git is the better quilt

Managing Debian packages in git with git-dpm

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Setting

This presentation wants to give a short introduction how Debian packages can be kept in git using git-dpm. It will start with a short introduction to git and proceed with how git-dpm fills the gaps. Audience is assumed to know the basics of Debian packaging. Git knowledge is not assumed.

Git

- What is git?
- quick and short introduction to git
- Why git is so good for managing patches

Git-dpm

- general idea
- branches
- some commands

Git Basics

Git is a version control system (VCS). A VCS is something you commit information about different versions of your code. That includes:

- States your project tree was in,
- who did that commit and when,
- a description of that commit,
- the previous state this state builds upon,
- ...

Git compared to other VCSes

Git

- only cares about files. Directories are created/removed as needed. $\Longrightarrow$ You cannot store empty directories in git.
- does not store diffs but snapshots $\Longrightarrow$ Removing and re-adding files is cheap. Storing both a classic development branch without autogenerated files and some commits containing full .orig.tar.gz contents is no problem.
- keeps commits in a graph, not a tree. $\Longrightarrow$ Merges are just joining two threads again. There is no real difference between merging branch A into B and branch B into A. Multiple merges are no problem at all.
- does not have a notion what branch a commit belongs to or any notion of persistent or global branches. Branches are just repository-local pointers to the commit that is the current head of a branch.

representation of history in git

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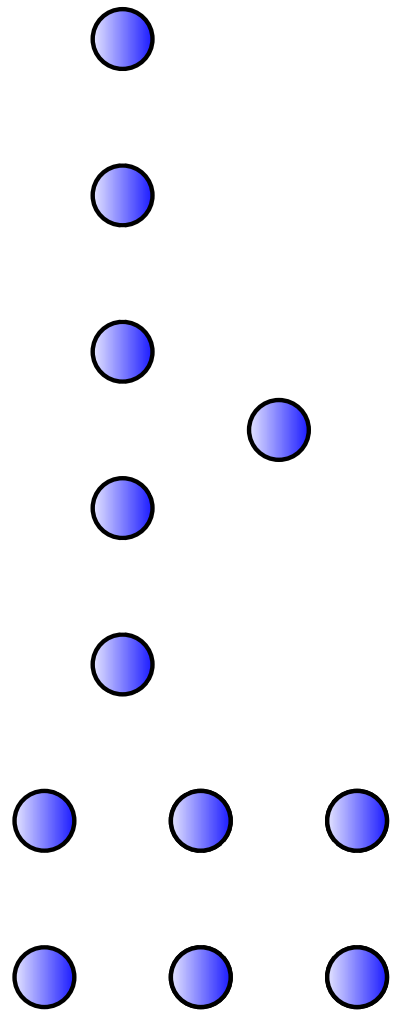

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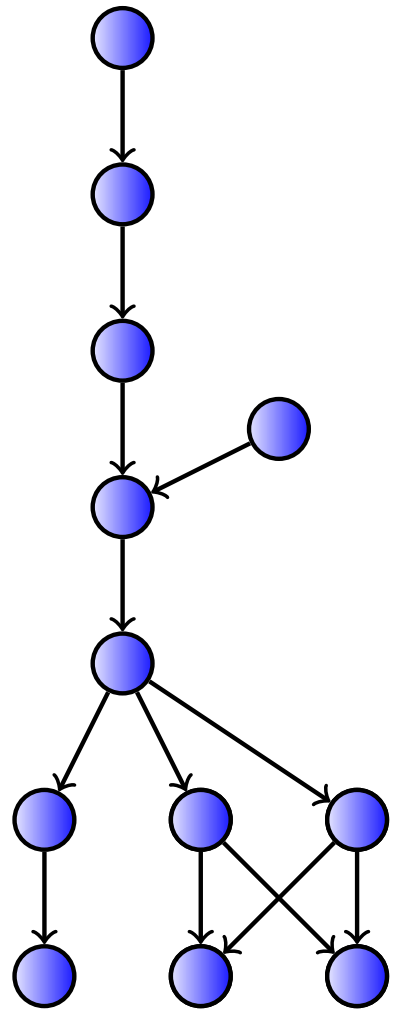

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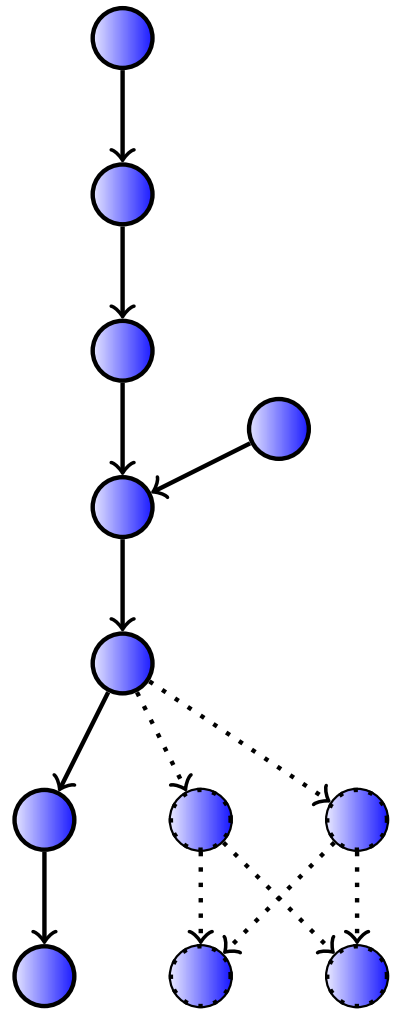

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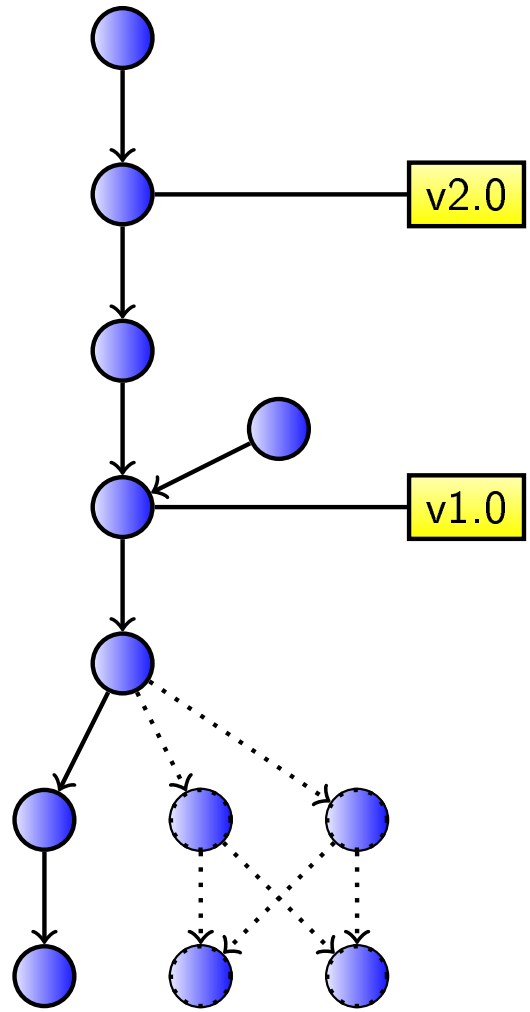

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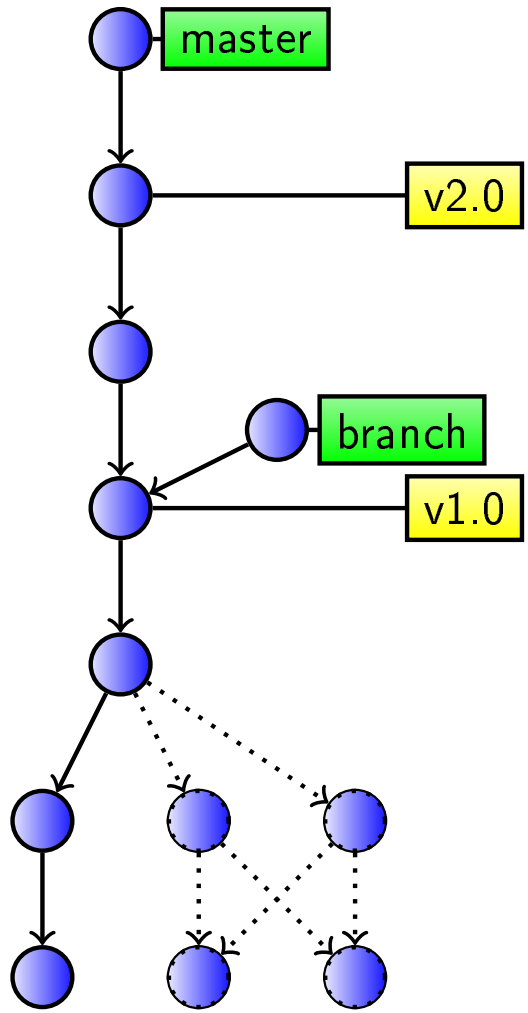

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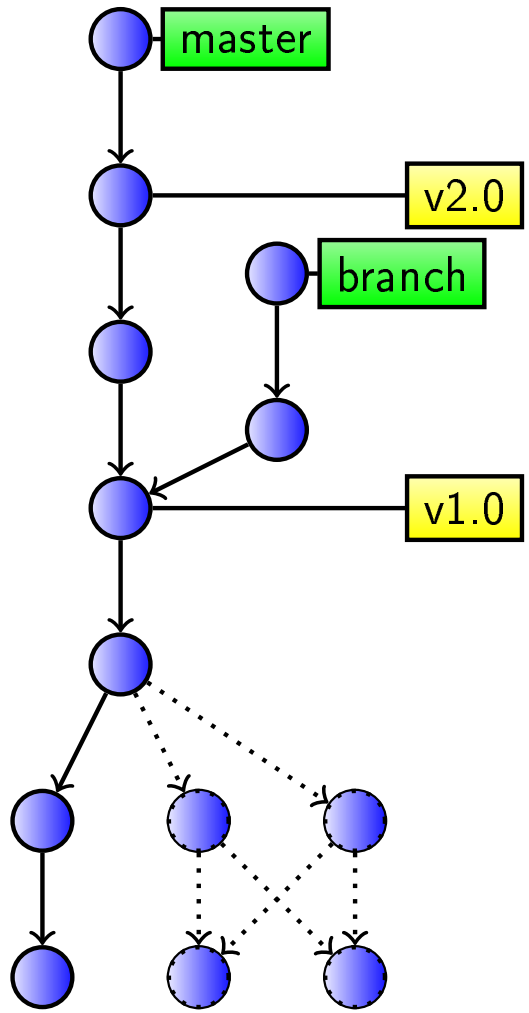

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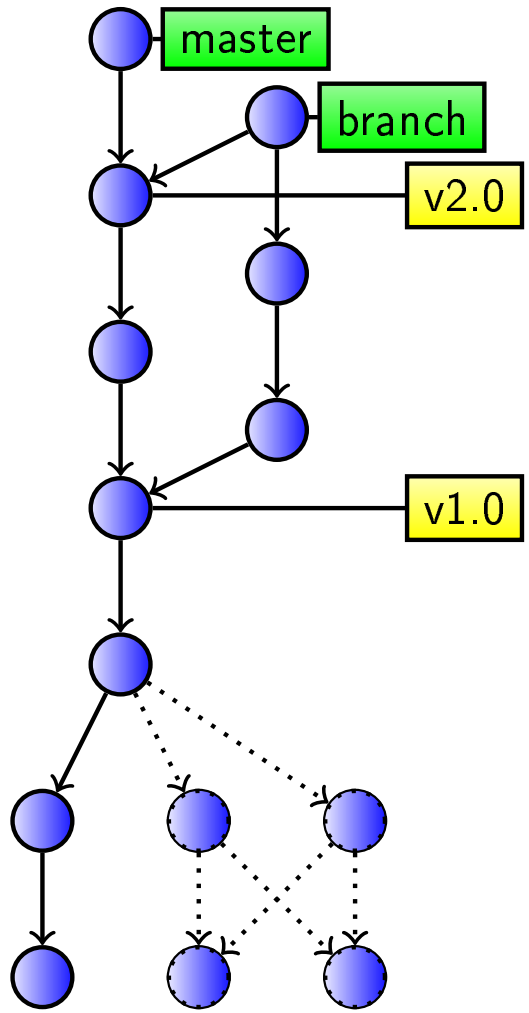

