

gitops-Training

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Git - Grundlagen

Grundlagen

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

Git - Commands (with tips & 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-message (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

List the result (last entry is being used)

```
git config --list
```

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
```

```
Administrator@D8 MINGW64 ~/Desktop/training2 (master)
$ git config --list
diff.astextplain.textconv=astextplain
filter.lfs.clean=git-lfs clean -- %f
filter.lfs.smudge=git-lfs smudge -- %f
filter.lfs.process=git-lfs filter-process
filter.lfs.required=true
http.sslbackend=schannel
core.autocrlf=true
core.fscache=true
core.symlinks=false
pull.rebase=false
credential.helper=manager
credential.https://dev.azure.com.usehttppath=true
init.defaultbranch=master
user.email=j.metzger@t3company.de
user.name=Jochen 'Blaumann' Metzger
core.repositoryformatversion=0
core.filemode=false
core.bare=false
core.logallrefupdates=true
core.symlinks=false
core.ignorecase=true
user.name=Phantomas
```

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

Creating and using tags

```
## 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
```

Deleting tags

```
## Fetch new tags from online
git fetch --tags

## Update master branch (rebase) and fetch all tags in addition from online
git checkout master
git pull --rebase --tags

## Tag local löschen und danach online löschen
git tag -d test.tag
git push --delete origin test.tag

## Tag online löschen und danach lokal
## Schritt 1: Über das interface (web) löschen
## Schritt 2: aktualisieren
```



```
git fetch --prune --prune-tags
```

git rm

Delete file in working directory, staging and repo

```
git rm filename.txt
```

Deleting files only from repo (not locally)

```
git rm --cached filename.txt
## Please be sure to commit the change afterwards
## to reflect the changes in repo
git commit -am "my filename.txt was deleted"
```

Git - mergetool

mergetool auf der Kommandozeile verwenden

Meld (Windows)

- <https://meldmerge.org/>

Find out if mergetool meld is available

```
## Important: close and reopen git bash before doing that
## you can try to see, if meld can be executed by simply typing "meld"

git mergetool --tool-help
```

Configure, when it is found by mergetool --tool-help

```
## you have to be in a git project
git config --global merge.tool meld
git config --global diff.tool meld
git config --global mergetool.keepBackup false
git config --list
```

If not found bei mergetool --tool-help :: Configuration in Git for Windows (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"
## sometimes here
git config --global mergetool.meld.path "/c/Program Files (x86)/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
```

Git - Advanced Commands

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
```

Git - Tipps & 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#_pretty_formats

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
```

Git - 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
```

Git - 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]          master -> master (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]          master -> master (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
```

Git - 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>

github actions - Einführung

Was ist ci/cd ?

Allgemein

CI/CD steht für **Continuous Integration** und **Continuous Delivery** bzw. **Continuous Deployment** – zwei zentrale Konzepte in der modernen Softwareentwicklung.

CI – Continuous Integration

Automatisches Testen und Zusammenführen von Code-Änderungen.

- Entwickler:innen arbeiten gemeinsam am Code.
- Sobald jemand etwas „pusht“, wird automatisch geprüft:
 - Funktioniert der Code? (z. B. durch Unit Tests)
 - Lässt sich das Projekt bauen (Build)?
- Ziel: Fehler frühzeitig erkennen, weniger Integrationstress.

CD – Continuous Delivery / Deployment

1. Continuous Delivery

Der Code ist jederzeit bereit für ein manuelles Deployment.

- Nach erfolgreich bestandem CI-Prozess wird der Code automatisch „bereitgestellt“, z. B. als Docker-Image.
- Das Deployment erfolgt per Knopfdruck oder Approval.

2. Continuous Deployment

Noch ein Schritt weiter: Änderungen gehen automatisch live, sobald sie durch die Tests kommen.

- Vollständige Automatisierung bis zum Produktionssystem.

- Typisch für Microservices und Cloud-native Architekturen.

