Gitting Further

More complex operations with Git

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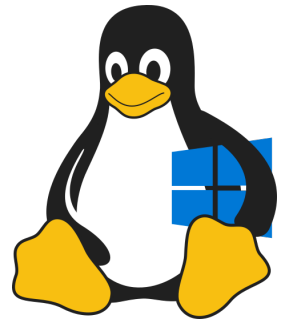

About us

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What are GPG Keys?

[1] Pretty Good Privacy
[2] GNU Privacy Guard

GPG Keys - Overview

What are GPG Keys?

- PGP[1]/GPG[2]
- Used for cryptographic encryption and signing of data
- In this case: signing of commits
- Proves that the Git identity belongs to you

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How to set one up?

1. Installation
2. Generate a keypair
3. Upload your public key
4. Configure Git

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[1] Pretty Good Privacy
[2] GNU Privacy Guard

GPG Keys - Installation

- Run `gpg --version` to see if installed
- Not installed? See https://gnupg.org/download/#binary
- Our advice:
  - Windows
    - Install Gpg4win
  - Linux
    - You already have it (-:
    - Install the RPM package or AppImage
  - MacOS
    - Install Mac GPG from gpgtools

GPG Keys - Generate a keypair

Run `gpg --full-generate-key`. Some remarks:

GPG Keys - Generate a keypair

Run `gpg --full-generate-key`. Some remarks:

- The default key type and size are good
- Set an expiry date
  - In one year is a good default
- Set a name and an email address
  - Useful if same as your Git identity
- Set a passphrase **and store it!**
  - Prevents others from using the key
  - **Keep the passphrase strong and secure!**

GPG Keys - Upload your public key

1. Export your **public key**: `gpg --armor --export <keyid>`
   - `<keyid>` is from the output of `gpg -K --keyid-format=long`: `sec rsa3072/<keyid> 2024-06-01 [SC] ...`
2. Copy everything including `BEGIN PGP PUBLIC KEY BLOCK` and `END PGP PUBLIC KEY BLOCK`
3. Add it to your account on Github/Gitlab. See the manual for
   - Github
   - Gitlab

GPG Keys - Configure Git

1. Tell Git to always sign your commits:
   `git config [--global] commit.gpgsign true`
2. Tell Git which GPG key to use for signing:
   `git config [--global] user.signingkey <keyid>`
   - `<keyid>` is from the output of `gpg -K --keyid-format=long`:
     `sec   rsa3072/<keyid> 2024-06-01 [SC] ...`

Aliases

- Shortcuts for existing commands (aliases)
  - `git gr` instead of `git log --oneline --graph`
  - `git sw other-branch` instead of `git switch other-branch`
  - `git ust` instead of `git stash pop`
- Completely custom commands
  - Get `git ignore <file>` with `git config --global alias.ignore '! echo $1 >> .gitignore; tail .gitignore; :`

Handling multiple identities

- You probably have multiple identities
  - Personal work
  - University projects
  - Study association
  - etc.

[3] Source: https://www.micah.soy/posts/setting-up-git-identities/

Handling multiple identities

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  - You forget to change it
  - There is no easy way to change it

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- You probably have multiple identities
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  - There is no easy way to change it
- Solution: combine custom configuration and aliases![3]

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Handling multiple identities

1. Create the alias `git identity <id>`

```
git config alias.identity '!
git config user.name "$(git config user.$1.name)";
git config user.email "$(git config user.$1.email)";
git config user.signingkey "$(git config user.$1.signingkey)"; :'
```

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2. Let Git force you to choose an identity
   1. `git config --global --unset user.name`
   2. `git config --global --unset user.email`
   3. `git config --global --unset user.signingkey`
   4. `git config --global user.useConfigOnly true`

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   4. `git config --global user.useConfigOnly true`
3. Create your different identities
   - `git config --global user.github.name 'Bob'`
   - `git config --global user.github.email 'bob@example.com'`
   - `git config --global user.ut.name 'Bob (BSc)'`
   - `git config --global user.ut.email 'bob@utwente.nl'`
   - `git config --global user.ut.signingkey A6A6A6A6A6A6A6A6`

Handling multiple identities

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   - `git config --global user.ut.email 'bob@utwente.nl'`
   - `git config --global user.ut.signingkey A6A6A6A6A6A6A6A6`
4. Choose your identity in a repository

