Dateiverwaltung & Versionskontrolle mit Git

Training Teil 1

Dauer: 8h

Doc. Vers. 2018-03-22

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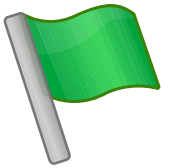
Voraussetzungen

1. Kurzinfo

   http://www.blunk-electronic.de/pdf/git_einfuehrung.pdf
2. Grundkenntisse zur Arbeit mit Kommandozeile
3. Mut zu etwas Neuem

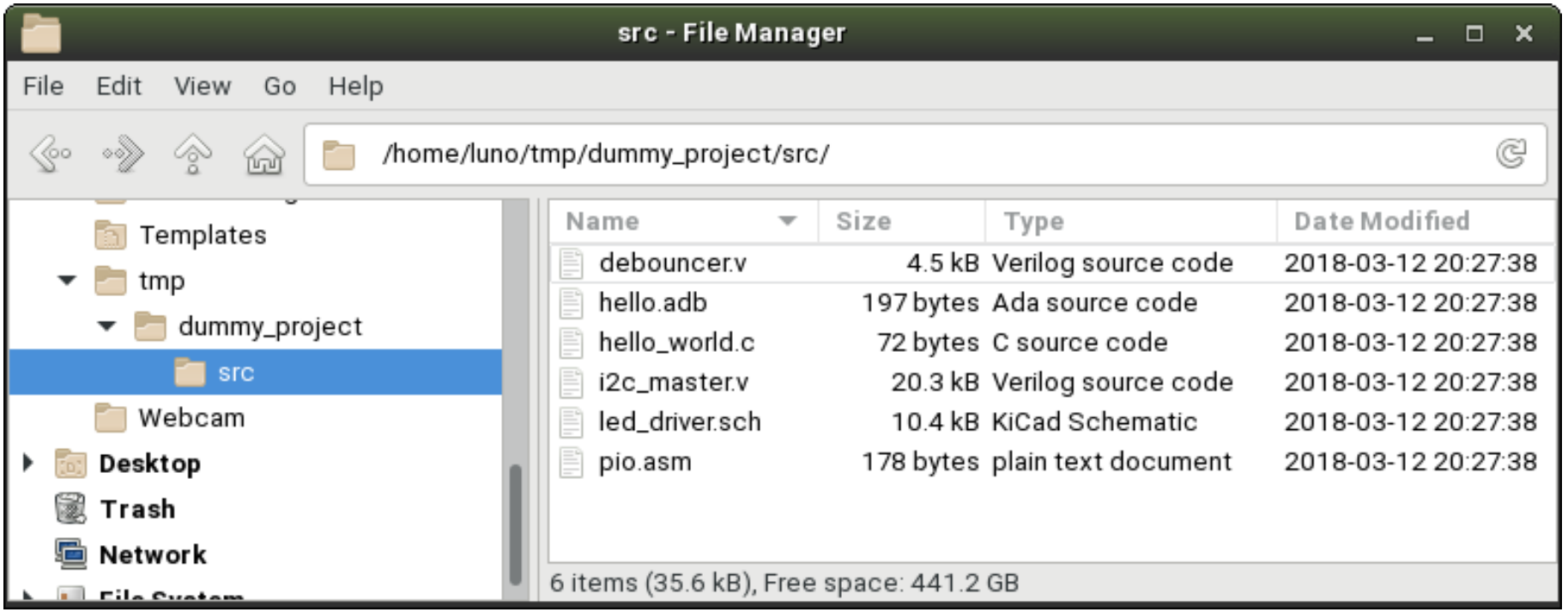
8h

Teil A - Überblick



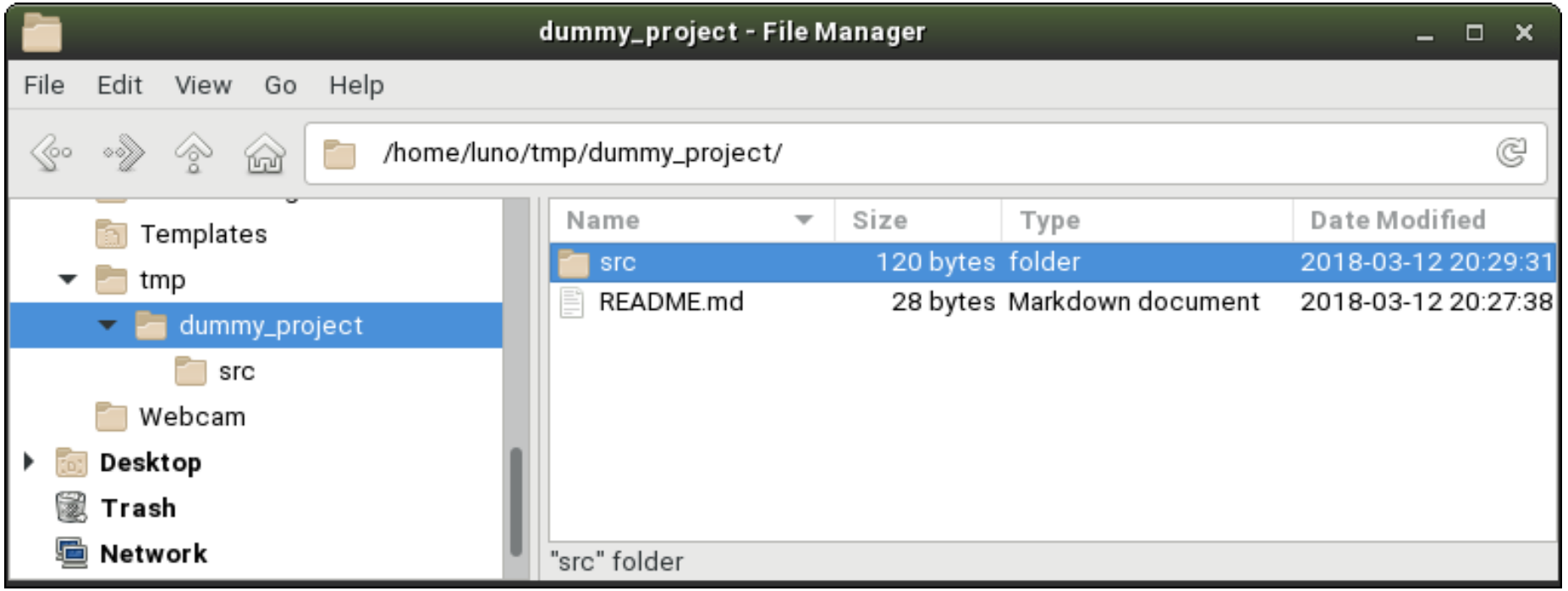
1. Repository anlegen (init)
2. Dateien auf Index setzen (add)
3. Änderungen einchecken (commit)
4. Projektverlauf einsehen (log)
5. beliebigen Arbeitsstand einsehen (checkout)
6. Dateien ignorieren
7. Dateien löschen/umbenennen (rm/mv)

Unser Projektverzeichnis



Beliebige Unterverzeichnisse möglich
- Mechanik-Konstruktion (FreeCad, ...)
- ECAD (KiCad, EAGLE, ...)
- Dokumentation (LibreOffice, Sphinx, ...)

