Distributed Software Development using Subversion and SubMaster

Infrastructure for the Bazaar

Clifford Wolf

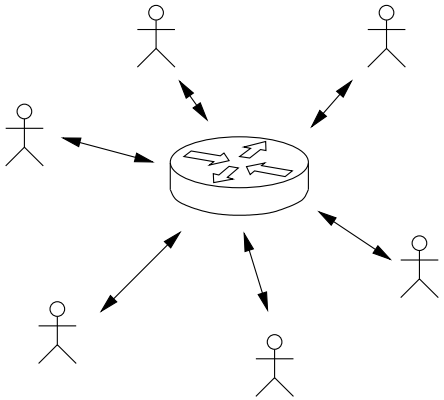
LINBIT

http://www.linbit.com

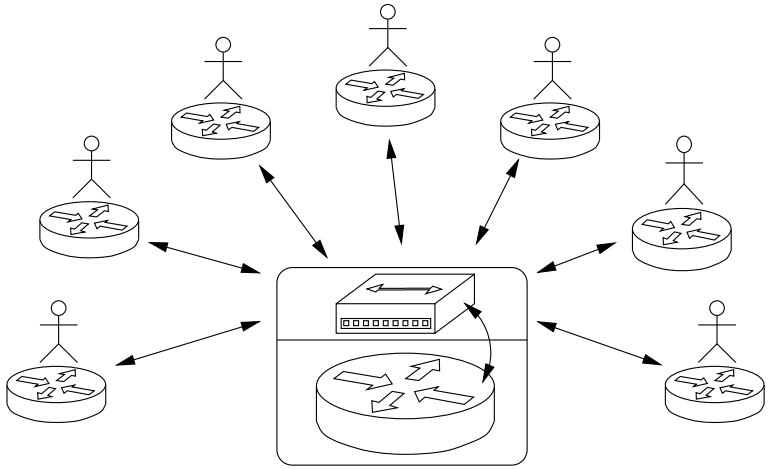
Introduction

Development Models

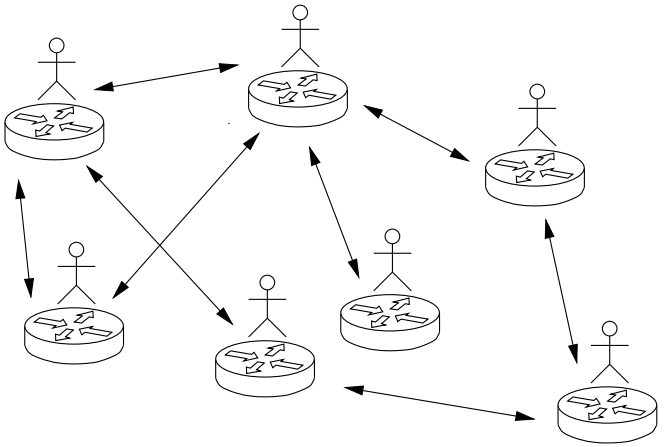
Centralized Model



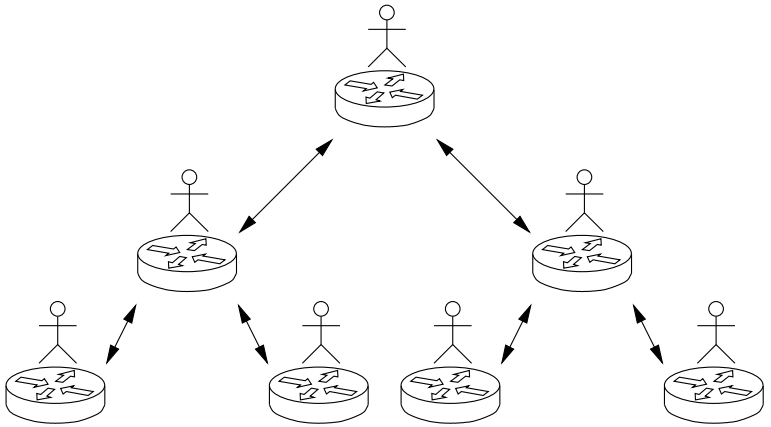
Distributed Model



Decentralized Model



Hierarchic Model



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Requirements

- Everyone must have the possibility to send patches
- There must be no way for patches to be lost or ignored
- Creating and sending patches must be as easy as possible
- Keeping local changes and main tree in sync must be easy
- There must be no restictions due to licences or binary only executables
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What is Subversion (1)

