

gitops-Training

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Installation (GIT)

GIT auf Ubuntu/Debian installieren

Installation

```
sudo apt update  
sudo apt install git
```

Language to english please !!

```
sudo update-locale LANG=en_US.UTF-8  
su - kurs  
  
## back to german  
  
sudo update-locale LANG=de_DE.UTF-8  
su - kurs  
  
## Reference:  
https://www.thomas-krenn.com/de/wiki/Locales\_unter\_Ubuntu\_konfigurieren  
  
## update-locale does a change in  
$ cat /etc/default/locale  
LANG=en_US.UTF-8
```

GIT unter Windows installieren

- <https://git-scm.com/download/win>

Kubernetes

Installation micro8ks (Ubuntu)

Reference:

- <https://ubuntu.com/tutorials/install-a-local-kubernetes-with-microk8s#2-deploying-microk8s>

Commands (with tipps & tricks)

git add + Tipps & Tricks

Trick with -A

```
## only adds from the folder you are in recursively
## but not above (you might miss some files, when you are in a subfolder
git add .

### Fix -A
## adds everything no matter in which folder you are in your project
git add -A
```

git commit

commit with multiple lines on commandline (without editor)

```
git commit -am "New entry in todo.txt

* nonsense commit-message because of missing text-expertise"
## enter on last line
```

Change last commit-mesage (description)

```
git commit --amend
## now you can change the description, but you will get a new commit-id
```

git log

Show last x entries

```
##  
## git log -x  
## Example: show last 2 entries  
git log -2
```

Show all branches

```
git log --all  
## oder wenn alias alias.lg besteht:  
## git lg --all
```

Show first log entry

```
## Step 1 - log needs to only show one line per commit  
git log --oneline --reverse  
  
## Step 2: combine with head  
git log --oneline --reverse | head -1
```

Multiple commands with an alias

```
git config --global alias.sl '!git log --oneline -2 && git status'
```

git config

How to delete an entry from config

```
## Important: Find exact level, where it was added --global, --system, --local
## test before
## should contain this entry
git config --global --list

git config --unset --global alias.log
```


git show

Show information about an object e.g. commit

```
git show <commit-ish>  
## example with commit-id  
git show 342a
```

Needed commands for starters

```
git add -A
git status
git log // git log -4 // or beautified version if setup as alias git lg
git commit -am "commit message" // "commit message" can be freely chosen
## for more merge conflict resolution use only
git commit # to not change commit - message: must be message with merge
## the first time
git push -u origin master
## after that
git push
git pull
```

git branch

Create branch based on commit (also past commit)

```
git branch lookaround 5f10ca
```

Delete unmerged branch

```
git branch -d branchname # does not work in this case  
git branch -D branchname # <- is the solution
```

git checkout - used for branches and files

Checkout (change to) existing branch

```
git checkout feature/4711
```

Checkout and create branch

```
## Only possible once  
git checkout -b feature/4712
```

Recover deleted file

```
rm todo.txt  
## get from last from last commit  
git checkout HEAD -- todo.txt
```

git merge

Merge without conflict with fast-forward

```
## Disadvantage: No proper history, because only one branch visible in log
## after fast-forward - merge

## Important that no changes are in master right before merging
git checkout master
git merge feature/4711
```

Merge (3-way) also on none-conflict (no conflicts present)

```
git merge --no-ff feature/4711
```

git tag

```
## set tag on current commit -> HEAD of branch
git tag -a v1.0 -m "my message for tag"
## publish
git push --tags

## set on specific commit
git tag -a v0.1 -m "Initial Release" a23c

## checkout files of a specific tag
git checkout v0.1
## or
git checkout tags/v0.1
```

Advanced Commands

git reflog

command

- show everything you (last 30 days), also stuff that is not visible in branch anymore

Example

```
git reflog
```

when many entries a pager like less (aka man less) will be used

```
## you can get out of the page with pressing the key 'q'
```

git reset - Back in Time

Why ?

