Git - The Distributed SCM

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Penguicon v4

Outline

1. An Introduction to SCMs

2. How does Git work?
   - Concepts
   - Getting started
   - Sharing code
   - Other stuff

What's a SCM?

- Definition
    - SCM - Source Code Manager
    - A simplified form of a revision control system
- Ok, so what does that mean?
    - Track versions
    - Show who changed what, when
    - Why they said they changed it
    - Recreate any old version

Types of SCMs

- Two major varieties
  - Centralized
    - Central, shared, repository
    - Users need permission to get commmit access
    - CVS, Subversion (SVN), Perforce, ClearCase
  - Decentralized
    - No central repository
    - Every source tree can be independent (frequently)
    - Convention: A special, central, repository exists
    - Many open source projects are moving to this
    - Arch / Bazaar, Bazaar-NG, SVK , BitKeeper, Git

Basic stuff

- Source: http://www.kernel.org/pub/software/scm/git/
- Packages: Look for git-core
- History: http://www.kernel.org/git/?p=git/git.git;a=summary
- Small projects using this:
    - Linux
        - http://www.kernel.org/git/
    - Wine
    - x.org
    - freedesktop.org

A brief history of Git

- 2005 April 6 - Public development begins
- 2005 April 18 - 1st multiple branch merge
- 2005 April 29 - Patches applied at 6.7/second (Kernel)
- 2005 June 16 - Linux 2.6.12 released
- 2005 July 26 - New maintainer (Junio Hamano) takes over
- 2005 Dec 21 - v1.0 released
- 2006 April 18 - v1.3.0 released.
  - Everything since 2.6.12-rc2 tracked.
- Insanely fast development
- Very mature, already

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Concepts

- Content-addressable filesystem
- 4 types of objects
  - Blob - A file
  - Tree - The state of the repository
  - Commit - The state at a given point in time
    - Contains a tree
    - 0, 1, or more parent commits
    - Author information
    - Committer information
  - Tag - GPG signed reference to a commit

Concepts

- The Index
  - Tracks the current state of the directory
  -

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Importing a new project

- Importing
  - tar xzf project.tar.gz
  - cd project
  - git init-db
  - git add .
  - git commit
    - Give a commit message
- Creates a directory
  - .git/
  - Stores all the repository metadata

Making changes

- Editing existing files
  - $EDITOR file1 file2 file3
  - git commit -a
- Or...
  - $EDITOR file1 file2 file3
  - git commit file1
  - git commit file3

Making changes

- Adding a new file
  - $EDITOR newfile
  - git add newfile
  - git commit
- Removing a file
  - git rm oldfile
  - git commit
- Moving/renaming a file
  - git mv oldfile newfile
  - git commit
  - This should work just like “mv”

Viewing changes

- What'd you do to the working directory?
    - git status
- Viewing the history of changes
    - Log:
        - All: git log
        - A range: git log ce5b6e7..HEAD
        - (or): git log ce5b6e7..
    - What was changed?
        - All: git whatchanged -p
        - A range: git whatchanged -p ce5b6e7..HEAD
        - (or): git whatchanged -p ce5b6e7..

Viewing changes (diffs)

- Changes to the working tree: git diff
- Changes to the index: git diff HEAD
- Changes between arbitrary things: git diff ce5b6e7 70827b1

Viewing changes

But this stuff is, well, blah...

Viewing changes (better)

Maybe that newfangled X11 thing can be used

- gitk
- gitweb
- gitview
- qgit

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Sharing your code

- HTTP (no special server code)
- SSH
- git-daemon
  - Bandwidth-efficient updating
  - (Not so CPU-efficient)

Getting a copy of a tree

- git clone $URL
- git clone git://git.kernel.org/pub/scm/git/git.git

Pulling others’ changes

- git pull
- git pull $URL
- git pull git://git.kernel.org/pub/scm/git/git.git
- git pull $REMOTE
  - ls .git/remotes/
- “git pull” grabs changes and merges them into your local working tree

Sharing your changes

- Using ssh: git push host:path/
- For web access
  - Needs git installed
  - chmod +x .git/hooks/post-update
- WebDAV works

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Other tools

- Extracting into patches: git format-patch
- Patch-bombing:
  - git format-patch
  - git send-email[1]
  - (Use man, patch-bomb yourself first!)
  - Or maybe: git imap-send
- git-cvsserver
  - Yes, you can run a CVS server against a git backend.

[1] Install git-email

Questions

What about binary files?

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What about binary files?

Summary

- Source: http://www.kernel.org/pub/software/scm/git/
- Why the name?
  - "I’m an egotistical bastard, so I name all my projects after myself. First Linux, now git." – Linus
- ObRecruitment: If you want to work for Google, email me: ryan@michonline.com