- Subversion is a a version control system
- The entire history of a project including all branches is stored in a Database called Subversion Repository
- A Subversion Repository can also be seen as a filesystem with special capabilities
- Pleople can check out files or directories from a Subversion Repository, change them and commit the changes back to the repository
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- Subversion Repositories can be accessed thru the filesystem, using HTTP/WebDAV or by a special SVN:// protocol
- The tool for creating and maintaining the database behind a Subversion Repository is called ’svnadmin’
- The tool for working with the Subversion Repository and Working copies is called ’svn’
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Subversion is for the Cathedral

- Subversion on it’s own is not good for bazaar-style development
- There is only one central repository
- Only a limited number of people has write access to the tree
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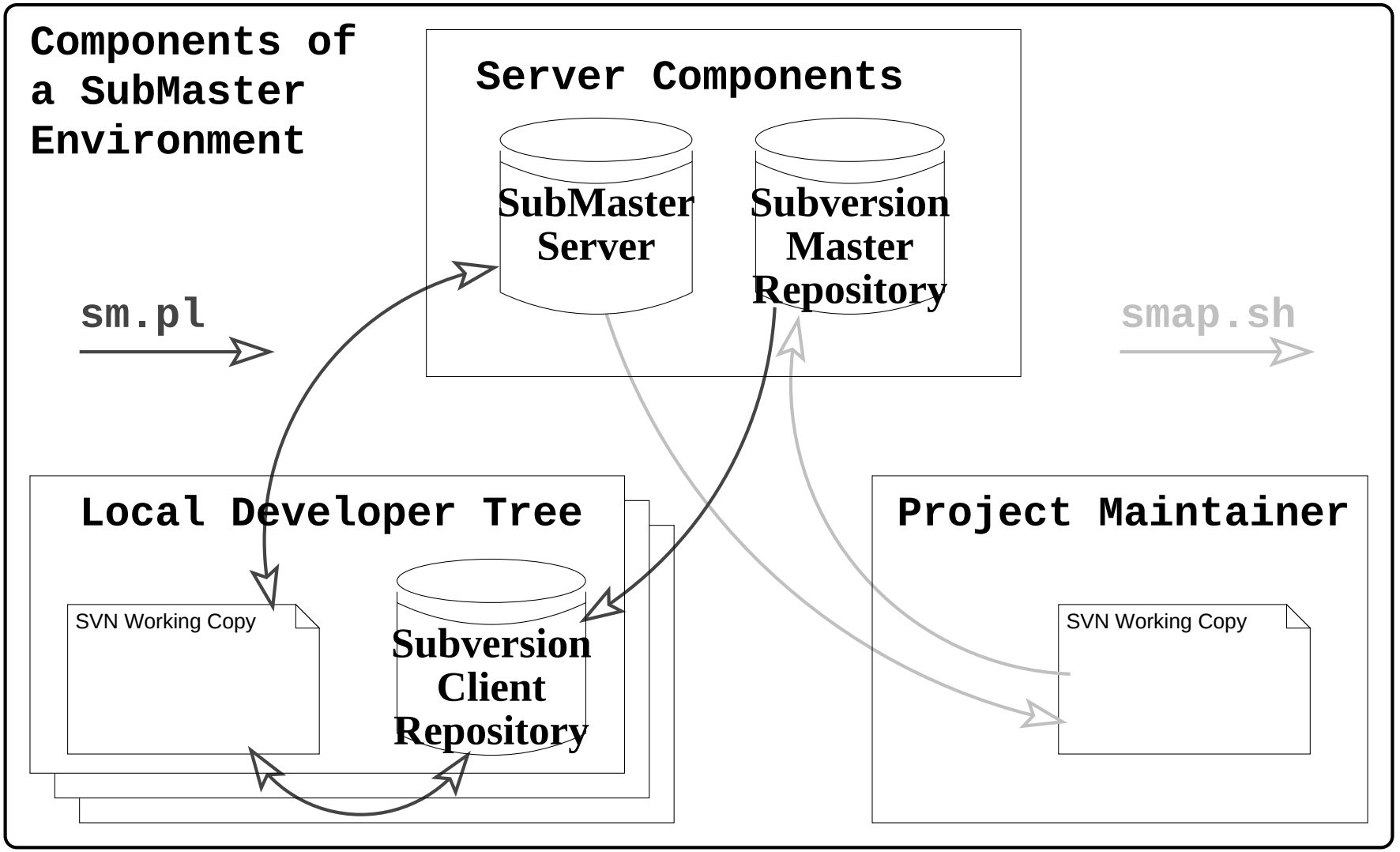
Components



Using Subversion

Creating a repository

- Creating the repository itself is easy:
  `svnadmin create /home/svn/repos`
- If the repository should be accessable thru HTTP/WebDAV (http://), you need to configure your apache to load the Subversion module and set it up.
- If the repository should be accessable thru the Subversion protocol (svn://), you need to set up the Subversion server `svnserve`.