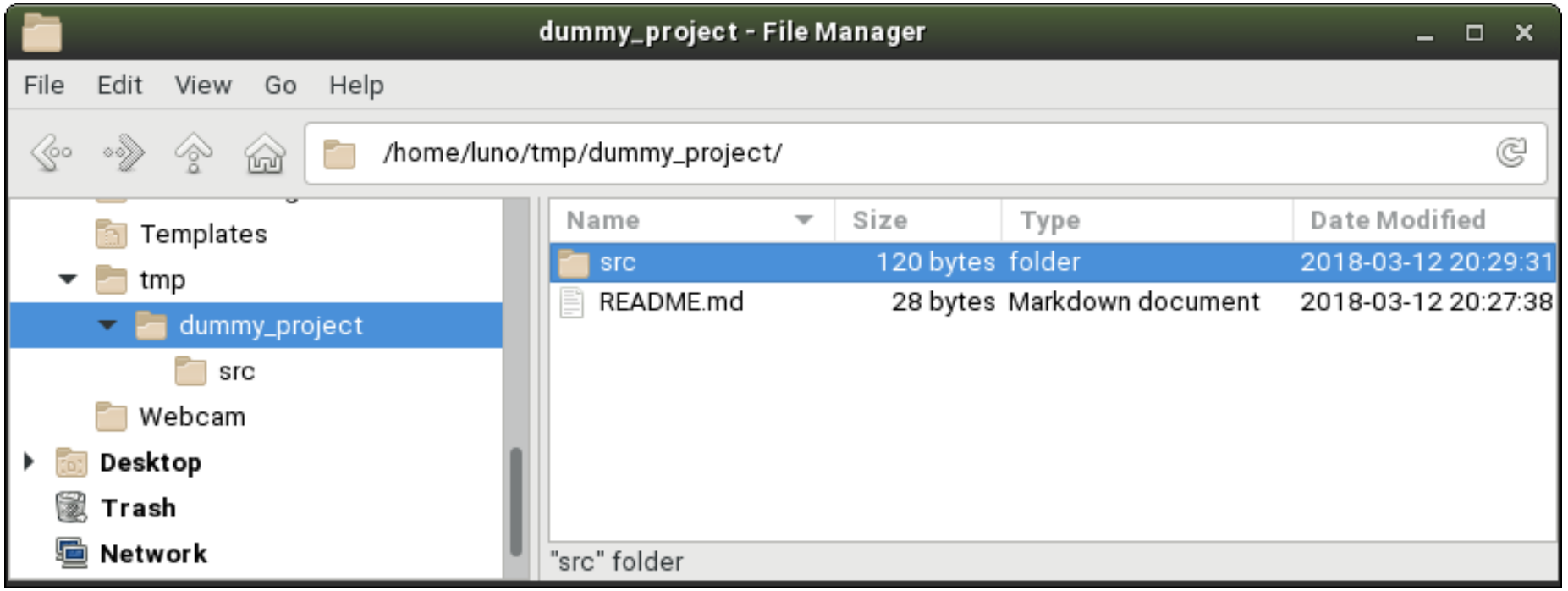
Repository anlegen #1



in Wurzelverzeichnis des Projektes wechseln:

```
$ cd tmp/dummy_project/
```

Repository anlegen #2



Repository initialisieren:

```
$ git init
Initialized empty Git repository in
/home/luno/tmp/dummy_project/.git/
```

Repository anlegen #3

Status abfragen:

```
$ git status
On branch master

No commits yet

Untracked files:
  (use "git add <file>..." to include in what will
be committed)

    README.md
    src/

nothing added to commit but untracked files
present (use "git add" to track)
```

Datei auf Index setzen

```
$ git add README.md
$ git status
On branch master

No commits yet

Changes to be committed:
  (use "git rm --cached <file>..." to unstage)

   new file:   README.md

Untracked files:
  (use "git add <file>..." to include in what will
be committed)

   src/
```

Datei einchecken

```
$ git commit -m "first commit"
[master (root-commit) 1d154f5] first commit
 1 file changed, 2 insertions(+)
 create mode 100644 README.md

$ git status
On branch master
Untracked files:
  (use "git add <file>..." to include in what will
be committed)

   src/

nothing added to commit but untracked files
present (use "git add" to track)
```

Weitere Datei auf Index

```
$ git add src/pio.asm
$ git status
On branch master
Changes to be committed:
  (use "git reset HEAD <file>..." to unstage)

   new file:   src/pio.asm

Untracked files:
  (use "git add <file>..." to include in what will
be committed)

   src/debouncer.v
   src/hello.adb
   src/hello_world.c
   src/i2c_master.v
   src/led_driver.sch
```

Weitere Datei einchecken

```
$ git commit -m "pio configuration"

$ git status
On branch master
Untracked files:
  (use "git add <file>..." to include in what will
be committed)

    src/debouncer.v
    src/hello.adb
    src/hello_world.c
    src/i2c_master.v
    src/led_driver.sch

nothing added to commit but untracked files
present (use "git add" to track)
```

Weitere Dateien auf Index

```
$ git add src/*.v

$ git status
On branch master
Changes to be committed:
  (use "git reset HEAD <file>..." to unstage)

   new file:   src/debouncer.v
   new file:   src/i2c_master.v

Untracked files:
  (use "git add <file>..." to include in what will
be committed)

   src/hello.adb
   src/hello_world.c
   src/led_driver.sch
```

