
lxplus5 > cd Det/DetCond
```

```
lxplus5 > svn info | grep URL
```

```
URL: svn+ssh://svn.cern.ch/repos/lhcb/LHCb/tags/Det/DetCond/v12r8
```

```
lxplus5 > svn switch \
```

```
?  svn+ssh://svn.cern.ch/repos/lhcb/LHCb/tags/Det/DetCond/v12r9
```

```
U    python/DetCond/Configuration.py
```

```
...
```

```
Updated to revision 5863.
```

```
lxplus5 > svn info | grep URL
```

```
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```
?  svn+ssh://svn.cern.ch/repos/lhcb/LHCb/trunk/Det/DetCond
```

```
At revision 5863.
```

```
lxplus5 > svn info | grep URL
```

```
URL: svn+ssh://svn.cern.ch/repos/lhcb/LHCb/trunk/Det/DetCond
```



## Example of switch

```
lxplus5 > getpack Det/DetCond v12r8
```

```
...
```

```
Checked out revision 5863.
```

```
Processed packages:
```

```
    Det/DetCond      v12r8
```

```
lxplus5 > cd Det/DetCond
```

```
lxplus5 > svn info | grep URL
```

```
URL: svn+ssh://svn.cern.ch/repos/lhcb/LHCb/tags/Det/DetCond/v12r8
```

```
lxplus5 > svn switch \
```

```
?  svn+ssh://svn.cern.ch/repos/lhcb/LHCb/tags/Det/DetCond/v12r9
```

```
U    python/DetCond/Configuration.py
```

```
...
```

```
Updated to revision 5863.
```

```
lxplus5 > svn info | grep URL
```

```
URL: svn+ssh://svn.cern.ch/repos/lhcb/LHCb/tags/Det/DetCond/v12r9
```

```
lxplus5 > svn switch \
```

```
?  svn+ssh://svn.cern.ch/repos/lhcb/LHCb/trunk/Det/DetCond
```

```
At revision 5863.
```

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lxplus5 > svn info | grep URL
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```

## Example of switch

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...
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```
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Processed packages:
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lxplus5 > cd Det/DetCond
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lxplus5 > svn info | grep URL
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URL: svn+ssh://svn.cern.ch/repos/lhcb/LHCb/trunk/Det/DetCond
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## getpack knows about switch

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lxplus5 > getpack Det/DetCond v12r8
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...
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```
U    python/DetCond/Configuration.py
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```

```
Updated to revision 5863.
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```
Processed packages:
```

```
    Det/DetCond      v12r9
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lxplus5 > svn info Det/DetCond | grep URL
```

```
URL: svn+ssh://svn.cern.ch/repos/lhcb/LHCb/tags/Det/DetCond/v12r9
```

```
lxplus5 > getpack Det/DetCond trunk
```

```
At revision 5863.
```

```
Processed packages:
```

```
    Det/DetCond      trunk
```

```
lxplus5 > svn info Det/DetCond | grep URL
```

```
URL: svn+ssh://svn.cern.ch/repos/lhcb/LHCb/trunk/Det/DetCond
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## getpack knows about switch

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lxplus5 > getpack Det/DetCond v12r8
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```
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Processed packages:
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URL: svn+ssh://svn.cern.ch/repos/lhcb/LHCb/tags/Det/DetCond/v12r8
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```
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```
...
```

```
Updated to revision 5863.
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Processed packages:
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```
    Det/DetCond      v12r9
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Processed packages:
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```
    Det/DetCond      trunk
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lxplus5 > svn info Det/DetCond | grep URL
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URL: svn+ssh://svn.cern.ch/repos/lhcb/LHCb/trunk/Det/DetCond
```



# Group Tagging (1)

Non-recursive check-outs are useful for global tagging