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Creating a working copy

- Using the tool `svn` is very simmilar to using `cvs`.
- A Working copy can be created with:

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svn co file:///home/svn/repos localdir
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- Note that no equivalent to $CVSROOT exists.
- Within the working copy, every directory has a `.svn` subdirectory containing the Subversion metadata.

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Making changes (1)

- Modifying files:
  - Just edit them as usual with your favorite editor
  - Note that Subversion is using binary deltas and has good support for non-ascii files
- Adding files:
  - First create the new file as usual
  - Then execute `svn add` *filename*
- Removing files:
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Making changes (2)

- Moving/renaming files:
  - Using `svn mv` instead of `mv`
- Copying files:
  - Using `svn cp` instead of `cp`
- Making changes without a working copy:
  - Most operations can also be performed directly on the repository:
  - ```
    svn copy -m "Commit message" \
             file:///home/svn/repos/demo2.txt \
             file:///home/svn/repos/demo3.txt
    ```
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- Commiting changes made in the working copy:
  `svn commit`
- Listing status (modified, etc) of files in working copy:
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- Bringing changes from the repository into the working copy:
  `svn up`
- Merging changes from somewhere else to working copy:

```
svn merge -r70:86 \
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svn merge file:///svn/repos/branch/stable \
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Branches and tags

- Subversion has no explicit support for branching.
- But it has support for copying directories in O(1).
- Creating a branch is just the same as creating a copy:

```
svn copy -m "Creating branch dummy" \
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- Changes in the branch can be merged back using the `svn merge` command.
- A “tagged version” is also just a copy. It just never gets modified.

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Getting Help (1)

- The command `svn help` lists all subcommands for `svn`:
  `add, blame (praise, annotate, ann), cat, checkout (co), cleanup, commit (ci), copy (cp), delete (del, remove, rm), diff (di), export, help (?, h), import, info, list (ls), log, merge, mkdir, move (mv, rename, ren), propdel (pdel, pd), propedit (pedit, pe), propget (pget, pg), proplist (plist, pl), propset (pset, ps), resolved, revert, status (stat, st), switch (sw), update (up)`
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- The command `svnadmin help` does it for `svnadmin`: `create, deltify, dump, help (?, h), hotcopy, list-dblogs, list-unused-dblogs, load, lstxns, recover, rmtxns, setlog, verify`
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- The Subversion Handbook is a great Subversion tutorial: http://svnbook.red-bean.com/

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The SubMaster Client

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Overview

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- The SubMaster client also automates the creation of patches and sending them upstream to the SubMaster server
- A detailed help message explaining all subcommands to `sm` is printed out by `sm help`

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Creating a local tree

- Create a local copy of the master repository:
  ```
  sm create svn://example.org/demo/trunk demo
  ```

- This creates two directories:
  - `demo` The local working copy
  - `demo.sm` Local repository and other sm data

- Create an account at the SubMaster Server:
  ```
  w3m https://example.org/demo/submaster
  ```

- Add your SubMaster Login information to your SM tree:
  ```
  vi demo.sm/SM/server.txt
     https://example.org/demo/submaster
     <username>
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Creating patches (2)

- Use `sm queue` to list the pending changes:

```
r44 | root | 2004-01-10 12:10:58 +0100 (Sat,
Added package oprofile.
------------------------------------------------
r51 | root | 2004-01-10 13:34:35 +0100 (Sat,
Oprofile:  don't run depmod.
------------------------------------------------
```

- Use `sm patch` to create a patch from your changes:
  `sm patch r44 r51`

- Use `sm send` to send the patch upstream to the SubMaster Server.

Creating patches (2)

