

Source code management

COMP8440: FOSSD
Lecture 3

Early approaches

- Simple tools
 - diff, patch and tar
 - Patches sent by email
 - Each developer maintains their own tree
 - Distribution by ftp and usenet

Patches

- Basic tool of code exchange
 - several formats available – unidiff now the norm
 - contains short context for each change
 - main tools: diff, patch, diffstat

```
--- a/source3/rpc_server/srv_svcctl_nt.c
+++ b/source3/rpc_server/srv_svcctl_nt.c
@@ -466,9 +466,7 @@ WERROR _svcctl_EnumServicesStatusW(pipes_struct *p,
    }

    blob = ndr_push_blob(ndr);
-    if (blob.length >= r->in.offered) {
-        memcpy(r->out.service, blob.data, r->in.offered);
-    }
+    memcpy(r->out.service, blob.data, r->in.offered);
}
```

Sending patches

- Common rules
 - use diff -up, exclude generated files
 - include diffstat output
 - include an explanation of your patch
 - [PATCH] at start of subject
 - use inline or plain text encoding for patch
 - don't send html encoded email!
 - break up your patches on logical boundaries
 - use a patch series if needed
 - check you've followed the project coding style
 - be sure you are sending to the right place
 - be patient, and follow up if need be
 - Add Signed-off-by (for some projects)

Let's look at some examples on the kernel list ...

First generation SCM systems

- RCS and SCCS
 - Manages files individually
 - Only one person editing at a time
 - No merge capability
 - Provides development history
 - Key data is who, what and when

The rise of CVS

- Concurrent Versions System
 - Built on top of RCS
 - Allowed for parallel development
 - Included merge and conflict resolution
 - based on diff/patch
- Hugely popular in the FOSS world
 - Dominated FOSS development from 1991 to 2005
 - Still very widely used, but less so each year
- Many limitations
 - Poor rename and directory support
 - Contacts centralised server for most operations
 - Poor branch merging support

Centralised vs Distributed

- Where is the project hosted?
 - CVS hosts in a central fashion
 - Each developer has a 'checkout'
 - Most project meta-data is only stored on the central server
- Distributed version control
 - All project history is locally available to all developers
 - Most systems aim for easy branching/merging

Subversion

- 'CVS done right'
 - Attempt to re-invent centralised source code control
 - Fixes many of the limitations in CVS
 - Adds project-wide revisions
 - Widely chosen to replace CVS in FOSS projects from 2001 onwards
 - Still very widely used
- Centralised design
 - Use of non-distributed design has been criticised
 - Distributed add-ons available (svk), but not widely used

Distributed Systems

- Early systems
 - Code Co-Op (windows based) in 1997
 - GNU Arch (aka TLA or Tom Lord's Arch) in 2001
- Bitkeeper
 - Adopted by Linux kernel in 2002
 - Unusual licensing model
 - Huge impact on speed of kernel development
- Newer systems
 - Lots of new systems starting in 2003
 - bazaar, darcs, mercurial, git, monotone
 - git has gained widest following

let's see a demo of git

Bitkeeper and git

- Controversial choice
 - Linux kernel adopted bitkeeper in 2002
 - Led to acceleration of kernel development
 - Proprietary tool, with freeware client
 - License terms included a strong non-compete clause
- Move to git
 - Makers of bitkeeper disapproved of free client
 - Free bitkeeper withdrawn in 2005
 - Replaced by new system 'git' in June 2005

SCM Interfaces

- **Command line dominates**
 - Most FOSS developers use command line interfaces
 - Tools aim to produce a very fast workflow
 - Most SCM tools also offer GUI or editor interfaces
- **Web Interfaces**
 - Many SCM tools provide web interfaces
 - Mostly used to browse development history
 - cvsweb, svnweb and gitweb are very popular
 - Custom web interfaces are often built
- **Interfaces with other systems**
 - Tools to integrate with bug tracking systems
 - Integration with build management and build farms

Build Farms

- Integrating SCM with testing
 - Automating testing can help find bugs faster
 - Especially important for portability
- A build farm
 - Wide range of machines/OS's
 - Automatically run regression tests on commit
 - Usually results are available publicly
 - Build/test failures may be reported by email
- Examples
 - Tinderbox
 - Samba build farm
 - Build-bot

Public SCM Hosting

- Canned hosting
 - Many/most FOSS projects use a canned hosting solution
 - Canned project hosting can make project maintenance much easier
 - usually less flexible than running your own
- DVCS public hosting
 - DVCS workflow created a demand for easier hosting
 - Many sites have sprung up for all the DVCS systems
 - See for example
 - Git: repo.oz.cz, github.com
 - Hg: bitbucket.org, freehg.org
 - bzr: launchpad.net

SCM Compatibility

- Two SCMs, one project
 - Some projects offer multiple SCMs for the same code
 - Gateway tools offer interoperability
 - As a new developer, choose the SCM that most of the existing developers in the project use
- Conversion tools
 - Many newer SCMs offer automated conversion
 - Allows project history to be preserved
 - Often requires some manual tweaking
 - Best known general converter is 'tailor'
- Builtin converters
 - some SCM tools have builtin access to other tools
 - “git svn” is particularly useful