Moving ROOT from Subversion to Git

Fons Rademakers
CERN PH/SFT

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What is Git?

- Git is a free Distributed Version Control System (DVCS)
- Initially created by Linus Torvalds to be able to handle the distributed development model of the Linux kernel
- The development of Git began on 3 April 2005
- The project was announced on 6 April
- Became self-hosting as of 7 April
- The first merge of multiple branches was done on 18 April
- Current version is 1.8.2

Why Git?

- Strong support for non-linear development
  - Easy branching and merging

- Distributed development
  - Gives each developer a local copy of entire development history

- Compatibility with existing systems/protocols
  - Repositories can be published over https, ssh, rsync, ...

- Efficient handling of large projects
  - Fast and scalable (and often bypassing network due to local copy)

- Cryptographic authentication of history
  - Commits are SHA1 hashes based on complete history

- Periodic explicit object packing
  - Files are stored in delta-compressed packfiles + index file

Who is Using Git?

- Linux kernel
- Apache
- KDE
- Gnome
- Python
- Samba
- Mono
- Twitter
- ...

- GnuPG
- CUPS
- Boost
- Zope
- Qt
- Google
- Facebook
- Eclipse
- ...

Converting ROOT from Subversion to Git

```
cd /tmp
mkdir root
cd root
svn2git http://root.cern.ch/svn/root -v -m --authors ~/authors.txt
<takes 25 hours for ROOT's 50000 commits on fast server>
git svn show-ignore > .gitignore
git add .gitignore
git commit -m 'Convert svn:ignore properties to .gitignore.'

<make bare git repo>
git init --bare /tmp/root.git
git remote add remotes /tmp/root.git
git push remotes --all
git push remotes --tags

cd /tmp/root.git
<clean up unwanted branches>
<clean up unwanted tags>
mv /tmp/root.git /home/git/root.git
sudo chown -R apache:apache /home/git/root.git
```

Git Size and Performance

- Repository size difference:

```
$ du -sk /user/svn/root
1497300  /user/svn/root

$ du -sk /user/git/root.git
494576   /user/git/root.git
```

- Checkout performance:

```
$ time svn co https://root.cern.ch/svn/root/trunk root-svn
real  0m39.744s
$ du -sk root-svn
552652    root-svn

$ time git clone https://root.cern.ch/git/root.git root-git
real  0m25.934s
$ du -sk root-git
655720   root-git
```

Branch and Checkout Performance

- Switching to patch branch:

```
$ time svn switch https://root.cern.ch/svn/root/branches/v5-34-00-patches
Updated to revision 49231.
real  0m31.402s

$ time git checkout -b v5-34-00-patches
Switched to branch 'v5-34-00-patches'
real  0m2.177s
```
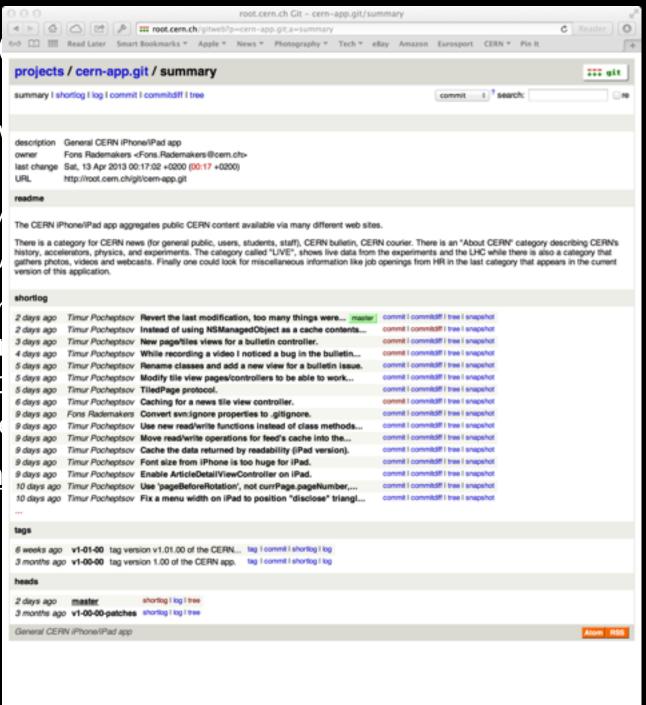
Git Repository Organization

- In Subversion we followed the standard organization of trunk, tags, branches

- We had branches/dev/... writeable for all developers to store their own (private) developments and allow sharing

- In Git there are no hierarchical branches, so we decided to move the branches/dev to an own repository rootdev where all developers can share their code
  - But this can as well be github
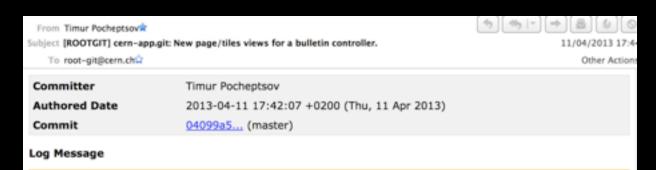
- See http://root.cern.ch/gitweb

Git Repository [...]

- In Subversion we follo[...] tags, branches

- We had branches/dev/[...] their own (private) dev[...]

- In Git there are no hier[...] the branches/dev to a[...] developers can share t[...]
  - But this can as well b[...]

- See http://root.cern.ch[...]

Hooks

- In post-receive hook:
  - gitmailer
- In update hook:
  - log format
  - acl's

Getting the Git Client

- By default installed on all modern Unixes, Linuxes and OSX
- For Windows see http://msysgit.github.io

Impact on the Developers

- Easy transition foreseen, developers already exposed to Git in many other projects

- They love easy branching and merging, the offline repo and the speed

Impact on the Users

- "Please, provide ROOT in Git" was one of the clear messages from the ROOT Users Workshop

- For users that were using ROOT from svn:

```
svn co http://root.cern.ch/svn/root/trunk root
```

- Becomes:

```
git clone http://root.cern.ch/git/root.git
```

- A writable version is obtained by cloning via https

Migration Strategy

- After initial 25 hour import, "git svn --rebase" is being used to keep the ROOT Git version in sync with the svn version

- Prepare announcement and documentation

- On the migration date we just switch repositories

- The cern-app and roottest repositories have already been migrated to Git

Some Git Resources

- The web is overflowing with resources about Git
- Nice article:
  - Why You Should Switch from Subversion to Git
- Nice talk:
  - Introduction to Git
- Nice free book:
  - Pro Git

Conclusions

- A pilot project has shown that moving from Subversion to Git is a fairly easy project

- The benefits of moving to Git are many

- We will be using a DVCS that is actively being developed

- The ROOT developers are all enthusiast

- The ROOT users are all enthusiast