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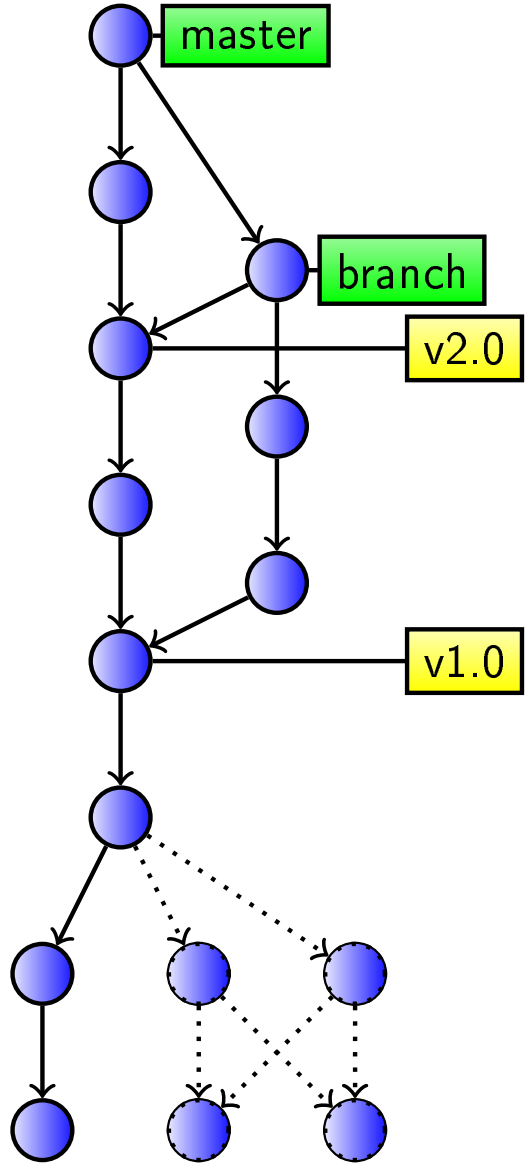

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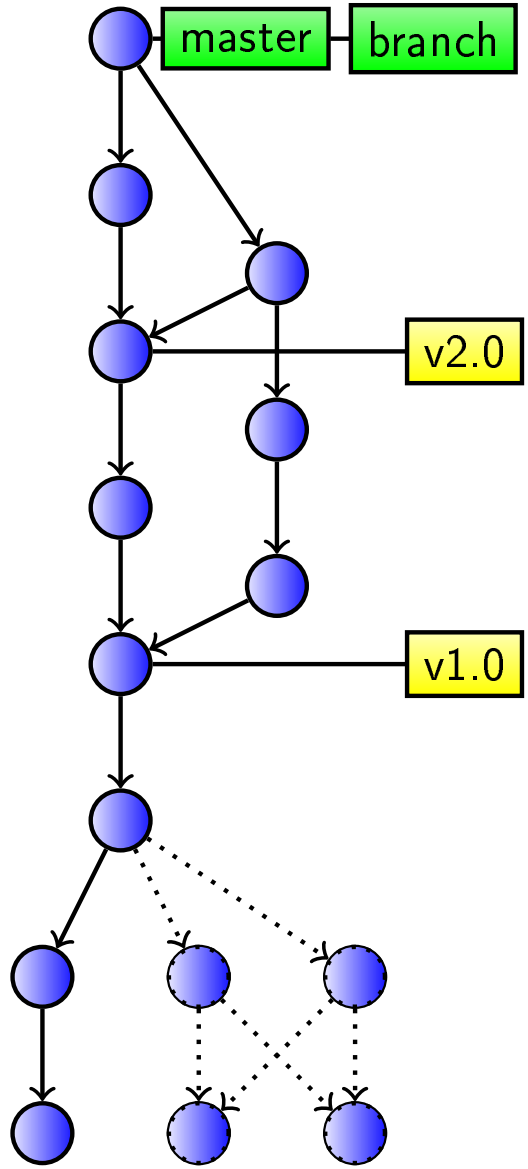

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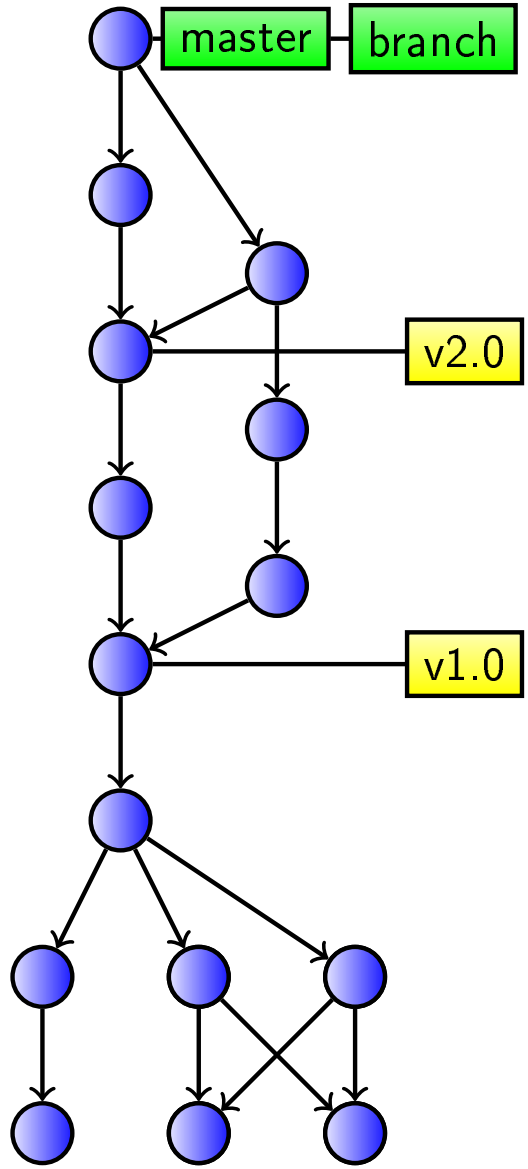

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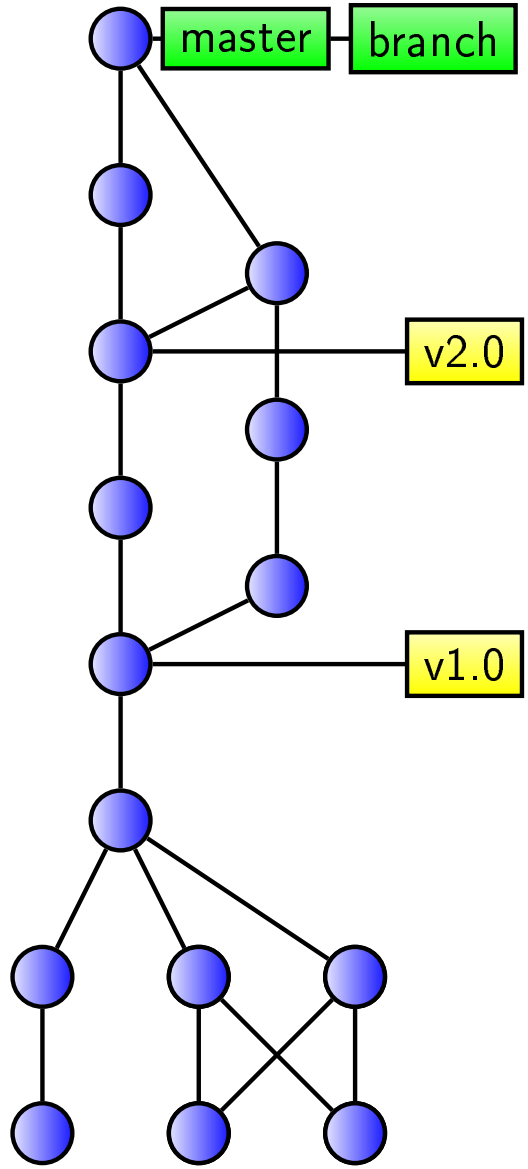

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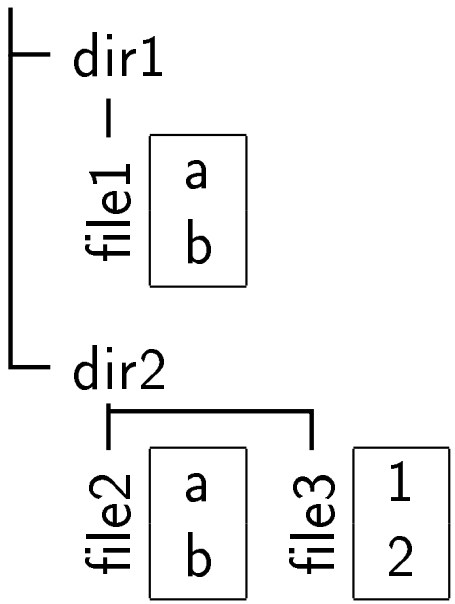