- Use `sm queue` to list the pending changes:

```
r44 | root | 2004-01-10 12:10:58 +0100 (Sat,
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Syncing with the main tree

- Merging changes from master tree to local tree:
  - `sm sync`
  - manually resolve conflicts, if any
  - patches beeing applied in master do not result in conflicts
  - `svn commit -m "SM Sync 2434:2442"`
- Full-syncing local tree to master:
  - `sm fsync`
  - This will discard all local changes
- Showing differences between local tree and master:
  - `sm diff`

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WIP Archive

- The WIP (work-in-progress) archive can be used to suspend the work on a changeset and resume it later.
- Revert in working copy and save as patch in WIP archive: `sm wip push` *name* `r180 r181 r182`
- Apply patch in working tree and remove from WIP archive: `sm wip pull` *name*
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Filesystem Layout (1)

- `demo/` The local Subversion working copy
- `demo.sm/*.patch` Patches waiting to be send to server
- `demo.sm/SENT/` Patches already sent to server
- `demo.sm/WIP/` Archive of work-in-progres patches
- `demo.sm/MASTER/` Exported up-to-date master tree
- `demo.sm/SVN/` Local Subversion Repository (DB)

Filesystem Layout (2)

- `demo/SM/master.txt` URL of main SVN repository
- `demo/SM/mrev.txt` Revision currently in MASTER/
- `demo/SM/queue.txt` Revisions in the change queue
- `demo/SM/server.txt` URL, etc. for SM Server
- `demo/SM/sync.txt` Last master rev. synced to local

The SubMaster Server

Overview

- Basically a cgi-based relay for patches

- Everyone can register as user
- Everyone can upload patches
- Everyone can vote for/agains and comment patches

- The tree maintainer can pull patches and apply them to the master Subversion Repository

- The tools `sm` and `smap` can communicate directly with the cgi script, no webbrowser is needed

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Patch Properties

- A Unique Patch ID (such as "20040110203646150 18")
- The login-name of the user who created the patch
- Current patch status (open, applied, rejected and discarded)
- The patch file itself
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Filesystem Layout (1)

- `password/<username>.txt`
  encrypted password
- `password/<username>.super`
  if this file exists, the matching user is a superuser
- `user/<username>.email`
  the e-mail address of that user
- `open/<year>_<month>_<id>.open`
  empy file which marks a patch as open

Filesystem Layout (2)

- `data/<year>/<month>/<id>.patch`
  the patch file as originally sent by the user
- `data/<year>/<month>/<id>.msg`
  messages attached to the patch
- `data/<year>/<month>/<id>.votes`
  votes by different users
- `data/<year>/<month>/<id>.owner`
  this patches owner
- `data/<year>/<month>/<id>.info`
  auto-created additional info
- `data/<year>/<month>/<id>.done`
  eighter "Applied" or "Rejected" does not exist for open patches

The smap helper script

Overview

- Helps applying patches from the SM Server
  - Download patch from server
  - Check if it applies cleanly
  - Apply the patch to the current directory
  - Run `svn add` and `svn rm` commands
  - Run `svn commit`
  - Mark patch as applied
- E.g. for maintaining the official tree
- E.g. for testing or extending patches
- Sometimes called by `sm`
- Usage: `smap [options] <patch-id>`

LINBIT Information Technologies GmbH

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Options

- -pN -l -R pass this option to the patch program
- -d just make a dry-run

- -S don’t commit to svn (e.g. if this isn’t a svn tree)
- -E edit commit message before running svn commit
- -D don’t remove temp files after success

- -a file add this smap command to file after success
- -A don’t apply anything, just do -a

- -M mark patch as applied on SM Server
- -C do nothing if already marked as applied

Configuration

- If this is a SubMaster tree, read config from the SM config.
- Otherwise read server URL, Username and Password from `./smap.cfg`.
- It's also possible modify the parameter list in `./smap.cfg`:

```
set -- -M -I "$@"
URL="https://www.rocklinux.net/submaster"
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Fixdiff

- Can be used to create patches for patches (e.g. so they apply cleanly)
- `smap 20040405094233279l3` (this fails)
- `fixdiff 20040405094233279l3.patch co package/base/linux24/lx_config.sh`
- Merge `package/base/linux24/lx_config.sh.rej`
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SubMaster Action Scripts

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- Action scripts are called whenever the status of a patch changes

- This can be used to send notify mails
- .. to check who should review the patch
- .. to eventually run any regression test on the patch

- The action scripts can be written in any language

- The action script for the ROCK SM is written in shell

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Calling Convention

- `./action.sh` *id user* `new`
- `./action.sh` *id user* `msg` *'Message Text'*

- `./action.sh` *id user* `vote contra`
- `./action.sh` *id user* `vote pro`
- `./action.sh` *id user* `vote delete`

- `./action.sh` *id user* `status rejected`
- `./action.sh` *id user* `status applied`
- `./action.sh` *id user* `status opened`
- `./action.sh` *id user* `status discarded`

URLs and References

Subversion and SubMaster

- The Subversion Handbook:
  http://svnbook.red-bean.com/
- The Subversion Homepage:
  http://subversion.tigris.org/
- The SubMaster Homepage:
  http://www.rocklinux.org/submaster.html

Related Projects

- SVK: A decentralized system based on Subversion
- Transvn: A patch-scripts clone based on Subversion http://alexm.here.ru/transvn/
- SVM: Mirror Remote Subversion Repository to local http://search.cpan.org/ clkao/SVN-Mirror/

Credits

- LINBIT Information Technologies GmbH:
  http://www.linbit.com/
- The ROCK Linux Project:
  http://www.rocklinux.org/
- Clifford Wolf:
  http://www.clifford.at/

http://www.rocklinux.org/submaster.html