   `git identity github` or `git identity ut`

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Complex Operations

We will look at three commands:

1. Reset
2. Rebase
3. Cherry-pick

Important remarks:

- ! These commands can rewrite history
- ! Should only be used on *private*[4] branches

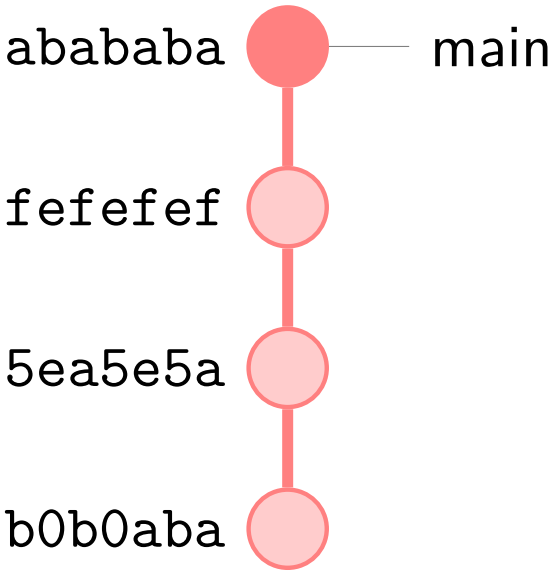
[4] branches on which only you are working

Reset

`git reset [<mode>] <hash>`

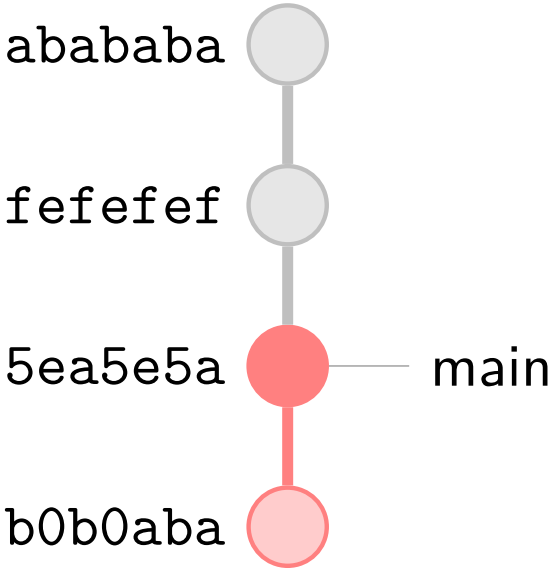
- Always undoes 1 or more commits
- Moves back to the commit hash provided
- Multiple modes
  1. soft - Doesn't touch the index or working tree
  2. mixed - Resets the index (default)
  3. hard - Cleans the index and working tree. Untracked files are deleted