```
lxplus5 > svn co -N svn+ssh://svn.cern.ch/repos/lhcb
U    lhcb
Checked out revision 5863.
lxplus5 > cd lhcb
lxplus5 > svn up -N Erasmus Erasmus/trunk Erasmus/tags
A    Erasmus
Updated to revision 5863.
A    Erasmus/trunk
Updated to revision 5863.
A    Erasmus/tags
Updated to revision 5863.
lxplus5 > (cd Erasmus/trunk; svn up -N `svn ls`)
A    ErasmusSys
Updated to revision 5863.
...
A    cmt
A    cmt/project.cmt
Updated to revision 5863.
lxplus5 >
```

# Group Tagging (1)

Non-recursive check-outs are useful for global tagging

```
lxplus5 > svn co -N svn+ssh://svn.cern.ch/repos/lhcb
U    lhcb
Checked out revision 5863.
lxplus5 > cd lhcb
lxplus5 > svn up -N Erasmus Erasmus/trunk Erasmus/tags
A    Erasmus
Updated to revision 5863.
A    Erasmus/trunk
Updated to revision 5863.
A    Erasmus/tags
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lxplus5 > (cd Erasmus/trunk; svn up -N `svn ls`)
A    ErasmusSys
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# Group Tagging (1)

Non-recursive check-outs are useful for global tagging

```
lxplus5 > svn co -N svn+ssh://svn.cern.ch/repos/lhcb
U    lhcb
Checked out revision 5863.
lxplus5 > cd lhcb
lxplus5 > svn up -N Erasmus Erasmus/trunk Erasmus/tags
A    Erasmus
Updated to revision 5863.
A    Erasmus/trunk
Updated to revision 5863.
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Updated to revision 5863.
lxplus5 > (cd Erasmus/trunk; svn up -N `svn ls`)
A    ErasmusSys
Updated to revision 5863.
...
A    cmt
A    cmt/project.cmt
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# Group Tagging (1)

Non-recursive check-outs are useful for global tagging

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lxplus5 > svn co -N svn+ssh://svn.cern.ch/repos/lhcb
U    lhcb
Checked out revision 5863.
lxplus5 > cd lhcb
lxplus5 > svn up -N Erasmus Erasmus/trunk Erasmus/tags
A    Erasmus
Updated to revision 5863.
A    Erasmus/trunk
Updated to revision 5863.
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Updated to revision 5863.
lxplus5 > (cd Erasmus/trunk; svn up -N `svn ls`)
A    ErasmusSys
Updated to revision 5863.
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Non-recursive check-outs are useful for global tagging

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lxplus5 > svn co -N svn+ssh://svn.cern.ch/repos/lhcb
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Checked out revision 5863.
lxplus5 > cd lhcb
lxplus5 > svn up -N Erasmus Erasmus/trunk Erasmus/tags
A    Erasmus
Updated to revision 5863.
A    Erasmus/trunk
Updated to revision 5863.
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lxplus5 > (cd Erasmus/trunk; svn up -N `svn ls`)
A    ErasmusSys
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# Group Tagging (1)

Non-recursive check-outs are useful for global tagging

```
lxplus5 > svn co -N svn+ssh://svn.cern.ch/repos/lhcb
U    lhcb
Checked out revision 5863.
lxplus5 > cd lhcb
lxplus5 > svn up -N Erasmus Erasmus/trunk Erasmus/tags
A    Erasmus
Updated to revision 5863.
A    Erasmus/trunk
Updated to revision 5863.
A    Erasmus/tags
Updated to revision 5863.
lxplus5 > (cd Erasmus/trunk; svn up -N `svn ls`)
A    ErasmusSys
Updated to revision 5863.
...
A    cmt
A    cmt/project.cmt
Updated to revision 5863.
lxplus5 >
```

## Group Tagging (2)