- Back in time -> reset
- e.g. git reset --hard e2d5
- attention: only use it, when changes are not published (remotely) yet.
- → It is your command, IN CASE your are telling yourself, omg, what's that, what did i do here, let me undo that

Example

```
git reset --hard 2343
```


github pages

Github Pages

Types of Pages

- Personal Page: <http://jmetzger.github.io>
- Project Page <http://>

Personal Site

```
## Step 1: create personal repo
e.g.
https://github.com/gittrainereu/gittrainereu.github.io

git clone https://github.com/gittrainereu/gittrainereu.github.io
cd gittrainereu.github.io
echo "Hello World" > index.html
git add -A
git commit -m "Initial commit"
git push -u origin master

https://gittrainereu.github.io
```

Project Page

github actions

General overview

Komponenten

- actions
- workflows
- jobs
- steps
- events

Actions

- What can we do ?
- i.d.R läuft jede Action in einem docker-container (aber auch möglich: node-js (12), combined)

Workflows

- ENV (Umgebungsvariablen, Variablen)
- Jobs -> Steps
- Events

Add a self-host runner

Prerequisites

- Install docker

Walkthrough

```
1. Login to github
2. Click on repo -> settings
3. Click on actions
4. Click on runners
5. Click add self-hosted runner

## important, as we install it as root,
## you need to
export RUNNER_ALLOW_RUNASROOT="1"
## before doing the configuration ./config.sh
see:
https://serverfault.com/questions/1052695/must-not-run-with-sudo-while-trying-to-
create-a-runner-using-github-actions

## When configuration is done, install service and start it.
./svc.sh install
./svc.sh start
./svc.sh status
```

Using it for an action:

```
## Example
## You need to activated it as:
## runs-on: [self-hosted, linux, x64, gpu]
## minimal would be
runs-on: self-hosted
```

Full example

- in .github/workflows/whatevername.yml

```
name: GitHub Actions Demo
on: [push]
jobs:
  Explore-GitHub-Actions:
    runs-on: self-hosted
    steps:
      - run: echo "🚀 The job was automatically triggered by a ${ github.event_name } event."
      - run: echo "🌍 This job is now running on a ${ runner.os } server hosted by GitHub!"
      - run: echo "🔍 The name of your branch is ${ github.ref } and your repository is ${ github.repository })."
      - name: Check out repository code
        uses: actions/checkout@v2
```

```
- run: echo "💡 The ${github.repository} repository has been cloned to the runner."
- run: echo "🚀 The workflow is now ready to test your code on the runner."
- name: List files in the repository
  run: |
    ls ${github.workspace}
- run: echo "🍏 This job's status is ${job.status}."
```

View logs of runner - service

```
systemctl status actions.runner.gittrainereu-runnertest.gh-runner1 -l
journalctl -u actions.runner.gittrainereu-runnertest.gh-runner1
```

Reference

- <https://docs.github.com/en/actions/hosting-your-own-runners/adding-self-hosted-runners>

Create custom composite action

Walkthrough

```
## new repo - e.g.
bash-action

## action.yml
name: 'Hello World'
description: 'Greet someone'
inputs:
  who-to-greet: # id of input
    description: 'Who to greet'
    required: true
    default: 'World'
outputs:
  random-number:
    description: 'Random number'
    value: '${{ steps.random-number-generator.outputs.random-id }}'
runs:
  using: 'composite'
  steps:
    - run: echo Hello ${{ inputs.who-to-greet }}.
      shell: bash
    - id: random-number-generator
      run: echo "::set-output name=random-id::$(echo $RANDOM)"
      shell: bash
    - run: ${{ github.action_path }}/goodbye.sh
      shell: bash

## goodbye.sh
echo "Goodbye"

### use it in other repo in workflow
## .github/workflows/workflow-hello.yml
on: [push]

jobs:
  greetings:
    runs-on: ubuntu-latest
    name: Greet Again

    steps:
      - id: foo
        uses: gittrainereu/bash-action@main
        with:
          who-to-greet: 'Mona the Octocat'
      - run: echo random-number ${{ steps.foo.outputs.random-number }}
        shell: bash
```