Weitere Dateien einchecken

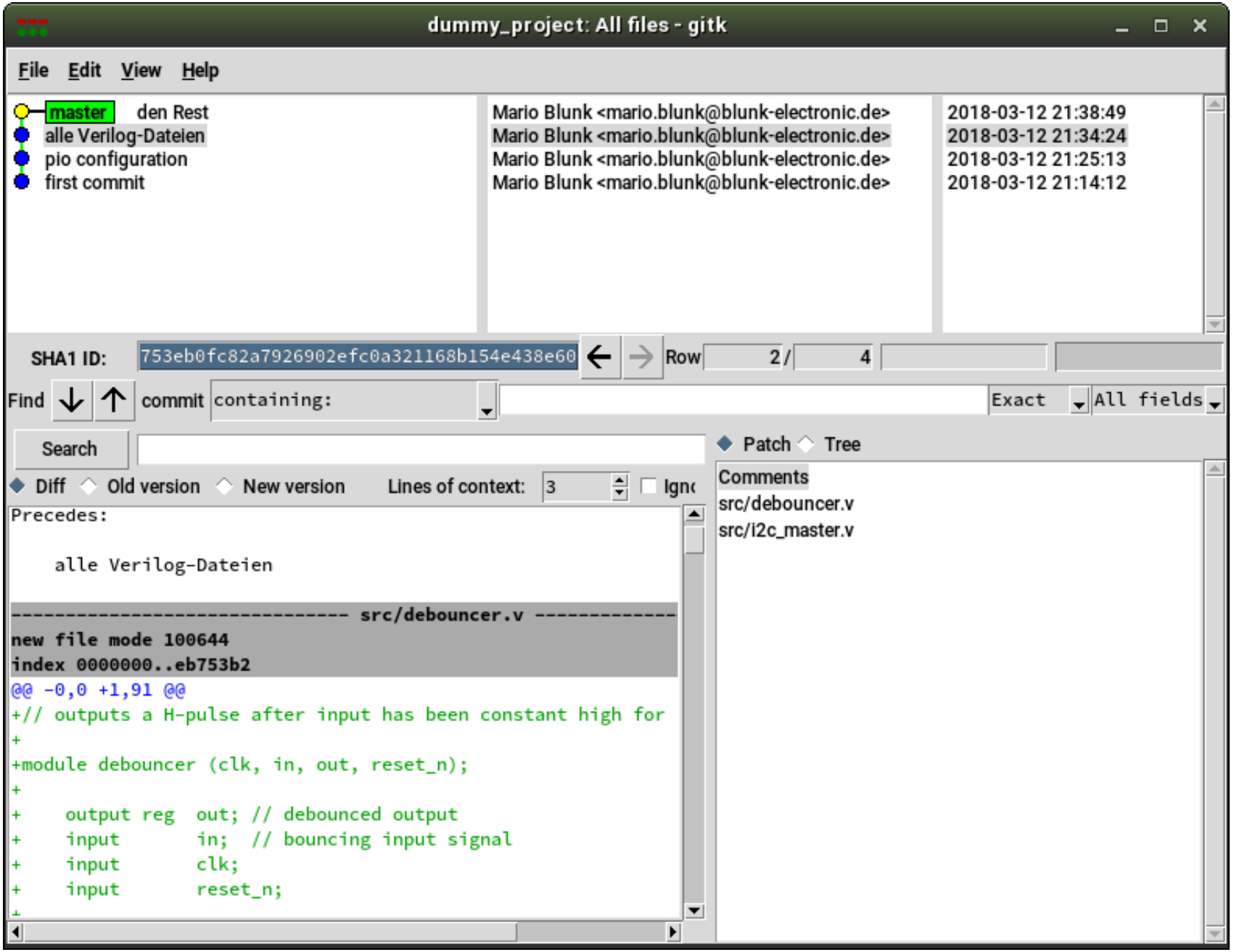
```
$ git commit -m "alle Verilog-Dateien"

$ git status
On branch master
Untracked files:
  (use "git add <file>..." to include in what will
be committed)

    src/hello.adb
    src/hello_world.c
    src/led_driver.sch

nothing added to commit but untracked files
present (use "git add" to track)
```

Weitere Dateien ...

```
$ git add src/*

$ git commit -m “der Rest”

$ git status
On branch master
nothing to commit, working tree clean
```

Projektverlauf #1

```
$ gitk
```



Projektverlauf #2

```
$ git log
commit eb376971479bbe207df68e26f95a2069213e0196 (HEAD -> master)
Author: Mario Blunk <mario.blunk@blunk-electronic.de>
Date:   Mon Mar 12 21:38:49 2018 +0100

    der Rest

commit 753eb0fc82a7926902efc0a321168b154e438e60
Author: Mario Blunk <mario.blunk@blunk-electronic.de>
Date:   Mon Mar 12 21:34:24 2018 +0100

    alle Verilog-Dateien

.
.
.

commit 1d154f59ccc91dd6eddc232570d5d357c3628411
Author: Mario Blunk <mario.blunk@blunk-electronic.de>
Date:   Mon Mar 12 21:14:12 2018 +0100

    first commit
```

Arbeitsstand einsehen #1

```
$ git checkout 753e
Note: checking out '753e'.

You are in 'detached HEAD' state. You can look around, make
experimental
changes and commit them, and you can discard any commits you
make in this
state without impacting any branches by performing another
checkout.

If you want to create a new branch to retain commits you
create, you may
do so (now or later) by using -b with the checkout command
again. Example:

  git checkout -b <new-branch-name>

HEAD is now at 753eb0f alle Verilog-Dateien
```

Arbeitsstand einsehen #2

```
$ git log
commit 753eb0fc82a7926902efc0a321168b154e438e60 (HEAD)
Author: Mario Blunk <mario.blunk@blunk-electronic.de>
Date:   Mon Mar 12 21:34:24 2018 +0100

    alle Verilog-Dateien

commit 35da10d4228e60b5592836c97ddb853a81b2928a
Author: Mario Blunk <mario.blunk@blunk-electronic.de>
Date:   Mon Mar 12 21:25:13 2018 +0100

    pio configuration

commit 1d154f59ccc91dd6eddc232570d5d357c3628411
Author: Mario Blunk <mario.blunk@blunk-electronic.de>
Date:   Mon Mar 12 21:14:12 2018 +0100

    first commit
```

Arbeitsstand einsehen #3

```
$ git checkout master
Previous HEAD position was 753eb0f alle Verilog-Dateien
Switched to branch 'master'


$ git log
commit eb376971479bbe207df68e26f95a2069213e0196 (HEAD -> master)
Author: Mario Blunk <mario.blunk@blunk-electronic.de>
Date:   Mon Mar 12 21:38:49 2018 +0100

    den Rest

commit 753eb0fc82a7926902efc0a321168b154e438e60
Author: Mario Blunk <mario.blunk@blunk-electronic.de>
Date:   Mon Mar 12 21:34:24 2018 +0100

    alle Verilog-Dateien
.
.
.
```

Dateien ignorieren #1

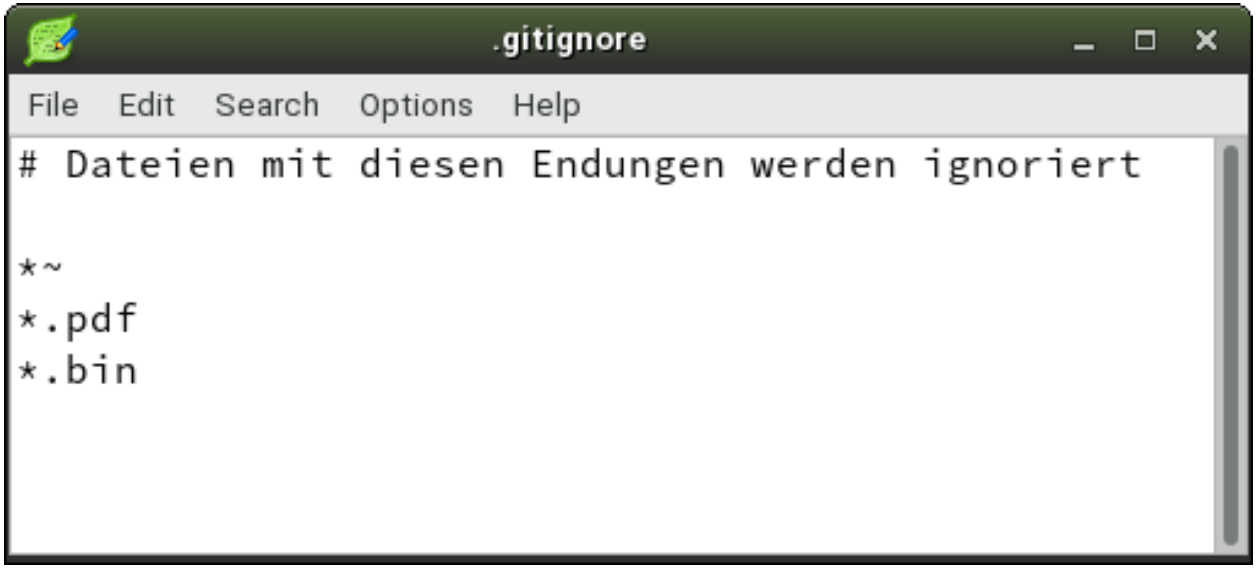
Manche Dateien sollen von Git ignoriert werden:

- Binärdateien
- PDF
- Log-Dateien von Editoren (z.B. readme.md~)
- ...

```
$ git status
On branch master
Untracked files:
  (use "git add <file>..." to include in what will be
committed)

    README.md~
```

Dateien ignorieren #2

Mit Texteditor im Wurzelverzeichnis des Projektes Datei mit Name .gitignore anlegen:




```
$ git status
On branch master
Untracked files:
  (use "git add <file>..." to include in what will be
committed)
```

.gitignore

Dateien ignorieren #3

Datei .gitignore auf Index und Einchecken:

```
$ git add .gitignore

$ git commit -m “Ignorierfilter eingebaut”

$ git status
On branch master
nothing to commit, working tree clean
```

Dateien/Verzeichnisse umbenennen

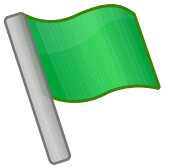
```
$ git mv hello.adb hello_world.adb
$ git status
On branch master
Changes to be committed:
  (use "git reset HEAD <file>..." to unstage)

    renamed:    hello.adb -> hello_world.adb

$ git commit -m “namen geaendert”
```

```
$ git mv src/ quellen
$ git status

$ git commit -m “quellverzeichnis geaendert”
```

Dateien/Verzeichnisse löschen

```
$ git rm hello.adb
$ git status
git status
On branch master
Changes to be committed:
  (use "git reset HEAD <file>..." to unstage)

    deleted:    hello.adb

$ git commit -m “aufgeraeumt”

$ git rm -r src/
rm 'src/debouncer.v'
rm 'src/hello.adb'
rm 'src/hello_world.c'
rm 'src/i2c_master.v'
rm 'src/led_driver.sch'
rm 'src/pio.asm'

$ git commit -m “quellen geloescht”
```

Teil B - Überblick



1. Datei zurücksetzen (checkout)
2. Datei aus Commit wiederherstellen (checkout)
3. einen Commit verwerfen
4. Marken setzen (tag)
5. Verzweigungen starten (branch)
6. Verzweigungen vereinen (merge)

Datei zurücksetzen #1

`Datei src/pio.asm mit Textedior bearbeiten:`

ursprünglicher Code

```
ld      A,0CFh
out     (PIO_A_C),A     ;set PIO A to bit mode
ld      A,0F1h
out     (PIO_A_C),A     ;set io configuration: A[2:0] are outputs
```

*geänderter Code, aber mit vielen **Fehlern***

```
ld      B,0CFh
in      (PIO_A_C),A     ;set PIO A to bit mode
ld      A,045h
out     (PIO_A_C),A     ;set io configuration: A[2:0] are outputs
```

Datei zurücksetzen #2

Feststellung: pio.asm ist Murks !
Ausgangslage zügig wieder herstellen !

```
$ git status
On branch master
Changes not staged for commit:
  (use "git add <file>..." to update what will be committed)
  (use "git checkout -- <file>..." to discard changes in working directory)

    modified:   pio.asm
```

```
$ git ckeckout src/pio.asm
```

```
$ git status
On branch master
nothing to commit, working tree clean
```

Datei aus Commit wiederherstellen #1

ursprünglicher Code

```
ld      A,0CFh
out     (PIO_A_C),A     ;set PIO A to bit mode
ld      A,0F1h
out     (PIO_A_C),A     ;set io configuration: A[2:0] are outputs
```

geänderter Code

```
ld      A,0CFh
out     (PIO_B_C),A     ;set PIO B to bit mode
ld      A,0F1h
out     (PIO_B_C),A     ;set io configuration: B[2:0] are outputs
```

```
$ git add src/pio.asm
$ git commit -m “port B verwenden”
```

Datei aus Commit wiederherstellen #2

```
$ git log
commit 8825874094ca8c72eba8d532ae80bcc740799594 (HEAD -> master)
Author: Mario Blunk <mario.blunk@blunk-electronic.de>
Date:   Wed Mar 14 21:31:15 2018 +0100

    port B verwenden

.
.
.

commit 35da10d4228e60b5592836c97ddb853a81b2928a
Author: Mario Blunk <mario.blunk@blunk-electronic.de>
Date:   Mon Mar 12 21:25:13 2018 +0100

    pio configuration

.
.
.
```

Datei aus Commit wiederherstellen #3

```
$ git checkout 35da1 src/pio.asm
$ git status
On branch master
Changes to be committed:
  (use "git reset HEAD <file>..." to unstage)

    modified:   src/pio.asm
```

```
ld      A,0CFh
out     (PIO_A_C),A    ;set PIO A to bit mode
ld      A,0F1h
out     (PIO_A_C),A    ;set io configuration: A[2:0] are outputs
```

```
$ git commit -m “zurück nach Port B”
$ git status
```

Datei aus Commit wiederherstellen #4

```
$ git log
commit 0304235af20ea17f6d42078de9fbba8e6e1d54a5 (HEAD -> master)
Author: Mario Blunk <mario.blunk@blunk-electronic.de>
Date:   Wed Mar 14 21:44:24 2018 +0100

    zurück nach Port A

commit 8825874094ca8c72eba8d532ae80bcc740799594
Author: Mario Blunk <mario.blunk@blunk-electronic.de>
Date:   Wed Mar 14 21:31:15 2018 +0100

    port B verwenden
.
.
.
```

Commit verwerfen #1

```
$ git reset --hard HEAD^
HEAD is now at 8825874 port B verwenden


$ git log
commit 8825874094ca8c72eba8d532ae80bcc740799594 (HEAD -> master)
Author: Mario Blunk <mario.blunk@blunk-electronic.de>
Date:   Wed Mar 14 21:31:15 2018 +0100

    port B verwenden

commit ff48f9df119b382e49a380a46fcf36b1831d2828
Author: Mario Blunk <mario.blunk@blunk-electronic.de>
Date:   Tue Mar 13 22:04:05 2018 +0100

    ignore filter wieder hergestellt
.
.
```

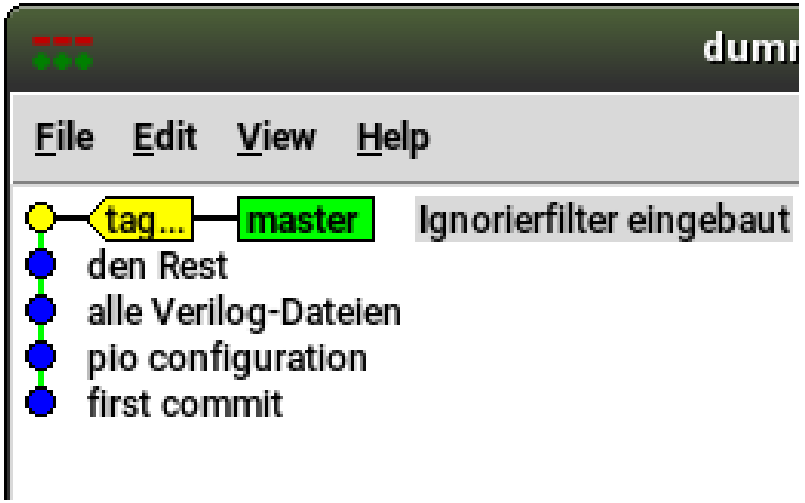
einfache Marke setzen #1

```
$ git log
commit 5cdcdeb444c4a3dcc9d35f0ac2800894bd963373 (HEAD -> master)
Author: Mario Blunk <mario.blunk@blunk-electronic.de>
Date:   Tue Mar 13 21:37:31 2018 +0100

    Ignorierfilter eingebaut

commit eb376971479bbe207df68e26f95a2069213e0196
Author: Mario Blunk <mario.blunk@blunk-electronic.de>
Date:   Mon Mar 12 21:38:49 2018 +0100

    den Rest

commit 753eb0fc82a7926902efc0a321168b154e438e60
Author: Mario Blunk <mario.blunk@blunk-electronic.de>
Date:   Mon Mar 12 21:34:24 2018 +0100

    alle Verilog-Dateien
.
.
```