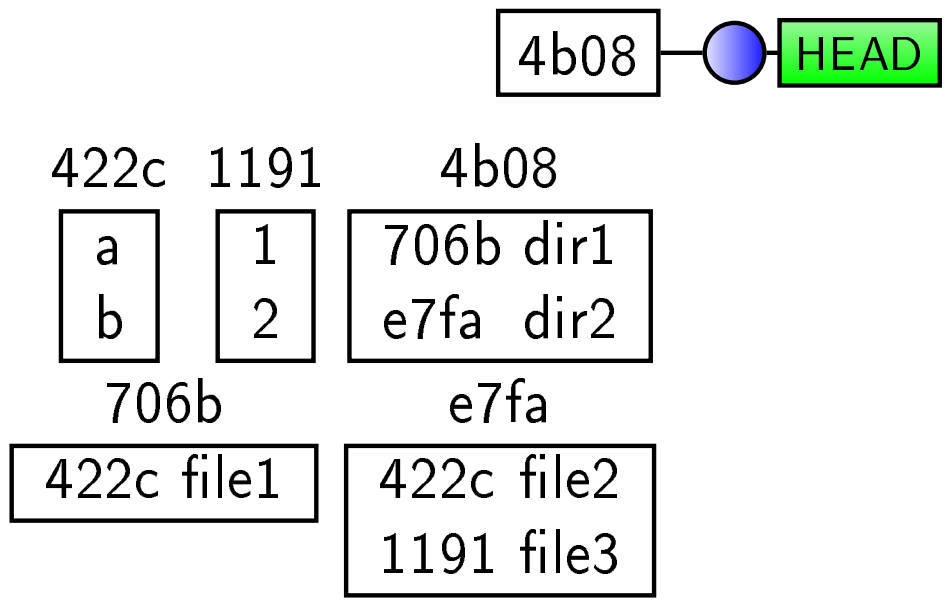

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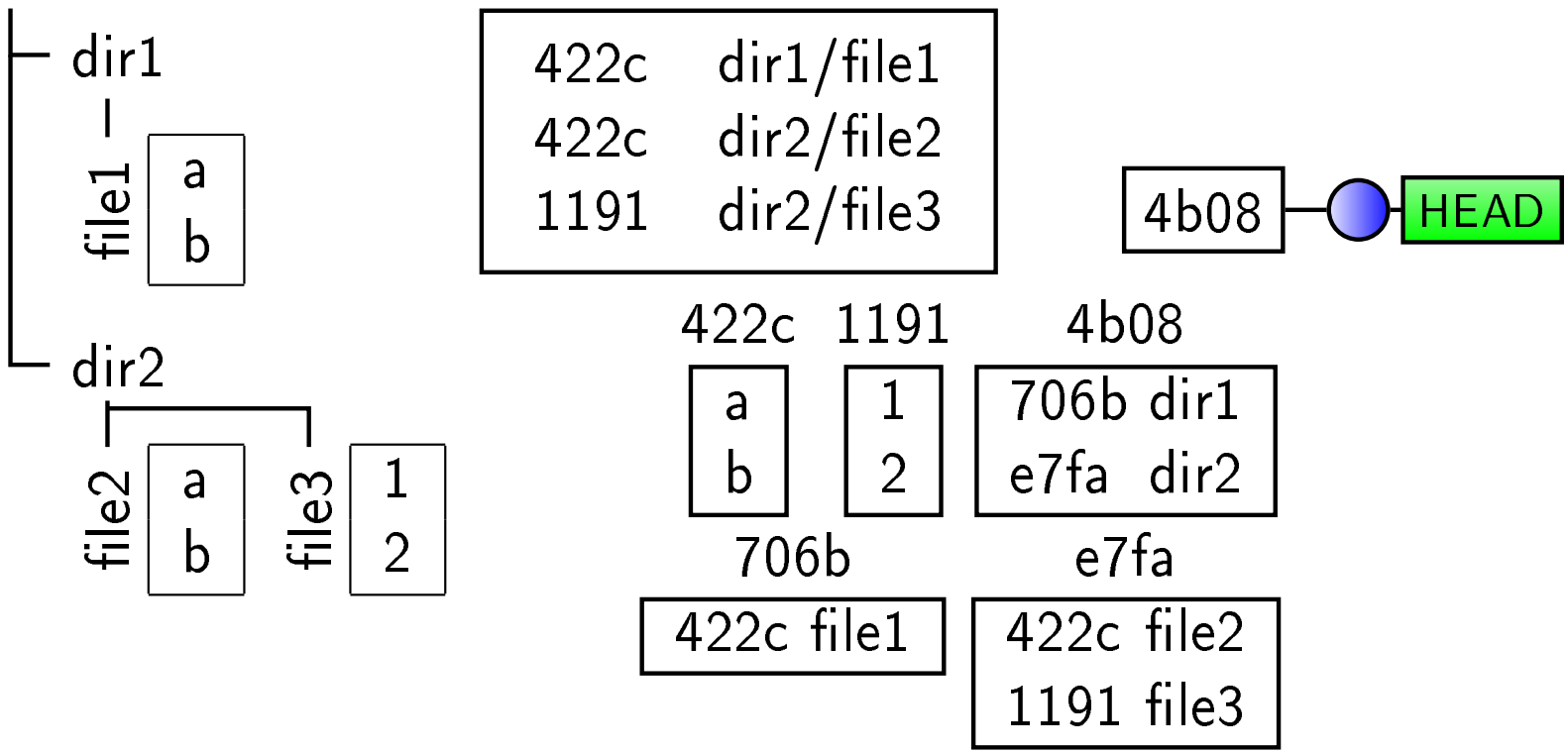

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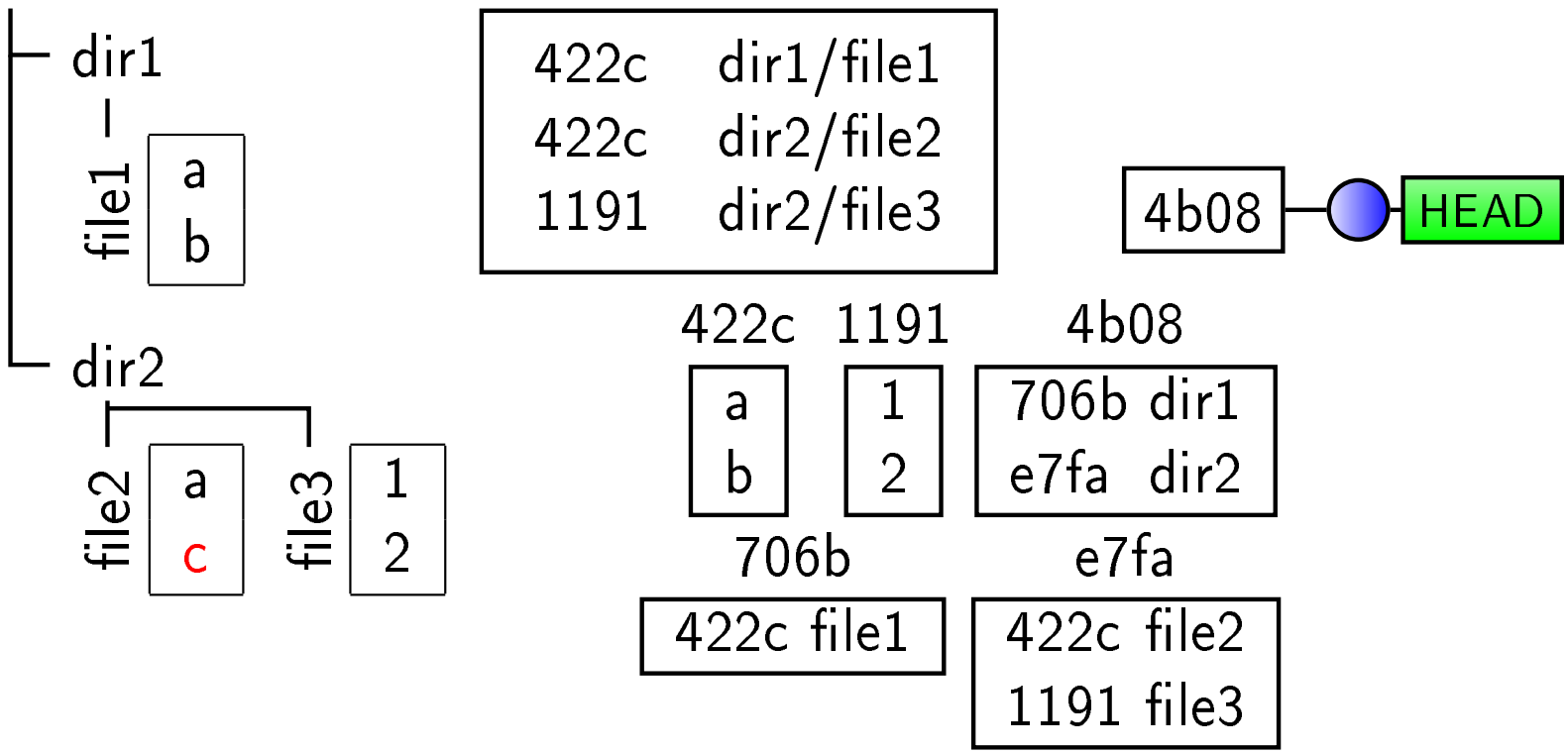

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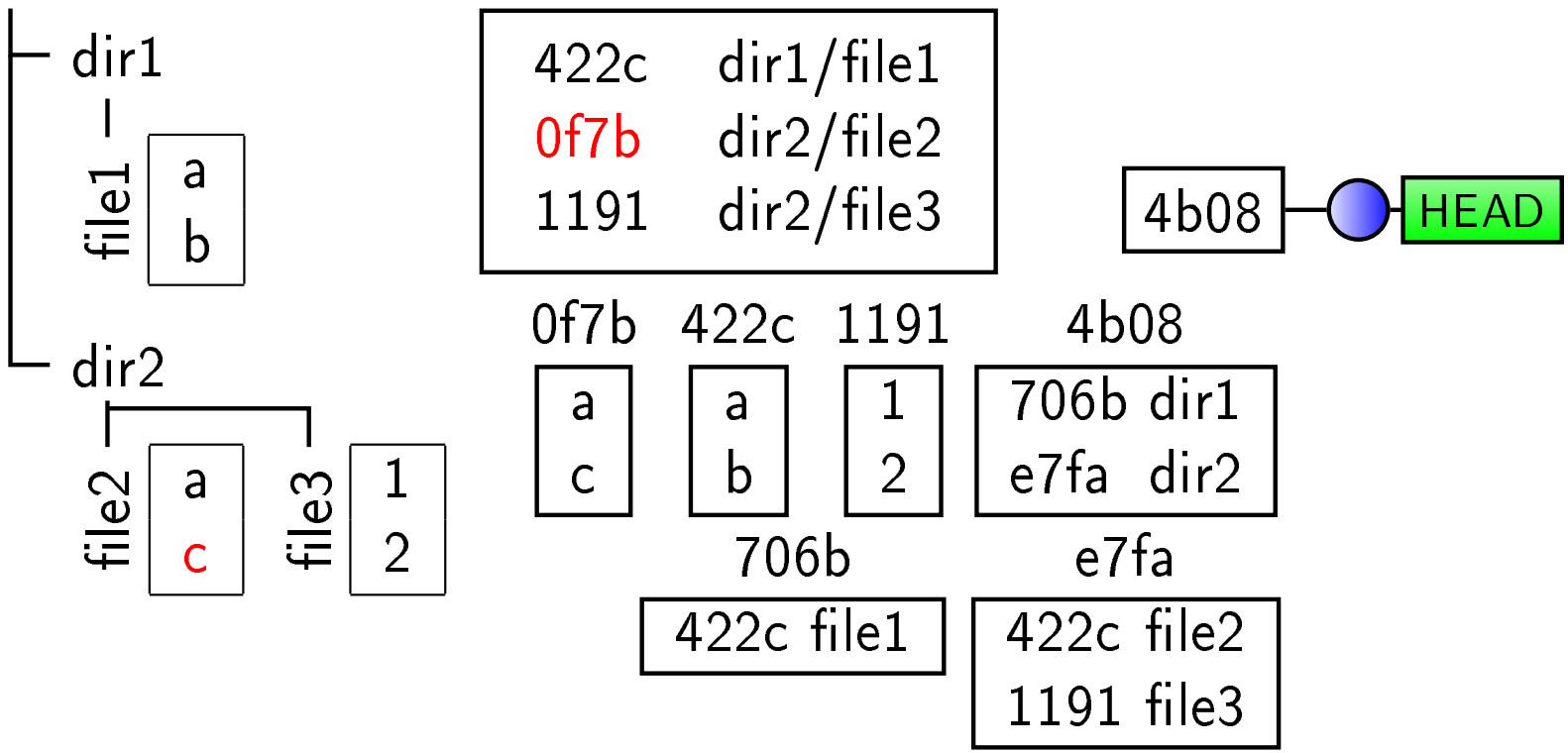

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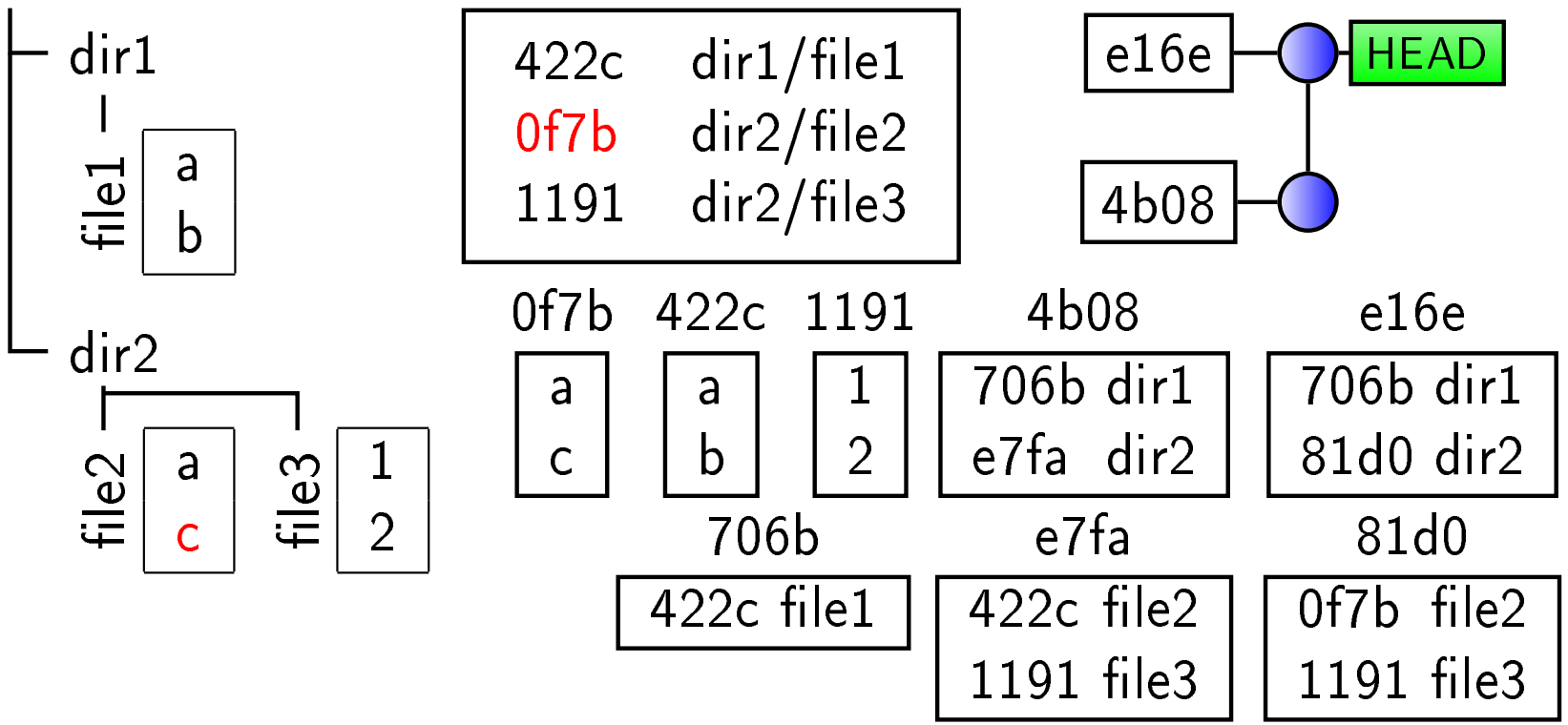