Type of actions

- JavaScript
- Docker
- Composite
- Ref: <https://docs.github.com/en/actions/creating-actions/about-custom-actions#types-of-actions>

Create a composite action

- <https://docs.github.com/en/actions/creating-actions/creating-a-composite-action>

Reference

- <https://docs.github.com/en/actions/creating-actions>

Create custom docker action

Walkthrough

```
##Dockerfile
## Container image that runs your code
FROM alpine:3.10

## Copies your code file from your action repository to the filesystem path `/` of the
container
COPY entrypoint.sh /entrypoint.sh

## Code file to execute when the docker container starts up (`entrypoint.sh`)
ENTRYPOINT ["/entrypoint.sh"]
```

```
## action.yml
name: 'Hello World'
description: 'Greet someone and record the time'
inputs:
  who-to-greet: # id of input
    description: 'Who to greet'
    required: true
    default: 'World'
outputs:
  time: # id of output
    description: 'The time we greeted you'
runs:
  using: 'docker'
  image: 'Dockerfile'
  args:
    - ${ inputs.who-to-greet }
```

```
## entrypoint.sh
#!/bin/sh -l

echo "Hello $1"
time=$(date)
echo "::set-output name=time::$time"
```

```
## .github/workflows/workflow-docker.yml
on: [push]

jobs:
  hello_world_job:
    runs-on: ubuntu-latest
    name: A job to say hello
    steps:
      - name: Hello world action step
        id: hello
        uses: gittrainereu/docker-action@main
        with:
```

```
    who-to-greet: 'Mona the Octocat'
  # Use the output from the `hello` step
  - name: Get the output time
    run: echo "The time was ${ steps.hello.outputs.time }"
```

Reference:

- <https://docs.github.com/en/actions/creating-actions/creating-a-docker-container-action>

Work with artefacts

Walkthrough

```
name: Share data between jobs

on: [push]

jobs:
  job_1:
    name: Add 3 and 7
    runs-on: ubuntu-latest
    steps:
      - shell: bash
        run: |
          expr 3 + 7 > math-homework.txt
      - name: Upload math result for job 1
        uses: actions/upload-artifact@v2
        with:
          name: homework
          path: math-homework.txt

  job_2:
    name: Multiply by 9
    needs: job_1
    runs-on: windows-latest
    steps:
      - name: Download math result for job 1
        uses: actions/download-artifact@v2
        with:
          name: homework
      - shell: bash
        run: |
          value=`cat math-homework.txt`
          expr $value \* 9 > math-homework.txt
      - name: Upload math result for job 2
        uses: actions/upload-artifact@v2
        with:
          name: homework
          path: math-homework.txt

  job_3:
    name: Display results
    needs: job_2
    runs-on: macOS-latest
    steps:
      - name: Download math result for job 2
        uses: actions/download-artifact@v2
        with:
          name: homework
      - name: Print the final result
        shell: bash
```

```
run: |  
  value=`cat math-homework.txt`  
  echo The result is $value
```

Reference

- <https://docs.github.com/en/actions/advanced-guides/storing-workflow-data-as-artifacts>