einfache Marke setzen #2

engl. lightweight tag

```
$ git tag Konfiguration_fertig
$ git log
commit 5cdcdeb....800894bd963373 (HEAD -> master, tag: Konfiguration_fertig)
Author: Mario Blunk <mario.blunk@blunk-electronic.de>
Date:   Tue Mar 13 21:37:31 2018 +0100

    Ignorierfilter eingebaut
.
.
$ gitk
```



einfache Marke setzen #3

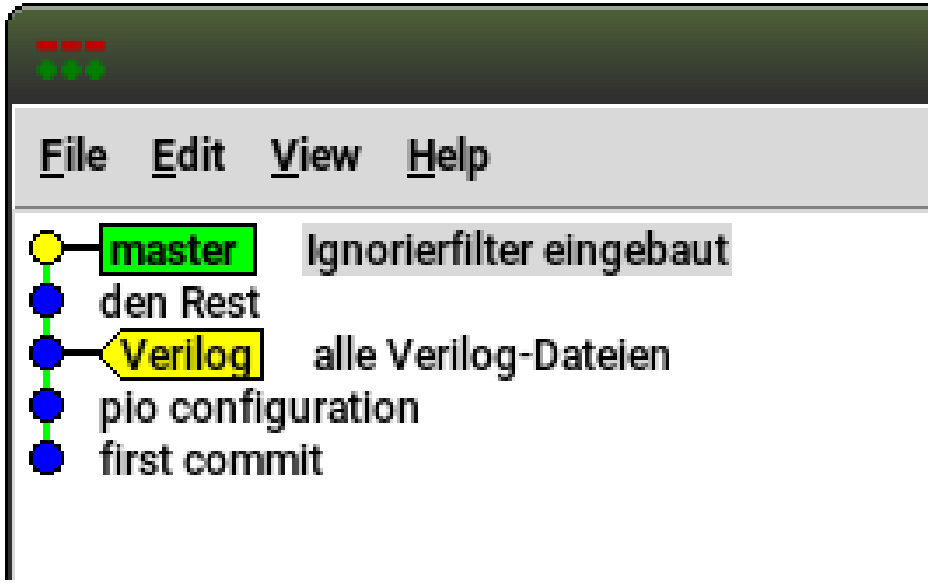
```
$ git tag Verilog 753eb0fc82
$ git log
commit 5cdcdeb....800894bd963373 (HEAD -> master, tag: Konfiguration_fertig)
Author: Mario Blunk <mario.blunk@blunk-electronic.de>
Date:   Tue Mar 13 21:37:31 2018 +0100

    Ignorierfilter eingebaut

commit eb376971479bbe207df68e26f95a2069213e0196
Author: Mario Blunk <mario.blunk@blunk-electronic.de>
Date:   Mon Mar 12 21:38:49 2018 +0100

    den Rest

commit 753eb0fc82a7926902efc0a321168b154e438e60 (tag: Verilog)
Author: Mario Blunk <mario.blunk@blunk-electronic.de>
Date:   Mon Mar 12 21:34:24 2018 +0100

    alle Verilog-Dateien
.
.
.
```

einfache Marke löschen #3

```
$ git tag -d Konfiguration_fertig
Deleted tag 'Konfiguration_fertig' (was 5cdcdeb)
```

```
$ git log
```

```
$ gitk
```



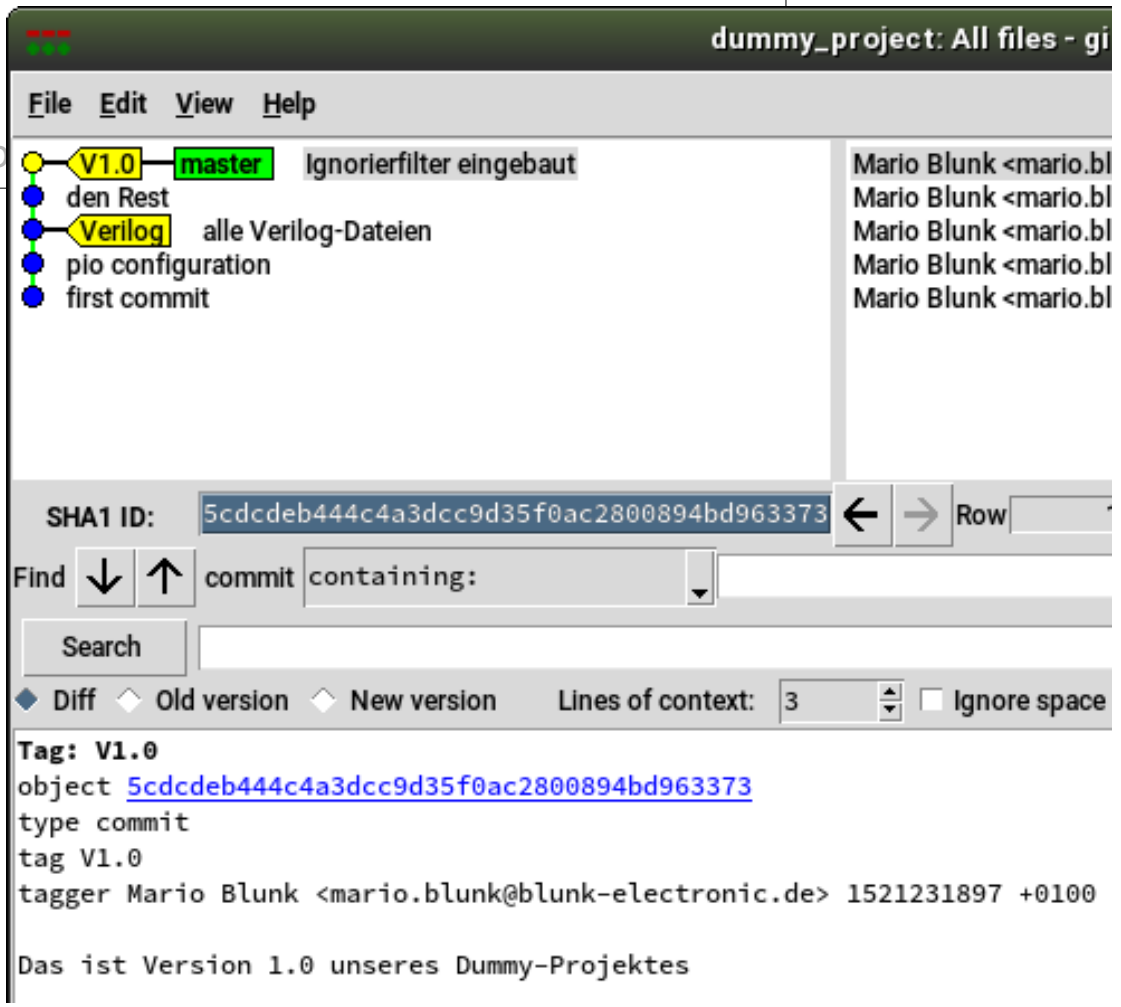
Release-Marke setzen #1

```
$ git tag -a V1.0
```

```
Das ist Version 1.0 unseres Dummy-Projektes

#
# Write a message for tag:
#   V1.0
# Lines starting with '#' will b
```

```
$ git log
```

```
$ gitk
```