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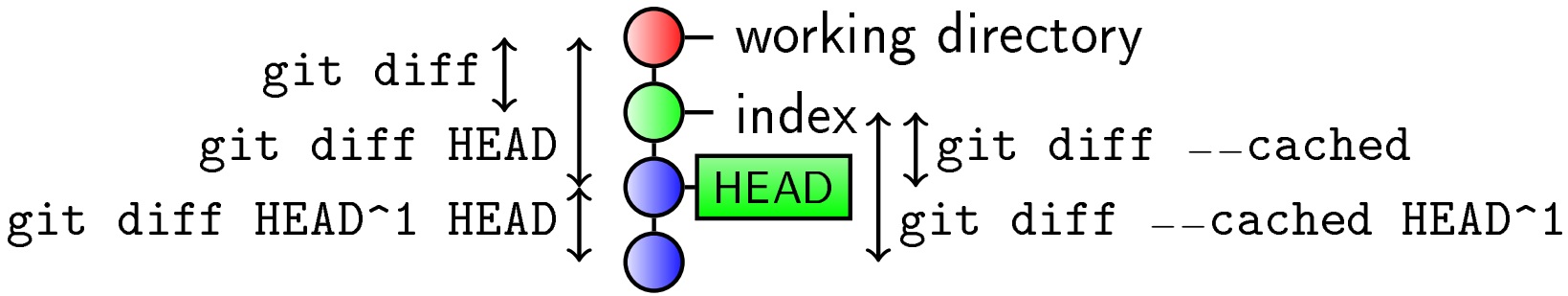

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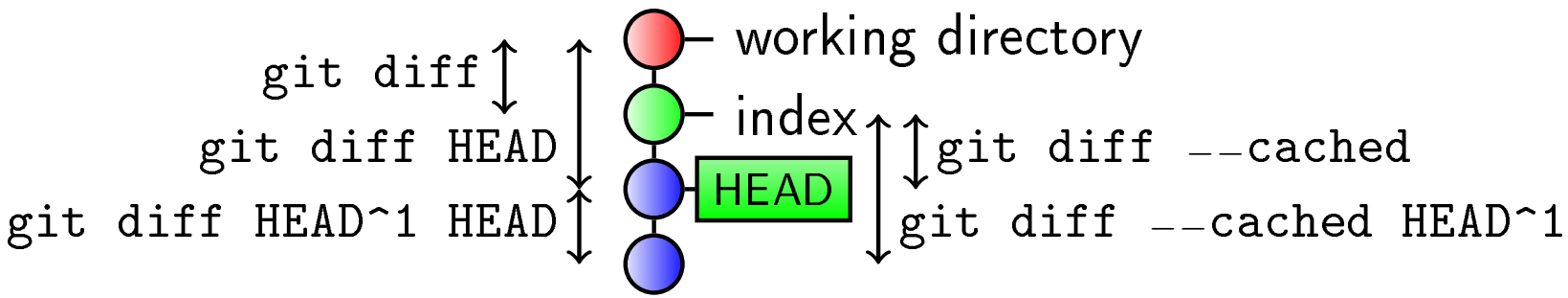

- `git reset --soft` *name* changes the head commit of your current branch (usually to a parent or ancestor), `git reset --mixed` *name* also resets the index, `git reset --hard` *name* also the working directory.

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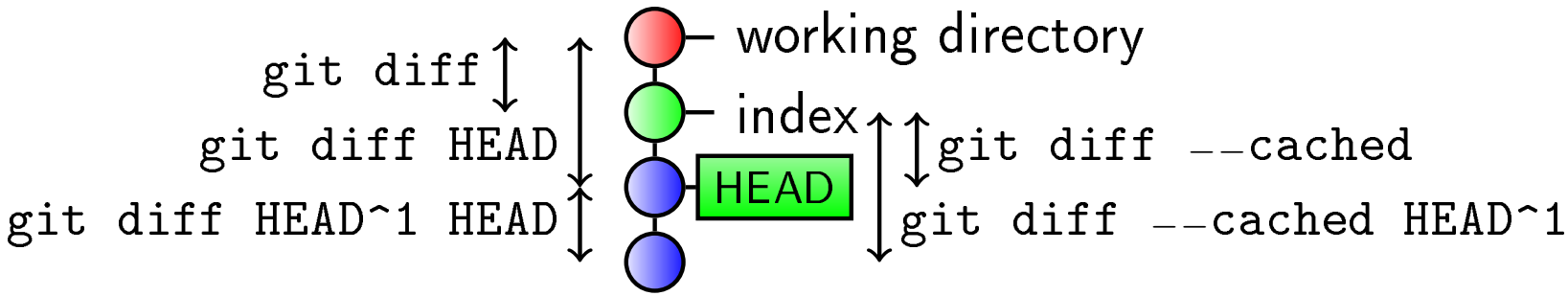

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- You can move partial content using `git add -p`.

Managing patches in git

Why modifying history?

- Most upstreams will usually require some properties for patches they include:
  - Every commit should be in a working state (important for bisect).
  - Commits should not mix unrelated things (one issue at a time).
  - Commits should have proper description.
- Getting everything good enough the first time in practically impossible in most cases.
- Replaying all your modifications and doing the correct commits is both too much work and too error prone.

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- Getting everything good enough the first time in practically impossible in most cases.
- Replaying all your modifications and doing the correct commits is both too much work and too error prone.
- Git to the rescue: modifying commits in git.

Amending a commit

Amending a commit with `git commit --amend` does not create a new commit on top of the current one, but creates a commit supposed to replace the current one.
The new commit will have the parents of the current HEAD, but can have a new tree and a new description and if you use `--reset-author` also a new author and timestamp.

Splitting a patch

Let's assume your last commit contains unrelated and you want to split it into two commits.

- `git branch old`
  First remember the current state somehow
  (I like temporary branches).

Splitting a patch

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- `git branch old`
- `git reset --mixed HEAD^1`
  Switch back to the previous state

Splitting a patch

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- `git branch old`
- `git reset --mixed HEAD^1`
- `git add file1 file2`
  Mark all files where you want all changes in the first commit.

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- `git branch old`
- `git reset --mixed HEAD^1`
- `git add file1 file2`
- `git add -p file3 file4`
  Add parts of the modifications of other files (give no names to be asked about all files)
  For every chunk in them answer whether to include it or not.

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- `git branch old`
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- `git add file1 file2`
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- `git commit -c old`
  Do the new commit (reusing the commit message where applicable using -c).

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- `git add file5`
  Add files newly added in the second patch (if any).

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- `git commit -c old -a`
  Do the second commit with all the other modifications (-a) to already tracked files.

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- `git commit -c old -a`
- `git diff old HEAD`
  Compare the resulting trees.

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- `git diff old HEAD`
- `git branch -D old`
  Clean up. Or if you goofed up revert using:
  `git reset --hard old`

Git rebase

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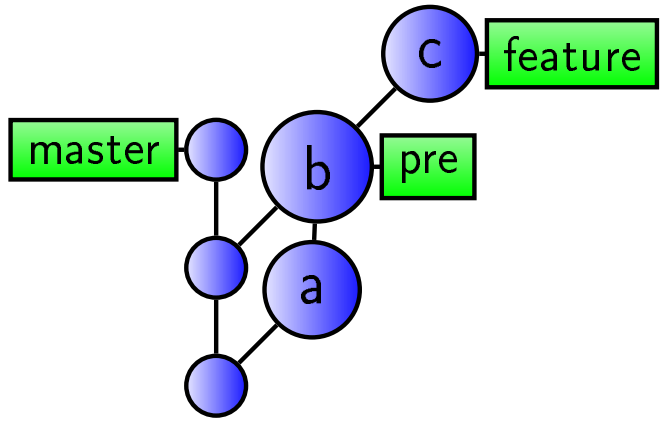

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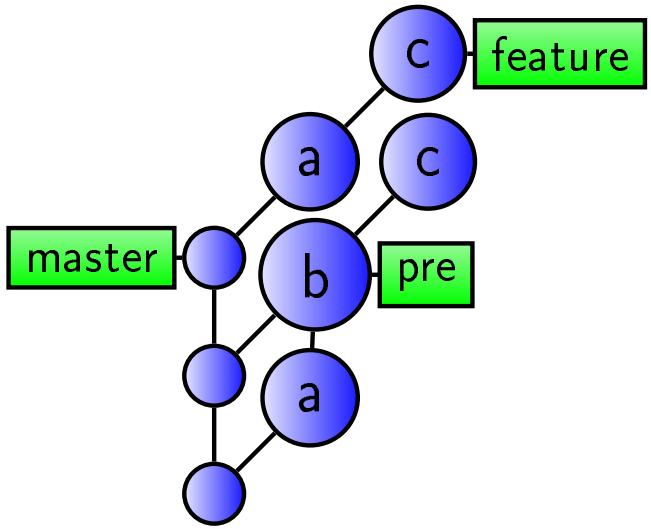

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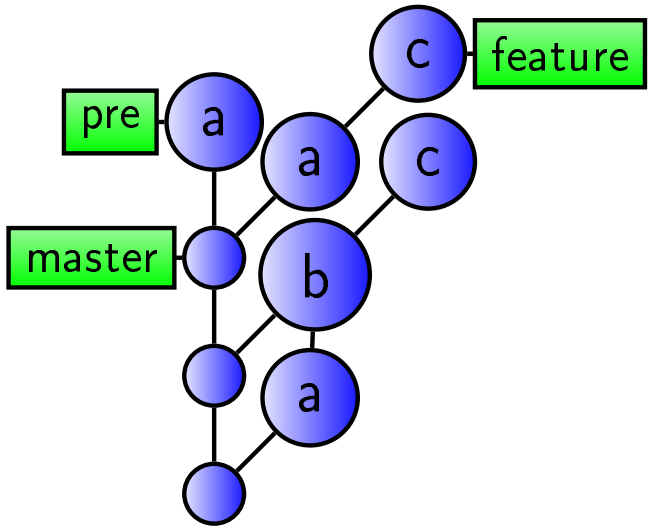

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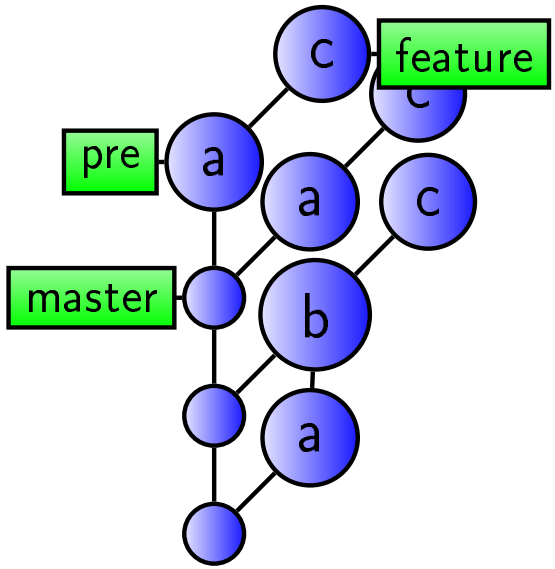

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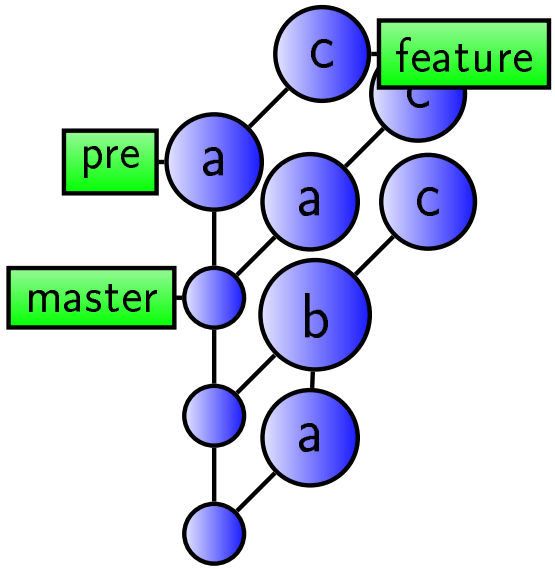
- The operation changes the history, the history of this operation is not retained.