Reset - Example




```
git reset --hard 5ea5e5a
```

Reset - Example



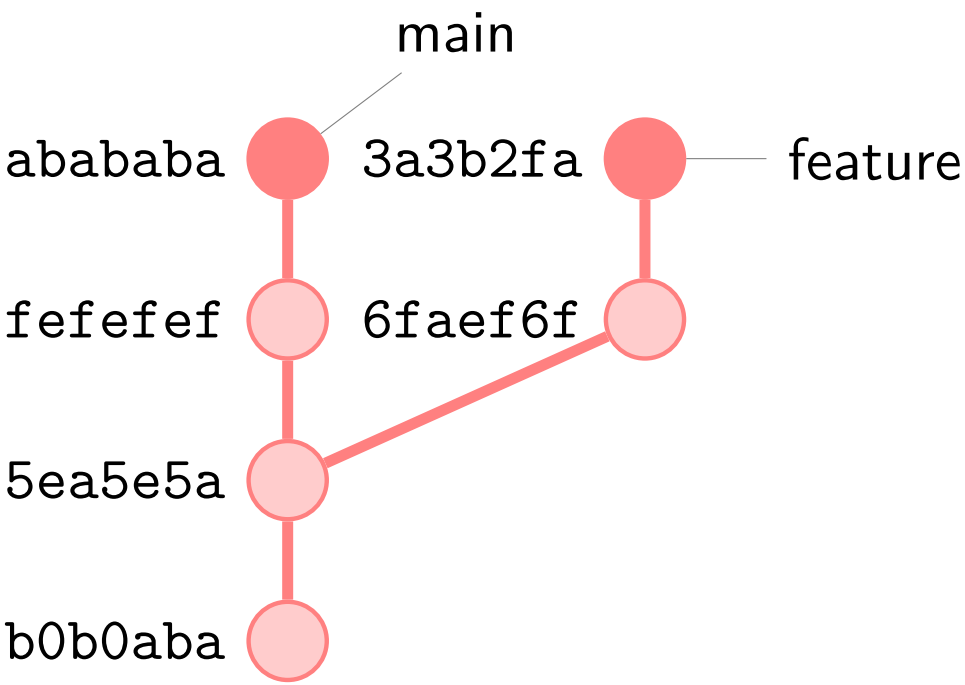

```
git reset --hard 5ea5e5a
```

Rebase

`git rebase [--interactive] [--onto <branch>] <branch>`

- Gives you a lot of power, so be careful!
- Allows you to
  - rebase a branch (duh)
  - edit commits and their order
  - a lot more

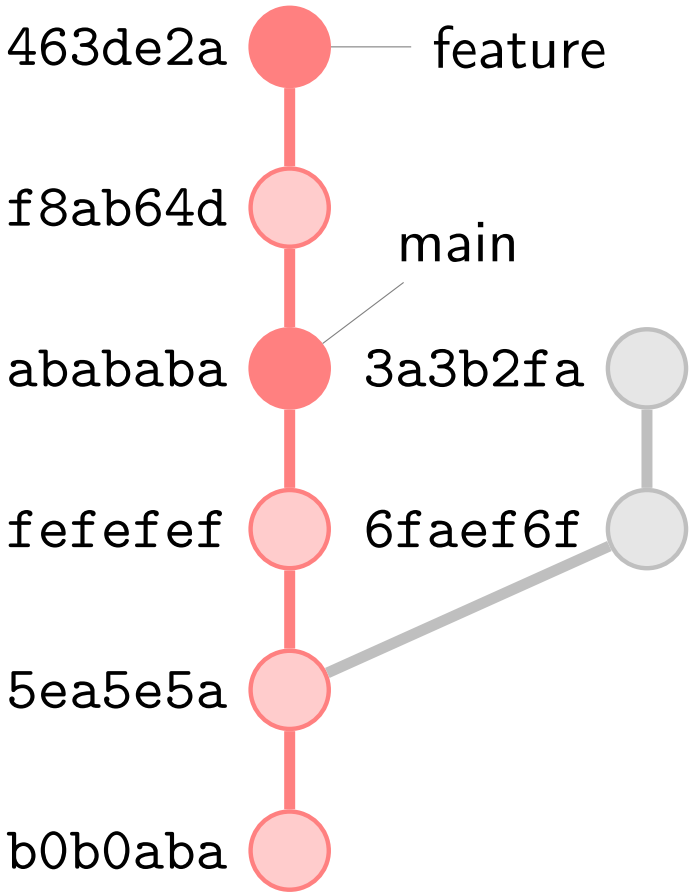
Rebase - Example



Rebase (move the base of) a branch:

```
git rebase main feature
```

Rebase - Example



Rebase (move the base of) a branch:

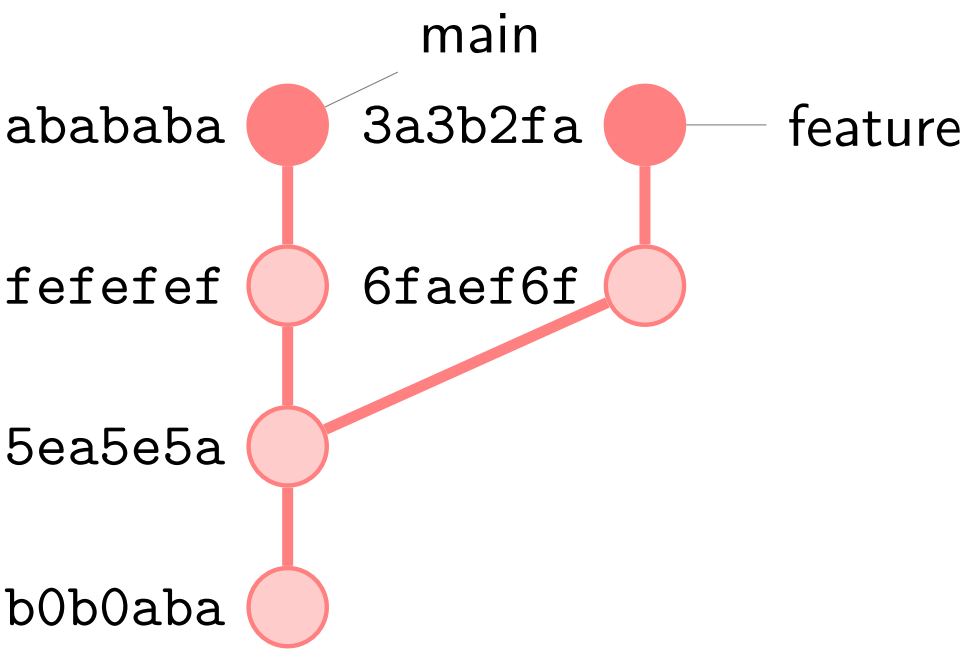
```
git rebase main feature
```

Cherry-picking

`git cherry-pick [--edit] [-x] <hash>`

- Reapply changes by the specified commits onto the head
- `--edit` allows you to edit the commit message
- `-x` adds a reference ("cherry picked from commit") to the commit message

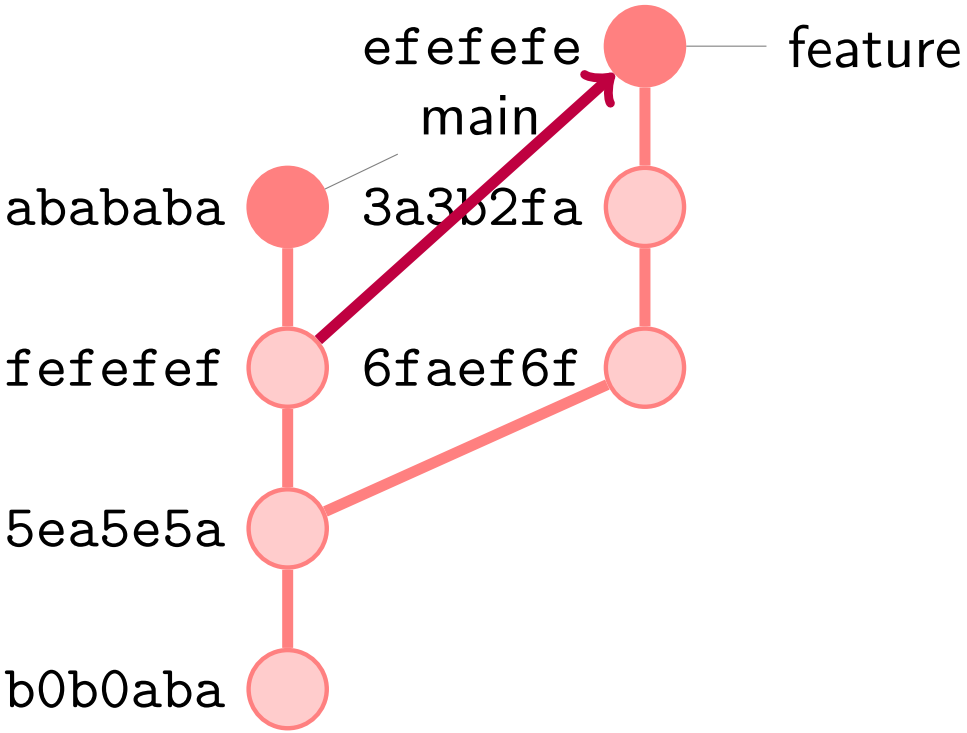
Cherry-pick - Example



Cherry-pick commit `fefefef`:

1. `git switch feature`
2. `git cherry-pick fefefef`

Cherry-pick - Example



Cherry-pick commit `fefefef`:

1. `git switch feature`
2. `git cherry-pick fefefef`

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Forking

Stashing

- Saves your uncommitted changes to the side
- Commands:
  - `git stash` - Save the changes
  - `git stash pop` - Put changes back in your working space and delete from stash
  - `git stash drop` - Delete changes from the stash

Bisect

Helps to find which commit introduced a bug

1. `git bisect bad`
2. Find a commit which doesn't contain the bug
3. `git bisect good`
4. Go to the commit specified and test it
5. Mark it accordingly

Sources for future reference

- `git help <command>`
- gitimmersion.com
- Rebase deep-dive: Conference talk about rebase (30m)

Contact details

Think of a question later on? Feel free to reach out to us!

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