Create digitalocean-kubernetes.md

Walkthrough

```
## Step 1: Setup Kubernetes through digitalocean interface

## Step 2: Setup Container Registry (digitalocean)
(if not setup create a container registry)
ours is currently: training

## Step 3a: Create personal access key
https://cloud.digitalocean.com/account/api/

## Step 3b: ... and save it as secret DIGITALOCEAN_ACCESS_TOKEN in your repo
Repo -> Settings -> Secrets -> New Repository Secret (Button top left)

## Step 4: Kubernetes Cluster (digitalocean) mit Registry verheiraten (digitalocean)
In the control panel, you can select the Kubernetes clusters to use with your
registry.
This generates a secret, adds it to all the namespaces in the cluster and updates
the default service account to include the secret, allowing you to pull images from
the registry.

Container Registry -> Settings (Tab) -> Digital Ocean Kubernetes Integration -> Edit

Integrate all clusters -> Save (Button) (or only one specific cluster)
```

Reference

- <https://docs.digitalocean.com/products/kubernetes/how-to/deploy-using-github-actions/>

Nix kaputtmachen - so gehts

Die 5 goldenenen Regeln

1. Kein `git commit --amend` auf bereits veröffentlicht (gepushed) commit.
2. Kein `git reset` vor bereits veröffentlichte (gepushed) commits
(1234 (HEAD -letzter Commit) < 5412 (vö - HEAD~1 - vorletzte Commit) -> kein reset auf 1234)
3. Mach niemals ein `git push --force` (JM sagt)
4. Kein Rebase auf bereits veröffentlichte commits (nach vö von Feature branchen)
- ausser Feature-Branch kann online gelöscht und nochmal erstellt werden

Tips & tricks

Beautified log

Walkthrough

```
git config --global alias.lg "log --color --graph --pretty=format:'%Cred%h%Creset \
-%C(yellow)%d%Creset %s %Cgreen(%cr) %C(bold blue)<%an>%Creset'"
```

PRETTY FORMATS

- all documented in git help log (section PRETTY FORMAT)
- <https://git-scm.com/docs/git-log>

Change already committed files and message

```
## Walkthrough
touch newfile.txt
git add .
git commit -am "new file added"

## Ups forgotten README
touch README
git add .
git commit --amend # README will be in same commit as newfile.txt
## + you can also changed the commit message
```

Best practice - Delete origin,tracking and local branch after pull request/merge request

```
## After a succesful merge or pull request und gitlab / github
## Follow these steps for a succesful cleanup

## 1. Delete feature branch in web interface (e.g. gitlab / github)
## e.g. feature/4811

## 2. Locally on your system prune the remote tracking branch
git fetch --prune

## 3. Switch to master or main (depending on what you master branch is)
git checkout master

## 4. Delete local branch
git branch -d feature/4811
```

Change language to german - Linux

```
sudo update-locale LANG=en_US.UTF-8
su - kurs

## back to german

sudo update-locale LANG=de_DE.UTF-8
su - kurs

## Reference:
https://www.thomas-krenn.com/de/wiki/Locales\_unter\_Ubuntu\_konfigurieren

## update-locale does a change in
$ cat /etc/default/locale
LANG=en_US.UTF-8
```


Reference tree without sha-1

Exercises

merge feature/4712 - conflict

Exercise

1. You are in master-branch
2. Checkout new branch feature/4712
3. Change line1 in todo.txt
4. `git add -A; git commit -am "feature-4712 done"`
5. Change to master
6. Change line1 in todo.txt
7. `git add -A; git commit -am "change line1 in todo.txt in master"`
8. `git merge feature/4712`

merge request with bitbucket

```
## Local
git checkout -b feature/4822
ls -la
touch f1.txt
git add .
git commit -am "f1.txt"
touch f2.txt
git add .
git commit -am "f2.txt"
git push origin feature/4822
```

Online bitbucket

```
## create merge request
## and merge
```

Delete branch online after merge

Cleanup locally

```
git fetch --prune
git checkout master
git branch -D feature/4822
git pull --rebase
```