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# x, exec = run command (the rest of the line) using shell
#
# These lines can be re-ordered; they are executed from top to bottom.
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# If you remove a line here THAT COMMIT WILL BE LOST.
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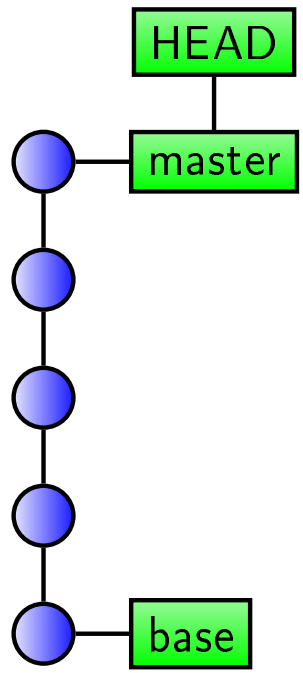

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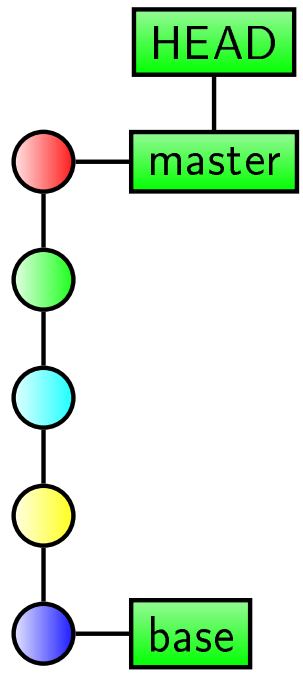

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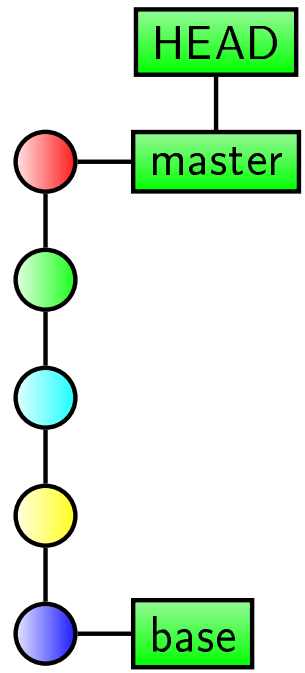

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# x, exec = run command (the rest of the line) using shell
#
# These lines can be re-ordered; they are executed from top
#
# If you remove a line here THAT COMMIT WILL BE LOST.
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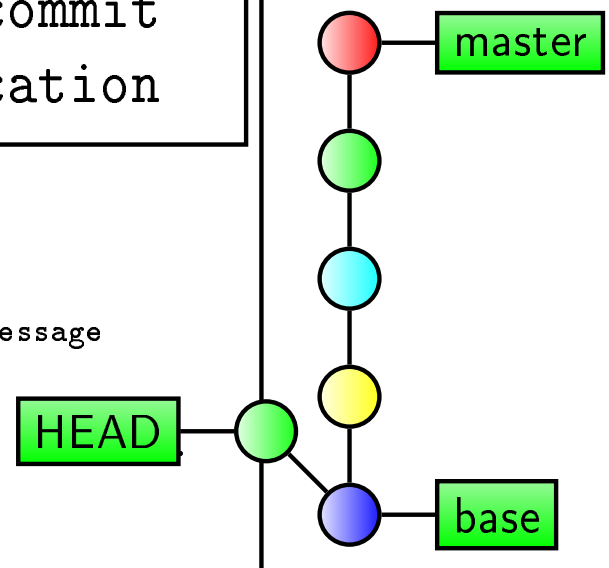
# However, if you remove everything, the rebase will be aborted.
#
# Note that empty commits are commented out
```



Git rebase –i