```
lxplus5 > (cd Erasmus/tags; svn up -N `svn ls`)
A      ERASMUS
Updated to revision 5863.
A      ErasmusSys
Updated to revision 5863.
...
A      PhysFit
Updated to revision 5863.
lxplus5 > cd Erasmus
lxplus5 > svn mkdir tags/ERASMUS/ERASMUS_v2r0
A      tags/ERASMUS/ERASMUS_v2r0
lxplus5 > svn cp trunk/cmt tags/ERASMUS/ERASMUS_v2r0
A      tags/ERASMUS/ERASMUS_v2r0/cmt
lxplus5 > svn cp trunk/ErasmusSys tags/ErasmusSys/v2r0
A      tags/ErasmusSys/v2r0
lxplus5 > svn status
A      tags/ERASMUS/ERASMUS_v2r0
A +   tags/ERASMUS/ERASMUS_v2r0/cmt
A +   tags/ErasmusSys/v2r0
lxplus5 > svn ci
```

## Group Tagging (2)

```
lxplus5 > (cd Erasmus/tags; svn up -N `svn ls`)
A      ERASMUS
Updated to revision 5863.
A      ErasmusSys
Updated to revision 5863.
...
A      PhysFit
Updated to revision 5863.
lxplus5 > cd Erasmus
lxplus5 > svn mkdir tags/ERASMUS/ERASMUS_v2r0
A      tags/ERASMUS/ERASMUS_v2r0
lxplus5 > svn cp trunk/cmt tags/ERASMUS/ERASMUS_v2r0
A      tags/ERASMUS/ERASMUS_v2r0/cmt
lxplus5 > svn cp trunk/ErasmusSys tags/ErasmusSys/v2r0
A      tags/ErasmusSys/v2r0
lxplus5 > svn status
A      tags/ERASMUS/ERASMUS_v2r0
A +   tags/ERASMUS/ERASMUS_v2r0/cmt
A +   tags/ErasmusSys/v2r0
lxplus5 > svn ci
```



## Group Tagging (2)

```
lxplus5 > cd Erasmus/tags; svn up -N `svn ls`
A      ERASMUS
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...
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A      tags/ERASMUS/ERASMUS_v2r0/cmt
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A      tags/ErasmusSys/v2r0
lxplus5 > svn status
A      tags/ERASMUS/ERASMUS_v2r0
A +    tags/ERASMUS/ERASMUS_v2r0/cmt
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```

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A +   tags/ErasmusSys/v2r0
lxplus5 > svn ci
```

## Group Tagging (3)

```
--This line, and those below, will be ignored--
```

```
A Erasmus/tags/ERASMUS/ERASMUS_v2r0  
A Erasmus/tags/ERASMUS/ERASMUS_v2r0/cmt  
A Erasmus/tags/ErasmusSys/v2r0
```

```
~  
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~
```

```
"svn-commit.tmp"
```

## Group Tagging (3)

```
Prepared tag v2r0.
```

```
--This line, and those below, will be ignored--
```

```
A Erasmus/tags/ERASMUS/ERASMUS_v2r0
```

```
A Erasmus/tags/ERASMUS/ERASMUS_v2r0/cmt
```

```
A Erasmus/tags/ErasmusSys/v2r0
```

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~
```

```
~
```

```
:wq
```

# Migrate a Package from CVS to Subversion

- Request that your packages are migrated to Hubert (and/or me).
- The write access to the CVS copy will be blocked.
- `getpack` will not be able to see it for a while.
- The package will be visible again, but from Subversion.

Post-migration instructions on twiki:

[LHCb.HowToMigrateACvsCheckoutToSvn](#)

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# Resources

- Subversion website  
<http://subversion.apache.org>
- Subversion book  
<http://svnbook.red-bean.com>
- CERN Central SVN Service  
<http://svn.web.cern.ch/svn>
- Gaudi SVN Repository description  
<https://twiki.cern.ch/twiki/bin/view/Gaudi/GaudiSVNRepository>
- Web interfaces to the LHCb repository
  - Trac: <https://svnweb.cern.ch/trac/lhcb/browser>
  - WebSVN: <http://svnweb.cern.ch/world/wsvn/lhcb>