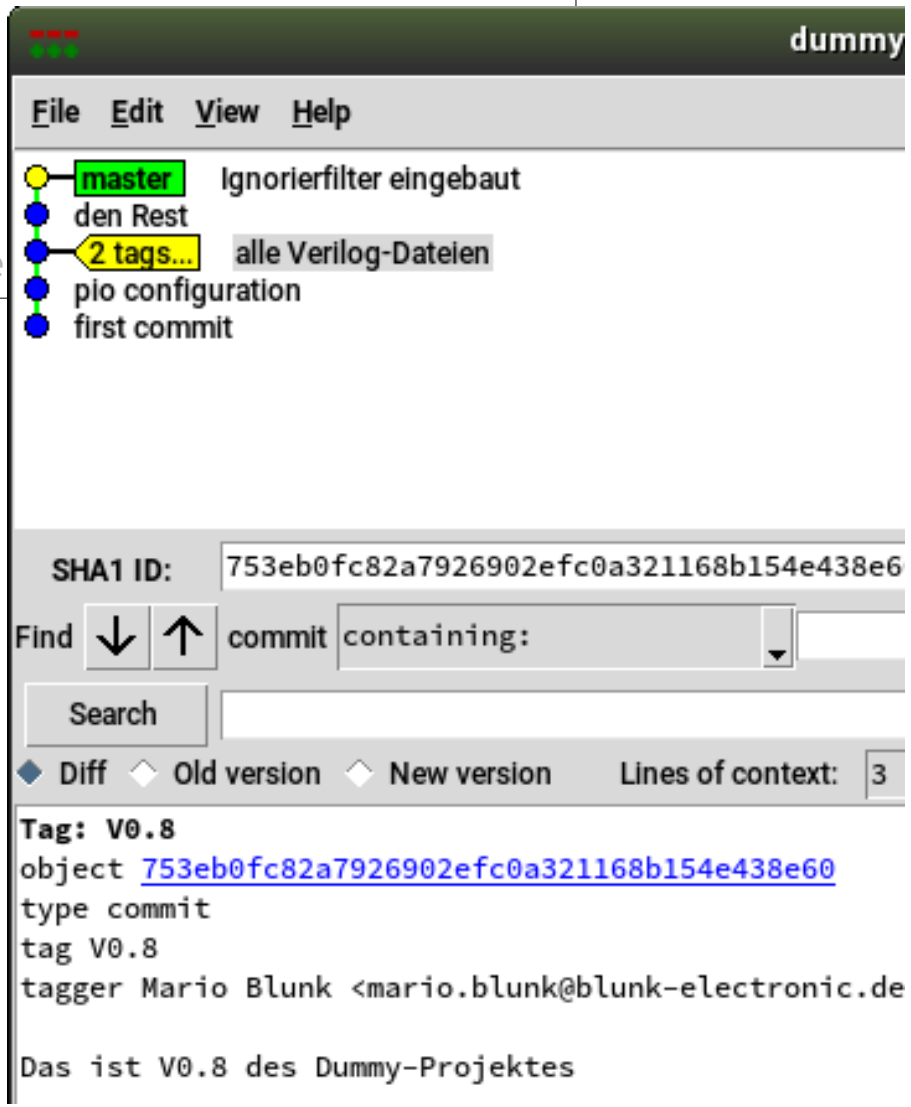
Release-Marke setzen #2

```
$ git tag -a V0.8 753eb0fc82
```

```
Das ist V0.8 des Dummy-Projektes

#
# Write a message for tag:
#   V0.8
# Lines starting with '#' will be ignore
```

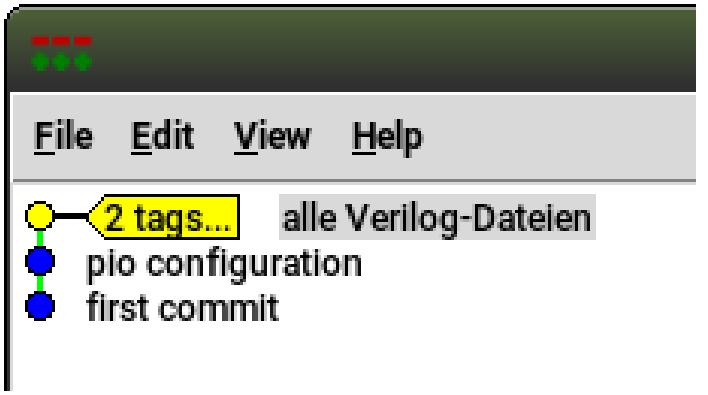
```
$ git log
```

```
$ gitk
```



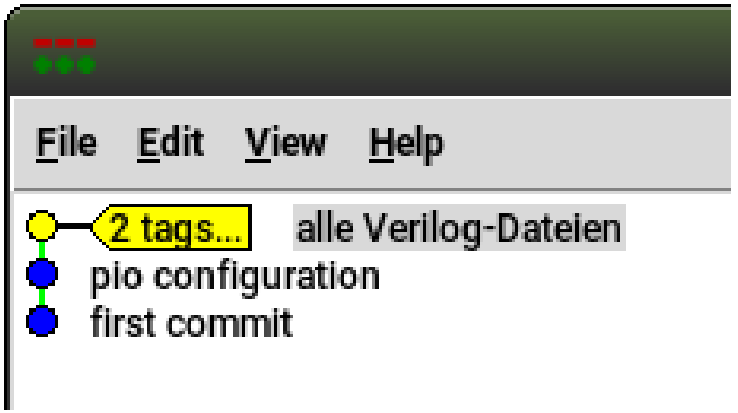
Verzweigung starten #1

```
$ git checkout 753eb0fc82
Note: checking out '753eb0fc82'.

You are in 'detached HEAD' state. You can look around, make experimental
changes and commit them, and you can discard any commits you make in this
state without impacting any branches by performing another checkout.

If you want to create a new branch to retain commits you create, you may
do so (now or later) by using -b with the checkout command again. Example:

  git checkout -b <new-branch-name>

HEAD is now at 753eb0f alle Verilog-Dateien
```