```
pick 5d0fb09 Some modification
pick 59853f1 Some other modfification
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```

```
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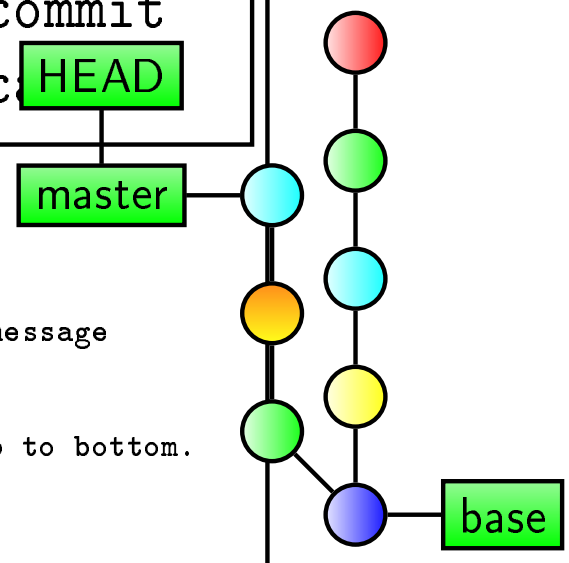

Git for Debian packaging

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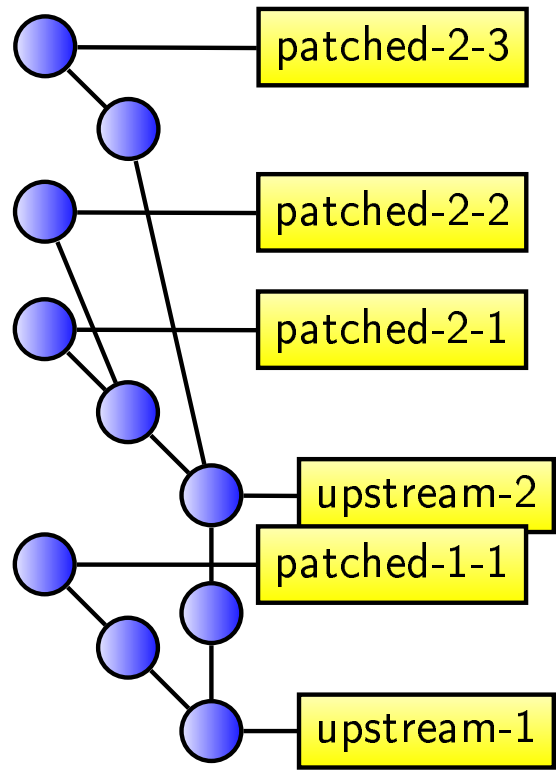

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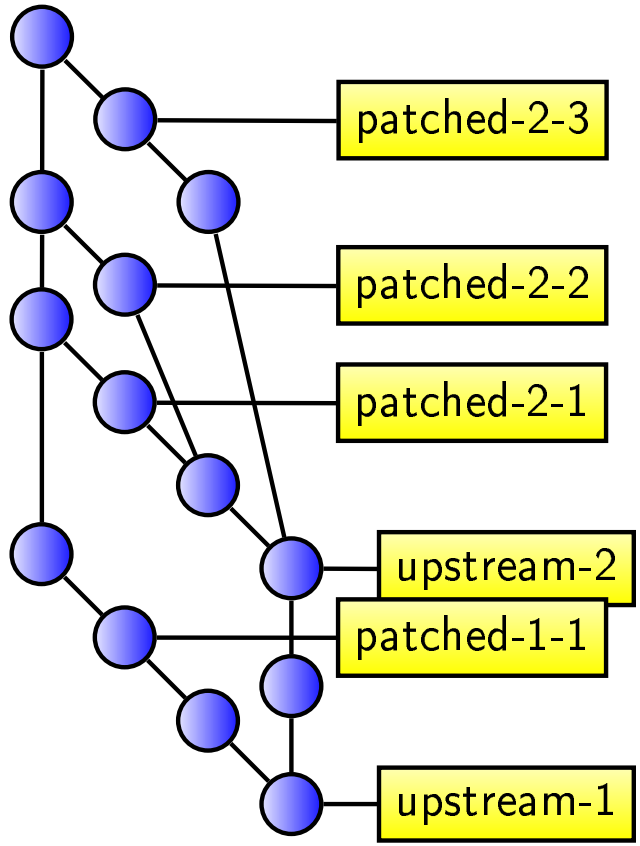

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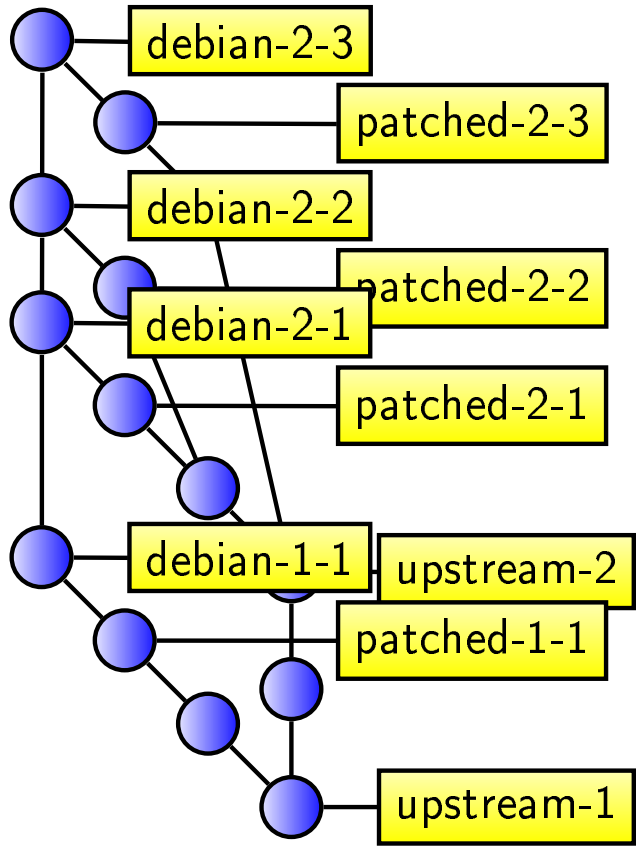
Idea: also store modifications to debian/ there.



git-dpm

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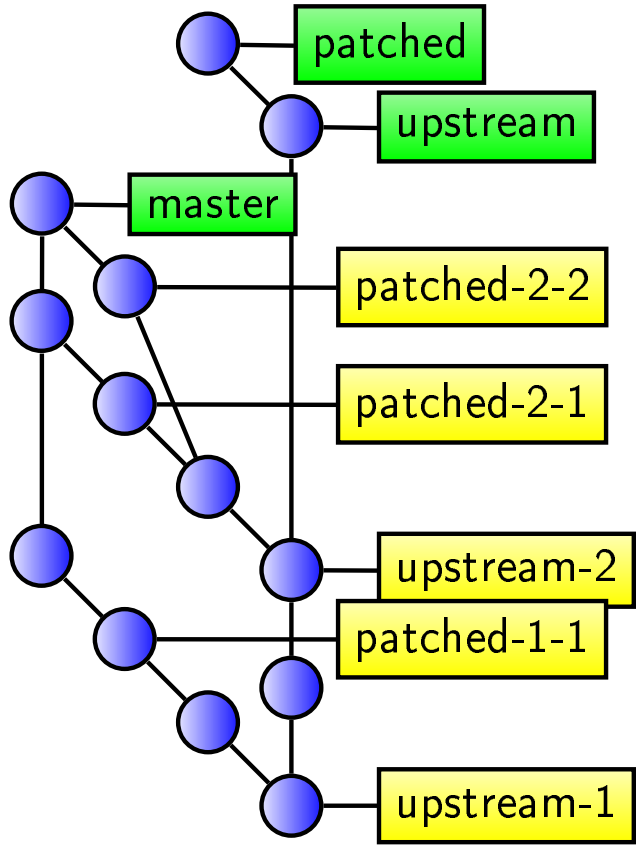
  - everything should be possible without git-dpm (and as easily as resonable possible)

git-dpm merge-patched

The above described method has one challange for git: A good merging method.
Consider this case: There was a new upstream. You have some patch against this (either a new one, or one of the previous ones survived because it was not included upstream). Now one needs a merge that does...



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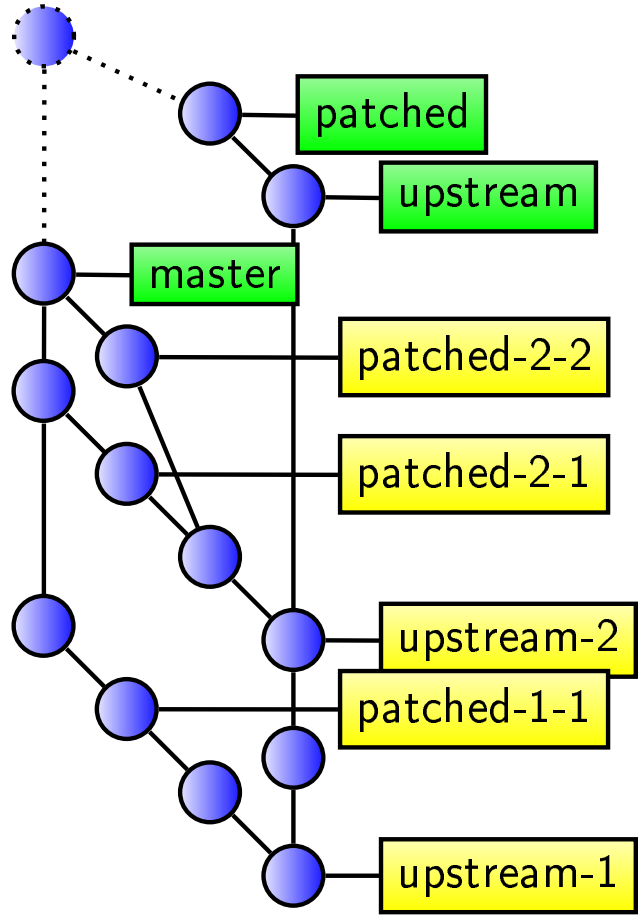

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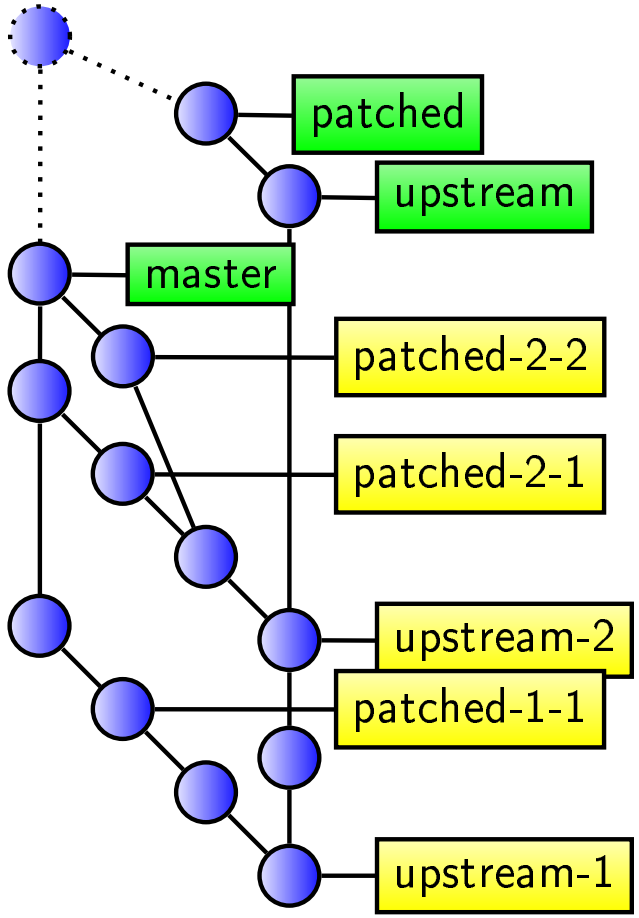

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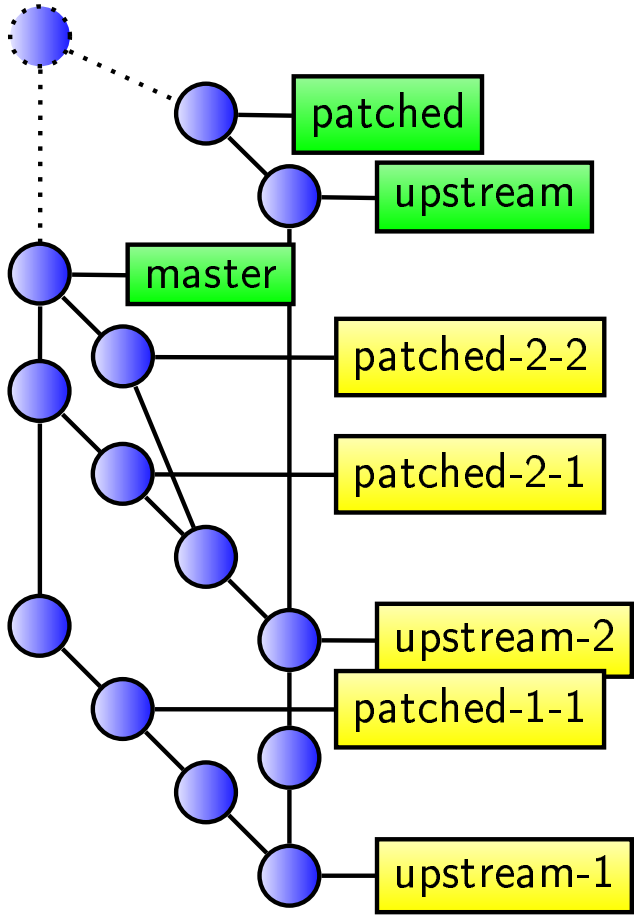

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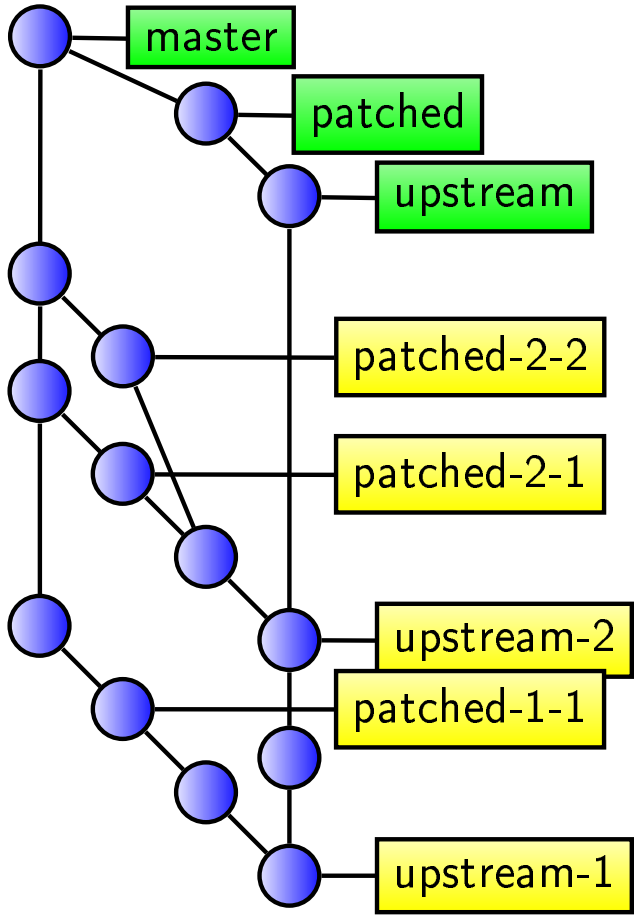
- except file deletions (so one can just clean files the upstream build system modifies, just as before using git).



branches used by git-dpm

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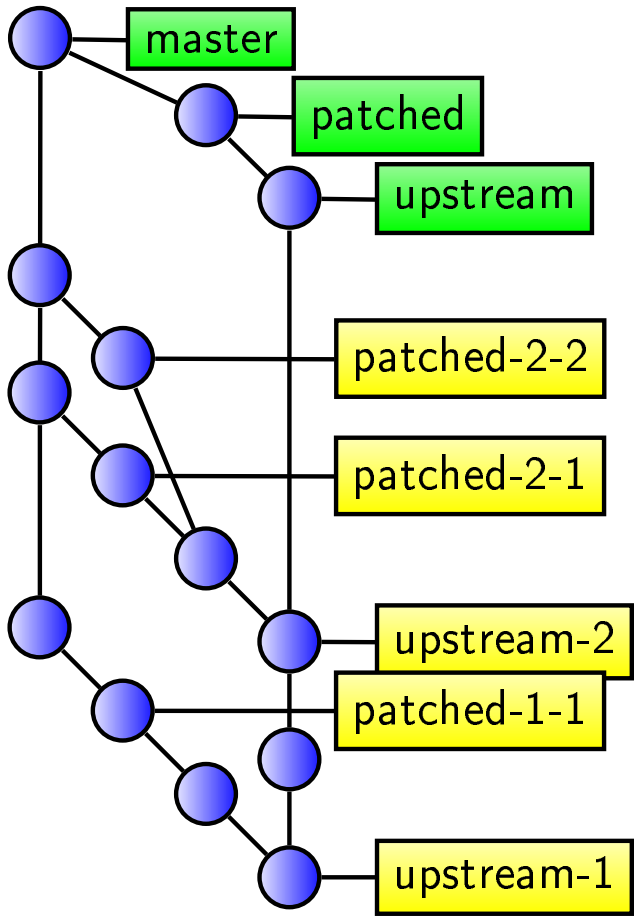

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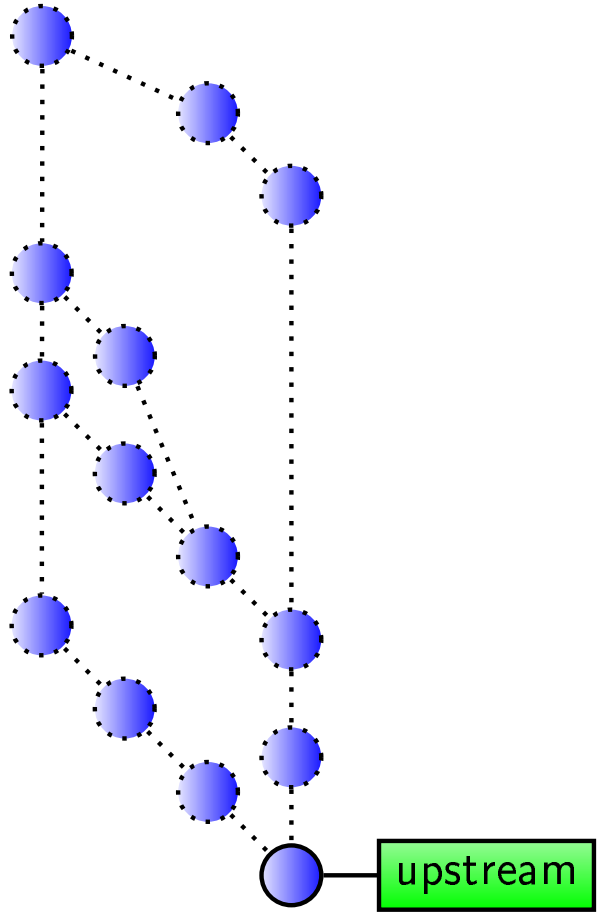

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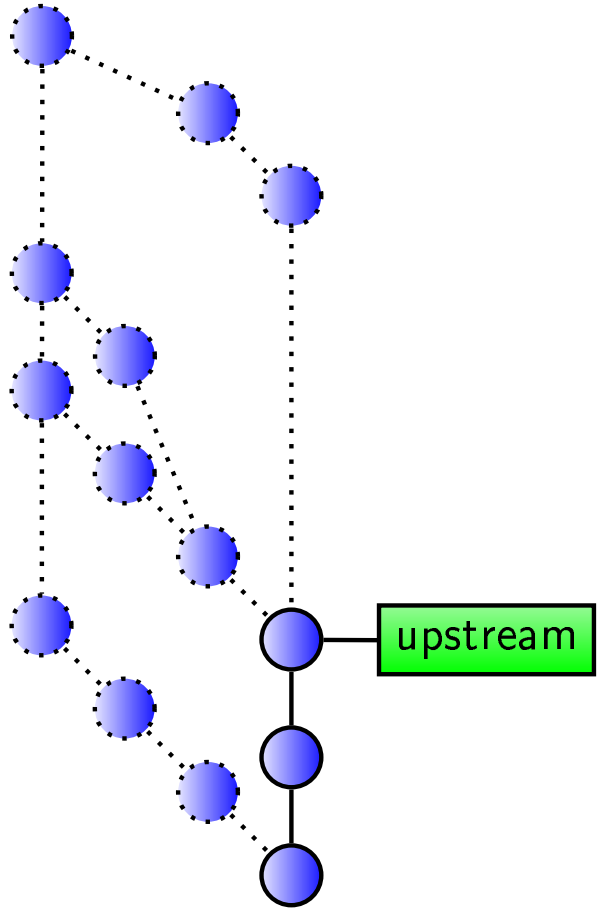

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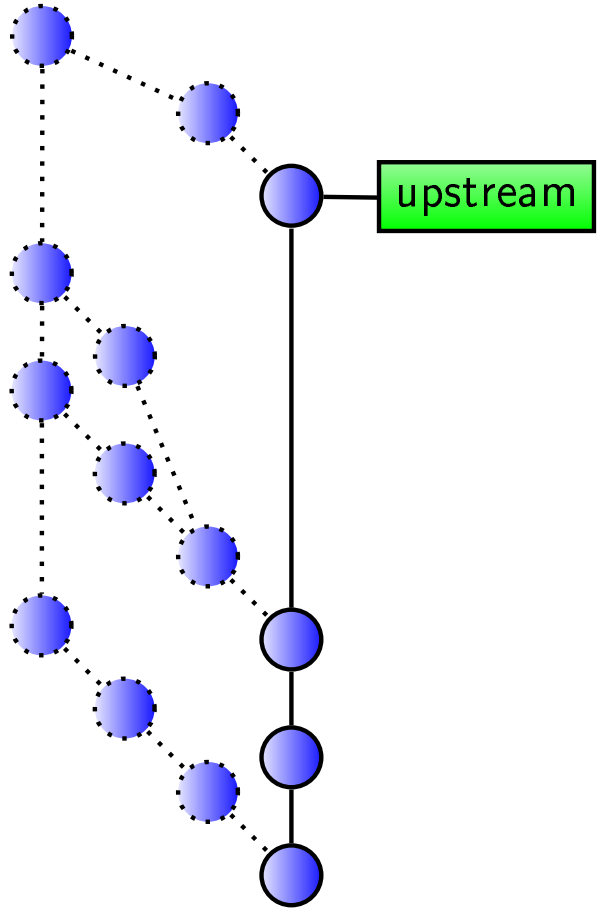