Snippets

publish lokal repo to server - bitbucket

```
# Step 1: Create repo on server without README and .gitignore /set both to NO when
creating

# Step 2: on commandline locally
cd /path/to/repo
git remote add origin https://erding2017@bitbucket.org/erding2017/git-remote-
jochen.git
git push -u origin master

# Step 3: for further commits
echo "test" > testdatei
git add .
git commit -am "added testdatei"
git push
```

failure-on-push-fix

```
## Step 1: push produces error
## you have done git push -u origin master the last to setup remote tracking branch by
option -u
git push
Password for 'https://erding2017@bitbucket.org':
To https://bitbucket.org/erding2017/git-remote-jochen.git
 ! [rejected] (fetch first)
error: failed to push some refs to 'https://erding2017@bitbucket.org/erding2017/git-
remote-jochen.git'
hint: Updates were rejected because the remote contains work that you do
hint: not have locally. This is usually caused by another repository pushing
hint: to the same ref. You may want to first integrate the remote changes
hint: (e.g., 'git pull ...') before pushing again.
hint: See the 'Note about fast-forwards' in 'git push --help' for details.
## Step 2: Integrate changes from online
git pull
## Step 2a: Editor opens and you need to save and ext (without changing anything)

## Step 3: re-push
git push
```

failure-on-push-with-conflict

Failure push

```
## Step 1: push produces error
## you have done git push -u origin master the last to setup remote tracking branch by
option -u
git push
Password for 'https://erding2017@bitbucket.org':
To https://bitbucket.org/erding2017/git-remote-jochen.git
 ! [rejected] (fetch first)
....
## Step 2: Integrate changes from online
git pull

## Step 3: Solve conflict
Auto-merging agenda.txt
CONFLICT (content): Merge conflict in agenda.txt
Automatic merge failed; fix conflicts and then commit the result.
kurs@ubuntu-tr01:~/training$ git status
On branch master
Your branch and 'origin/master' have diverged,
and have 1 and 1 different commits each, respectively.
    (use "git pull" to merge the remote branch into yours)

## Step 3a: Open file agenda.txt
## Decide for which version
## - remove all <<<<< and ===== and >>>>>>>>> - lines

## Step 3b: then: save + exit from editor

## Step 3c: mark resolution
git status
git add todo.txt

## Step 3d:
git status
## as written there
git commit

## Step 4: re-push
git push
```

recipe

```
git push # failure
git pull
git add todo.txt
```

```
git commit  
git push
```

Extras

Best practices

- Delete branches, not needed anymore
- `git merge --no-ff` -> for merging local branches (to get a good history from local)
- from online: `git pull --rebase` // clean history from online, not to many branches
- nur auf einem Arbeiten mit max. 2 Teilnehmern, wenn mehr feature-branch

Teil 2:

- Be careful with git commands that change history.
 - never change commits, that have already been pushed
- Choose workflow wisely
- Avoid `git push -f` in any case // should not be possible
- Disable possibility to push -f for branch or event repo

Using a mergetool to solve conflicts

Meld (Windows)

- <https://meldmerge.org/>

Configuration in Git for Windwos (git bash)

```
## you have to be in a git project
git config --global merge.tool meld
git config --global diff.tool meld
## Should be on Windows 10
git config --global mergetool.meld.path
"/c/Users/Admin/AppData/Local/Programs/Meld/Meld.exe"
## do not create an .orig - file before merge
git config --global mergetool.keepBackup false
```

How to use it

```
## when you have conflict you can open the mergetool (graphical tool with )
git mergetool
```


Help

Help from commandline

On Windows

```
## on git bash enter
git help <command>
## e.g.
git help log

## --> a webpage will open with content
```

Documentation

GIT Pdf

- <http://schulung.t3isp.de/documents/pdfs/git/git-training.pdf>

GIT Book EN

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

GIT Book DE

- <https://git-scm.com/book/de/v2>

Third Party Tools

Continuous Integration / Continuous Deployment (CI/CD)

```
## Test often / Test automated (CI)

* Jenkins
* Github Actions
* Git Webhooks

## Publish new versions frequently (CD)

* Jenkins
* Github Action
* Git Webhooks
```