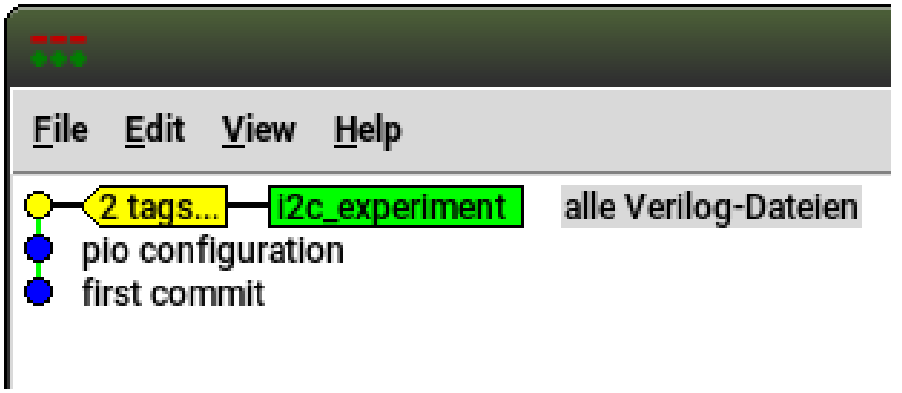


Verzweigung starten #2

```
$ git branch
* (HEAD detached at 753eb0f)
  master
```




```
$ git branch i2c_experiment

$ git branch
* (HEAD detached at 753eb0f)
  i2c_experiment
  master
```



zwischen Zweigen wechseln

```
$ git checkout i2c_experiment
Switched to branch 'i2c_experiment'

$ git branch
* i2c_experiment
  master
```

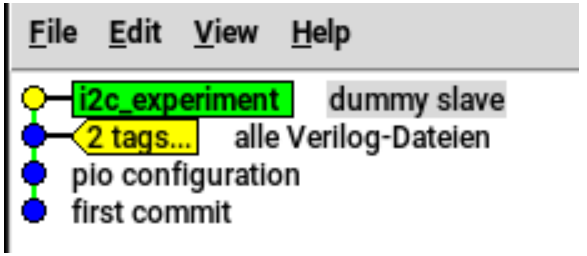
im Zweig i2c_experiment weiterarbeiten, add, commit, tag ...

```
$ git checkout master
Switched to branch 'master'

$ git branch
* master
  i2c_experiment
```

im Zweig master weiterarbeiten, add, commit, add, commit, tag ...

in Zweig weiterarbeiten

```
$ git status
git status
On branch i2c_experiment
Untracked files:
  (use "git add <file>..." to include in what will be committed)

    i2c_slave.v
```

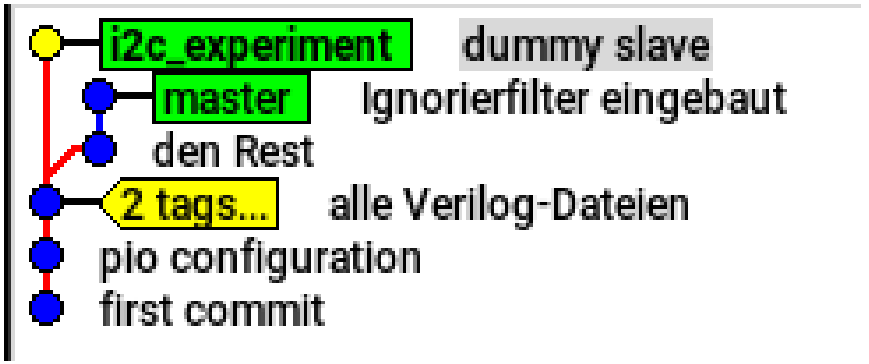



```
$ git add i2c_slave.v
```

```
$ ls src/
debouncer.v  i2c_master.v  i2c_slave.v  pio.asm
```

Zweige vereinen (merge) #1

```
$ gitk -all
```




```
$ git checkout master
Switched to branch 'master'
```

```
$ ls src/
debouncer.v  hello.adb  hello_world.c  i2c_master.v  led_driver.sch  pio.asm
```

```
$ git merge i2c_experiment
```

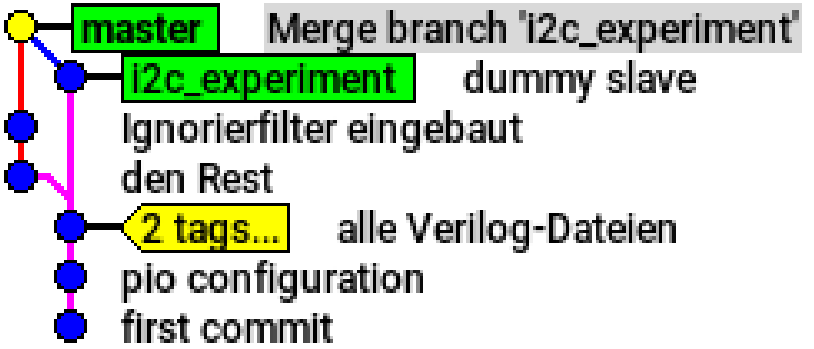
Zweige vereinen (merge) #2

```
$ git merge i2c_experiment
```

```
$ git status
On branch master
```

```
$ ls src/
debouncer.v  hello_world.c  i2c_slave.v     pio.asm
hello.adb    i2c_master.v   led_driver.sch
```

```
$ gitk -all
```



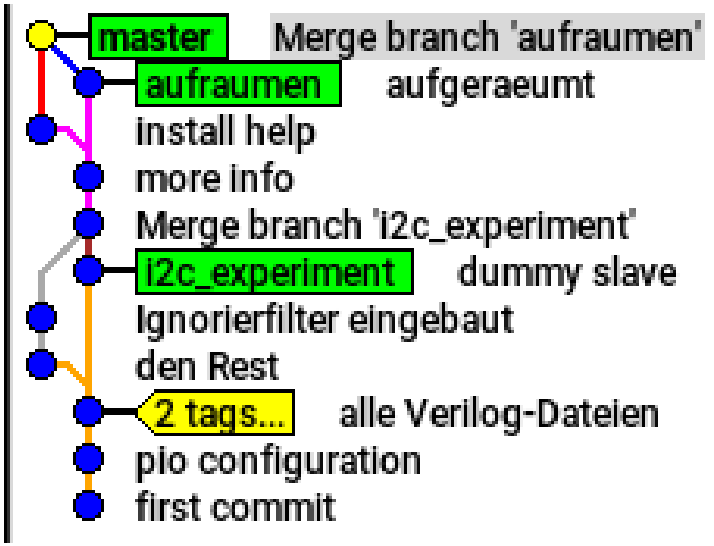
Verzweigung starten #3

```
$ git branch aufraeumen

$ git checkout aufraeumen
On branch ‘aufraeumen’

$ git rm src/hello_world.c

$ ls src/
debouncer.v  hello.adb  i2c_master.v  i2c_slave.v  led_driver.sch  pio.asm



$ git commit -m “aufgeraeumt”
```