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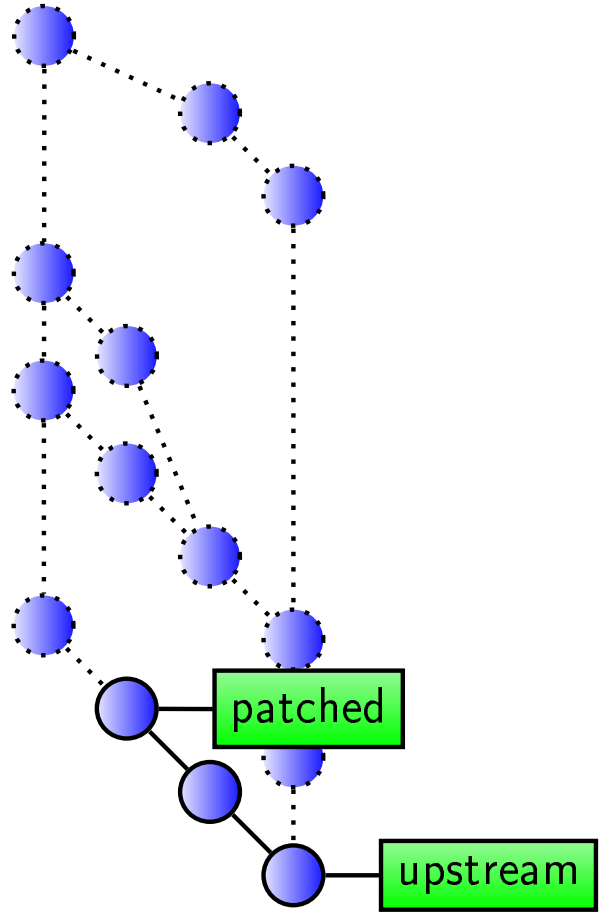

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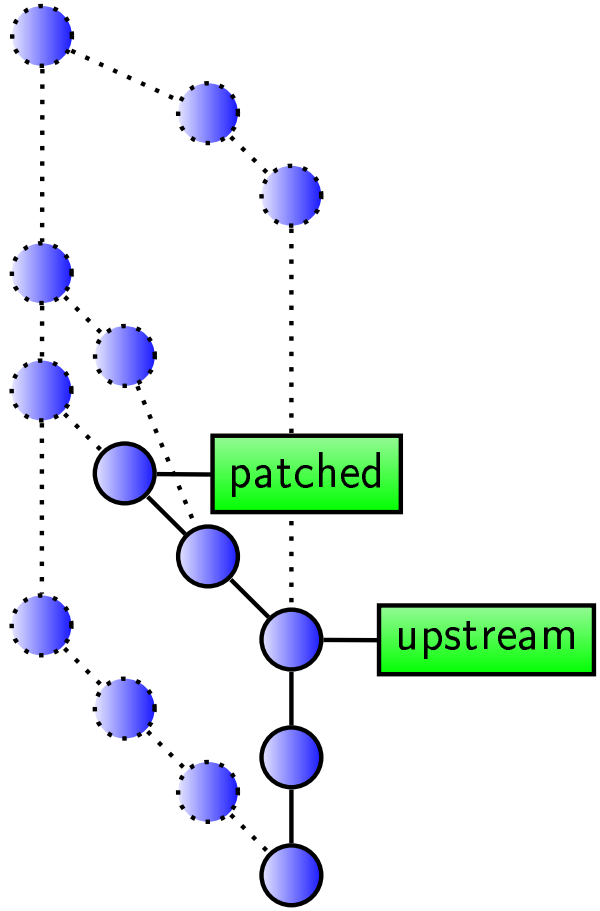

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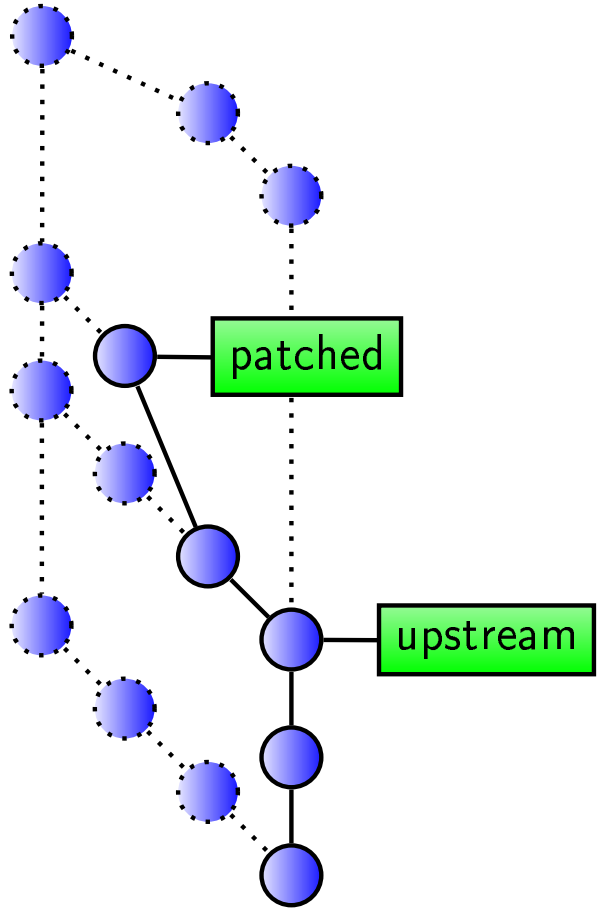

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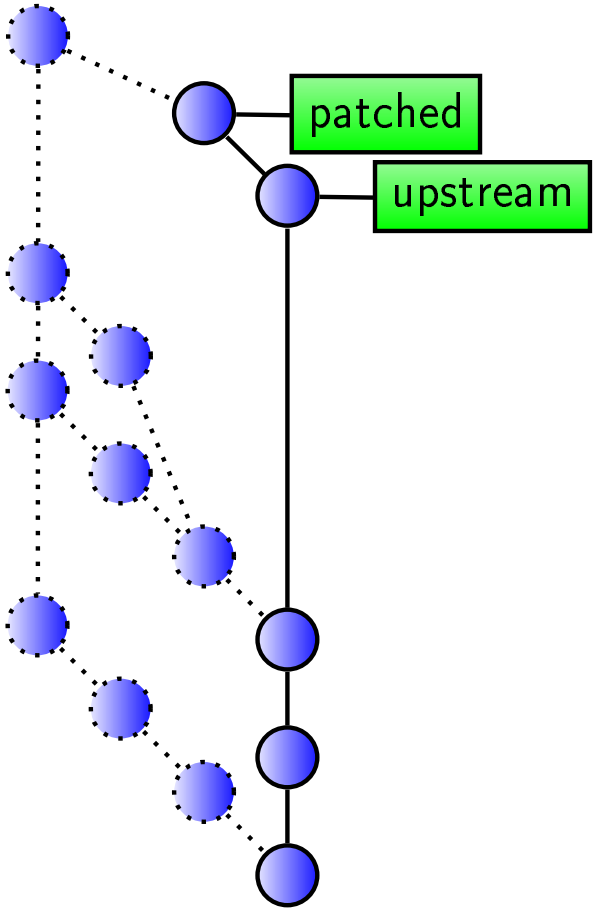

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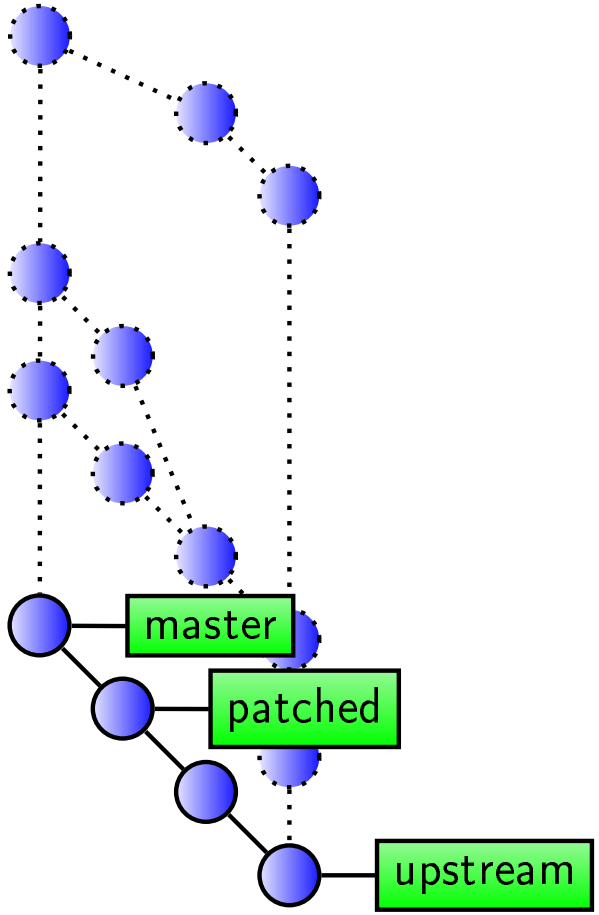

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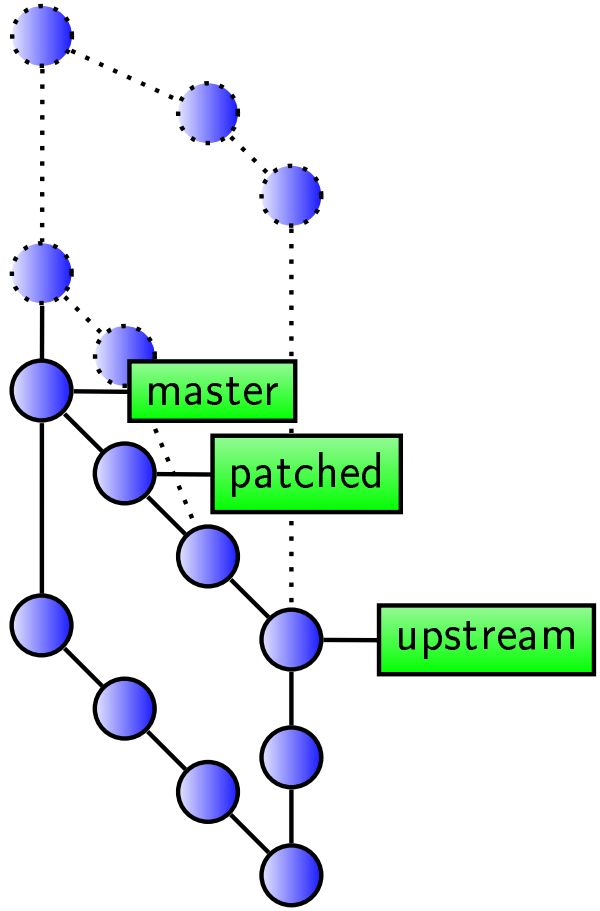

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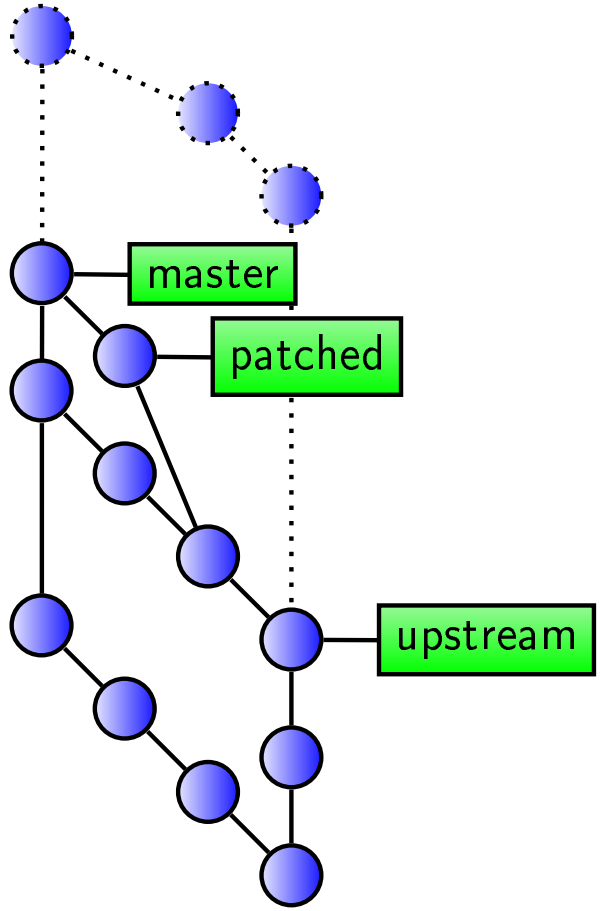

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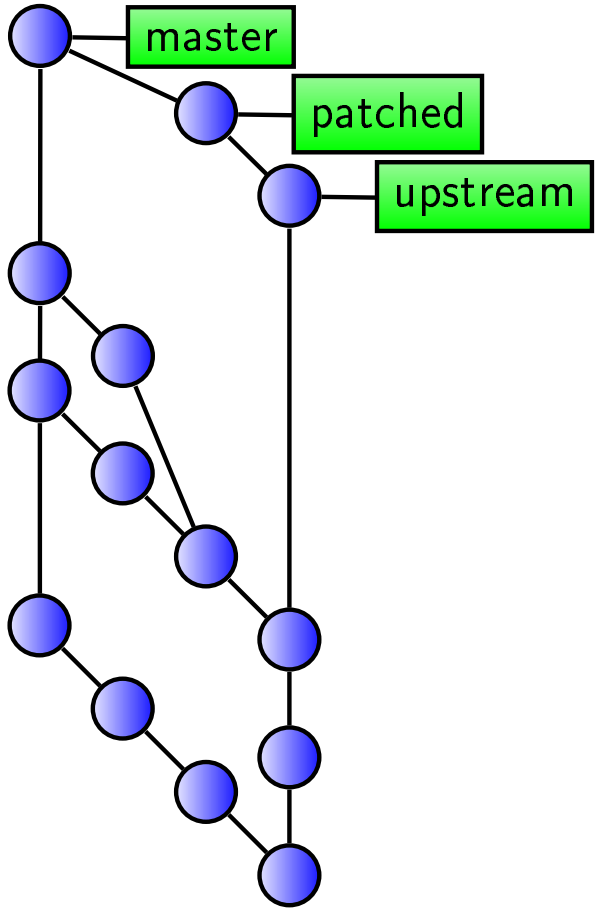

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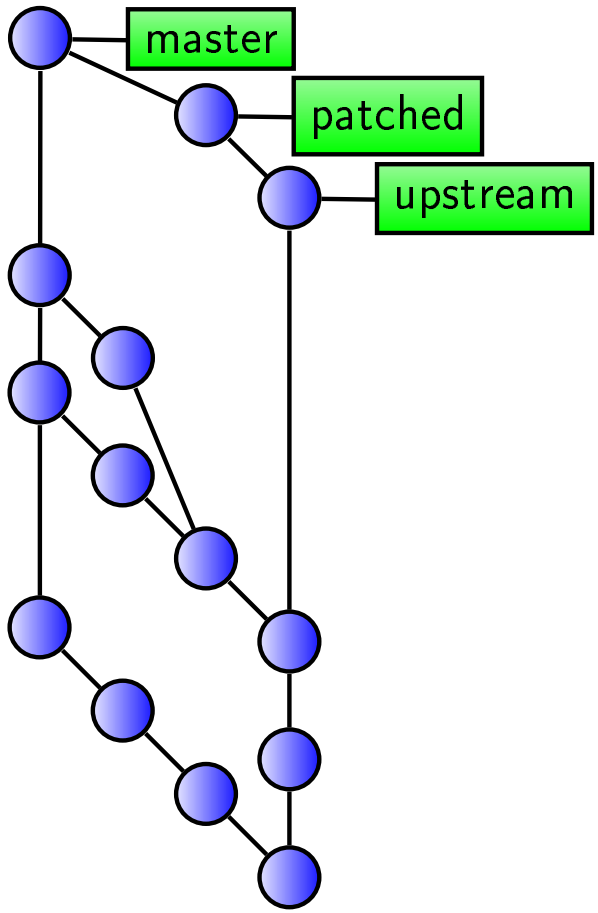

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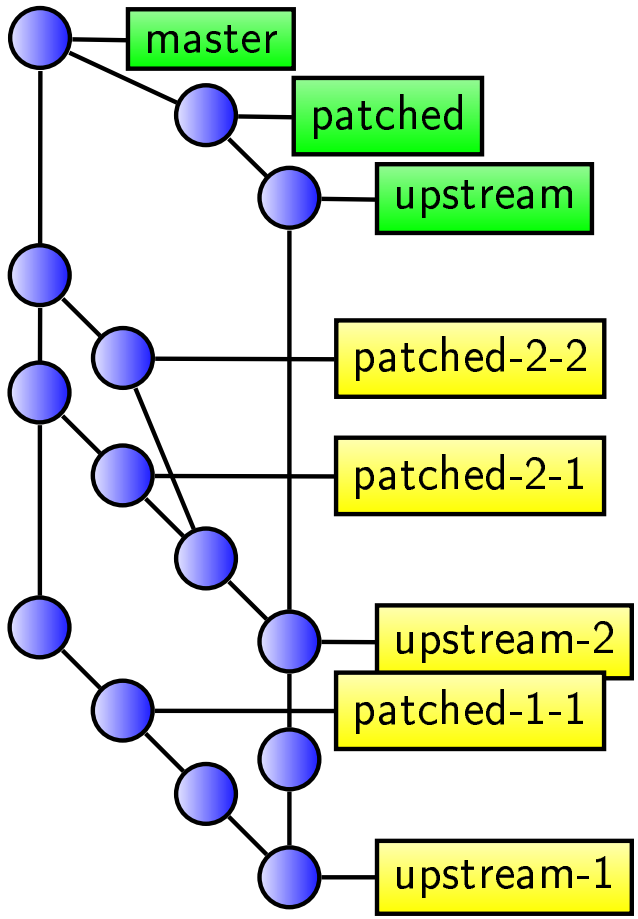

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branches used by git-dpm II

Unless configured differently, git-dpm assume that those branches are called

Debian branch	patched branch	upstream branch
`master`	`patched`	`upstream`
something	`patched-`*something*	`upstream-`*something*

So if it is called in a branch called `wheezy-patched` it assumes that to be belonging to a branch `wheezy` and an branch `wheezy-upstream`.

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- disavantage: the related branches are not directly visible via git means (but those related to released versions are tagged, and they are easy to find with `git log` or `gitk`.)
- advantage: With only a single branch head to care about, you get all of git's advantages. You can just branch off a different development line with `git branch`, reset to the previous state with `git reset` and push it around and even merge easy cases.

git-dpm update-patches

Having modifications stored in git commit, one wants to export them to a `debian/patches/` series, so one can create a `3.0` source package.
One can do this manually with something like:

```
git format-patch -o debian/patches upstream..patched |
sed -e 's#^debian/patches/##' > debian/patches/series
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or one can use `git-dpm update-patches`:

- does not need any arguments, but determines those automatically
- calls merge-patched first if necessary
- removes all old patches
- records that this state of the patched branch was exported
- commits the result

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The easiest way it just to use the full contents of the `.orig.tar` as HEAD commit of your upstream branch.

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recording and importing upstream files

- `git-dpm prepare`
  will make sure the correct `.orig.tar` is available or try to recreate it with pristine-tar. It will also make sure or create the upstream branch as local git branch.
- `git-dpm (record-)new-upstream`
  will record the current state of your upstream branch and record the checksum of the named `.orig.tar` file to belong to this. i.e.: you create a upstream branch any way you want and call this to tell git-dpm to remember it in `debian/.git-dpm`.
- `git-dpm rebase-patched`
  will call `git rebase` with the correct arguments to rebase your patched branch on the new upstrem branch (**read** and follow the instructions git gives you to resolve any possible conflicts).

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- `git-dpm rebase-patched`
  will call `git rebase` with the correct arguments to rebase your patched branch on the new upstrem branch.
- `git-dpm import-new-upstream`
  This creates a new commit in your upstream branch with the contents of the given `.orig.tar` file and records that as new upstream. Ypu can give additional parents this commit should have (useful to have upstream's git history included in there).

the patched branch

Collaboration gets easier if the patchd branch cannot get stale. Thus git-dpm by default removes it whenever it is not currently needed (i.e. after merging it in).
The suggested workflow is:

- `git-dpm checkout-patched`
  Creates the patched branch as git branch and checks it out.
- add new commits, amend commits, edit patches with interactive rebase, . . . , . . .
- record the new state and merge it back using `git-dpm merge-patched`, `git-dpm update-patched` or `git-dpm dch`.

When collaborating on a project and only one participant changed the patch branch, you can just merge the Debian branches (or let `git pull` merge them for you). If both did so, check out both patched branches, merge them, do an interactive rebase to linearize the result and chose which commits to use and then merge that back.

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  - giving it a commit message based on the changelog commit message
  - passes arguments as `-a` (so one can also include other `debian/` changes in the same commit.

git-dpm import-dsc

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- is there to import a .dsc file
- is the easiest way to start a git-dpm project
- will try to import any patches found in the package to commits.

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There are many different options. For example (see manpage for more):

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- `--use-changelog`
  Treat `.dsc` files like a vcs you are importing and set the author, date and message of the commits from the changelog.
- `--patch-system`
  Explicitely name a patch system the package uses to import packages from. Mostly useful to name explicitely are `none` to not import anything and `history` that will split directly-applied 1.0 diffs into one patch per imported version.

git-dpm tag

`git-dpm tag` is a convienience wrapper to create tags for one release. For each for the three branches a tag is created.
The names are configurable, but the defaults are

		––named
Debian	debian*%e*-*%v*	*%p*-debian*%e*-*%v*
patched	patched*%e*-*%v*	*%p*-patched*%e*-*%v*
upstream	upstream*%e*-*%u*	*%p*-upstream*%e*-*%u*

With *%p* package name, *%e* epoch, *%v* version without epoch, *%u* version without epoch and revision.

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With *%p* package name, *%e* epoch, *%v* version without epoch, *%u* version without epoch and revision.
I usually tag once I upload the resulting source package, but your milage may vary.

git-dpm record-dsc

With `git-dpm record-dsc` you can store a signed source package you created by using `pristine-tar` to store the `.debian.tar` and storing the signed `.dsc` in a branch called `dscs`.

- Any time left?
- Any questions?