Zweige vereinen (merge) #3

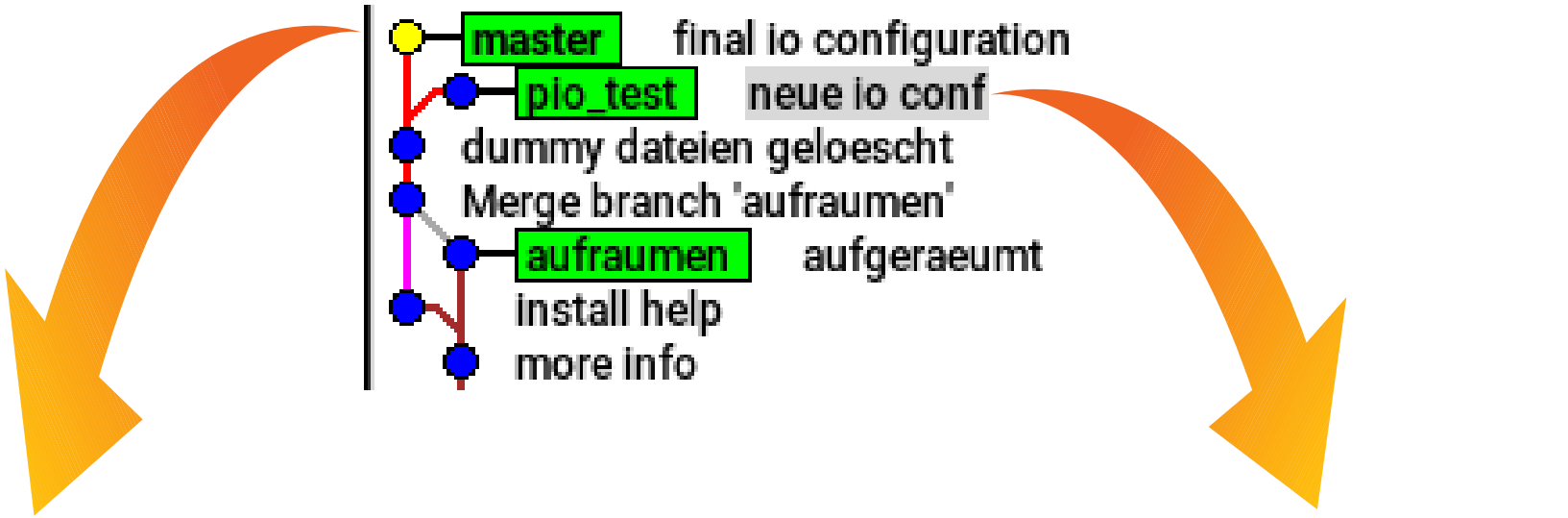
```
$ git checkout master
Switched to branch 'master'

$ git merge aufraeumen

$ ls src/
debouncer.v  hello.adb  i2c_master.v  led_driver.sch  pio.asm
```

```
$ gitk -all
```



Konflikte (merge) #1

```
$ gitk -all
```




```
ld      A,0CFh
out     (PIO_A_C),A
ld      A,0F5h
out     (PIO_A_C),A
```

```
ld      A,0CFh
out     (PIO_A_C),A
ld      A,0F2h
out     (PIO_A_C),A
```

Konflikte (merge) #2

```
$ git checkout master
$ git merge pio_test
Auto-merging src/pio.asm
CONFLICT (content): Merge conflict in src/pio.asm
Automatic merge failed; fix conflicts and then commit the result.

$ git status
On branch master
You have unmerged paths.
  (fix conflicts and run "git commit")
  (use "git merge --abort" to abort the merge)

Unmerged paths:
  (use "git add <file>..." to mark resolution)

    both modified:   src/pio.asm
```

Konflikte (merge) #3

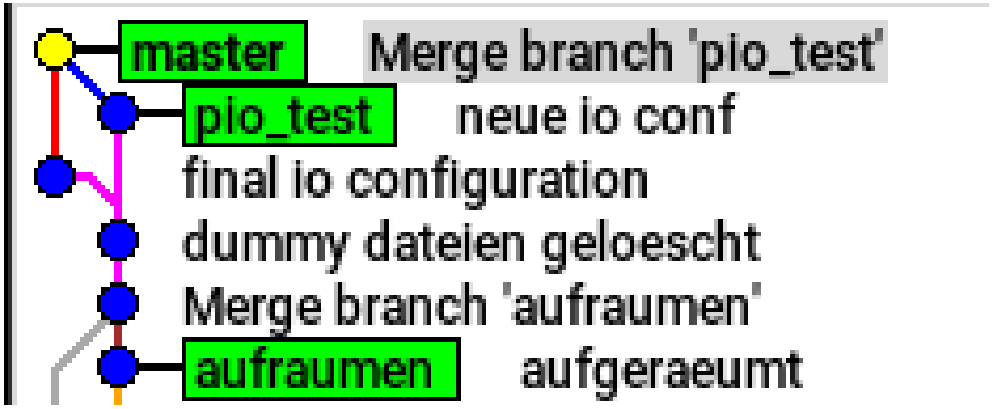
mit Texteditor Konfikt beheben

```
; Demo Assemby Code
; PIO initialization

        ld    A,0CFh
        out   (PIO_A_C),A    ;set PIO A to bit mode
<<<<<<< HEAD
        ld    A,0F5h
=======
        ld    A,0F2h
>>>>>>> pio_test
        out   (PIO_A_C),A    ;set io configuration: A[2:0] are
outputs

; end of file
```

Konflikte (merge) #4

```
$ git add src/pio.asm
$ git status
On branch master
All conflicts fixed but you are still merging.
  (use "git commit" to conclude merge)

$ git commit
```

```
$ gitk --all
```



Links

http://www.blunk-electronic.de/pdf/git_einfuehrung.pdf

https://de.wikipedia.org/wiki/Git

https://de.wikipedia.org/wiki/GitHub

https://de.wikipedia.org/wiki/GitLab

https://de.wikipedia.org/wiki/Bitbucket

https://git-scm.com/doc

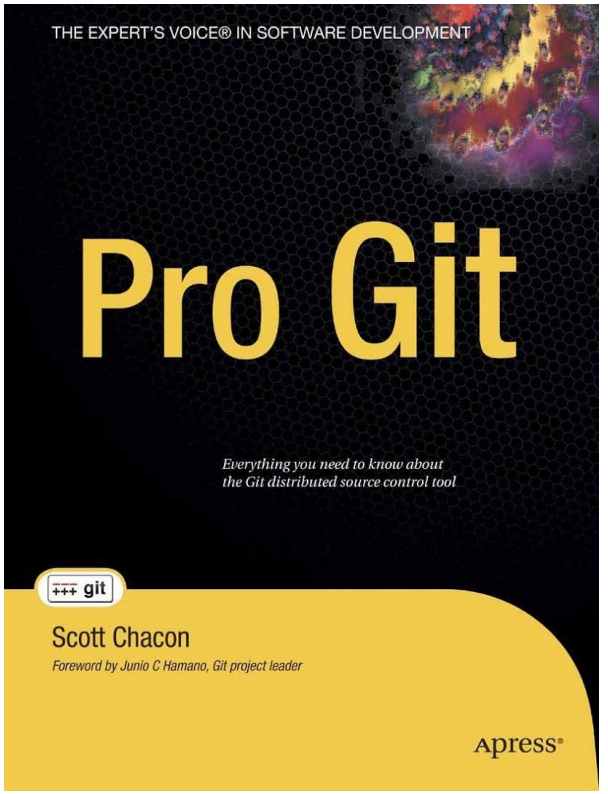
https://github.com/Blunk-electronic

Literatur

http://gitbu.ch/

https://git-scm.com/book/de/v1

https://git-scm.com/book/en/v2



https://progit2.s3.amazonaws.com/en/2016-03-22-f3531/progit-en.1084.pdf

Danke für Ihre Aufmerksamkeit !