Beispiel in GitHub Actions

Ein typischer CI/CD-Workflow:

```
on: push
jobs:
  test:
    runs-on: ubuntu-latest
    steps:
      - uses: actions/checkout@v4
      - run: npm install
      - run: npm test

  deploy:
    needs: test
    runs-on: ubuntu-latest
    steps:
      - run: echo "Deploying to production..."
```

Was kann github ci/cd

GitHub Actions ist eine sehr leistungsfähige CI/CD- und Automatisierungsplattform direkt in GitHub integriert. Du kannst damit so ziemlich alles automatisieren, was mit deinem Code zu tun hat. Hier sind die wichtigsten **Features** und **Möglichkeiten**:

Kern-Features von GitHub Actions

Feature	Beschreibung
Workflows	YAML-basierte Automatisierungen, die auf Events wie <code>push</code> , <code>pull_request</code> oder <code>schedule</code> reagieren.
Jobs & Steps	Workflows bestehen aus Jobs (z. B. "build", "deploy"), die wiederum aus Steps bestehen.
Self-hosted & GitHub-hosted Runner	Du kannst eigene Runner verwenden oder die von GitHub bereitgestellten virtuellen Maschinen.
Matrix Builds	Erlaubt dir, Tests parallel mit verschiedenen Parametern laufen zu lassen (z. B. Node-Versionen, OS).
Secrets & Umgebungsvariablen	Verwaltung sensibler Daten wie API-Keys sicher innerhalb von Repos/Organisationen.
Artifact Handling	Build-Artefakte speichern, herunterladen oder zwischen Jobs teilen.
Caching	Caching von z. B. <code>npm install</code> oder <code>pip-Dependencies</code> zur Beschleunigung von Builds.
Reusable Workflows	Wiederverwendbare Workflows via <code>workflow_call</code> .
Manueller Trigger	Starte Workflows manuell – auch mit Formularfeldern (Inputs).

<code>(workflow_dispatch)</code>	
Scheduled Workflows <code>(schedule)</code>	Cron-basierte Zeitsteuerung.
Docker Support	Docker-Container können direkt gebaut, gepusht und genutzt werden.
Matrix Builds	Automatische Variation von Builds durch definierte Matrix-Werte.
Integration mit GitHub APIs	Durch <code>gh</code> CLI oder REST/GraphQL APIs.
Marketplace Actions	Tausende vorgefertigte Actions im GitHub Marketplace .

Typische Anwendungsfälle / Möglichkeiten

Bereich	Beispiele
Build & Test	Automatisches Bauen und Testen von Code bei jedem Push/PR.
Deployments	Automatisierte Deployments zu Cloud-Anbietern (AWS, Azure, GCP, Vercel etc.).
Release-Automatisierung	Tags erstellen, Releases publishen, Changelogs generieren.
Code-Qualität	Linting, Formatierung, statische Codeanalyse, Security-Scans.
CI/CD	Komplette CI/CD-Pipelines für Webservices, Microservices etc.
Issue- und PR-Automation	Automatisches Labeln, Kommentieren, Zuweisen.
Cron-Jobs	Regelmäßige Aufgaben (z. B. tägliche Backups, Cleanup-Skripte).
Container Management	Docker-Images bauen, testen und in Registries pushen.
Monorepo Management	Selektives Ausführen von Tests/Builds abhängig vom betroffenen Verzeichnis.
Multi-Repo Workflows	Controller-Repositories, Trigger über <code>repository_dispatch</code> .

✔ Vorteile von GitHub Actions

- Keine externe CI/CD-Plattform notwendig
- Nahtlose GitHub-Integration
- Pay-as-you-go auf GitHub-hosted Runners
- Sehr flexibel dank Shell, Docker, eigene Actions
- Open-Source Marketplace mit riesiger Auswahl

General overview

Komponenten

- workflows
- jobs
- steps
- events
- actions

Workflows

Mit einfachen Worten:

Ein Workflow in GitHub Actions ist ein automatisierter Ablauf, der etwas für dich erledigt, sobald etwas in deinem GitHub-Projekt passiert.

Zum Beispiel:

- Du machst einen Push → automatisch wird dein Code getestet.
- Du öffnest einen Pull Request → dein Projekt wird gebaut und überprüft.
- Du willst regelmäßig etwas tun → GitHub kann z. B. jeden Tag um 6 Uhr morgens etwas starten.

Ein Workflow besteht aus:

- **Trigger** (Was löst den Ablauf aus? z. B. `push`, `pull_request`, `schedule`)
- **Jobs** (Was soll getan werden?)
- **Steps** (Wie wird es gemacht? z. B. Befehle oder Actions)

Ein einfaches Beispiel:

```
on: push
jobs:
  test:
    runs-on: ubuntu-latest
    steps:
      - uses: actions/checkout@v4
      - run: npm install
      - run: npm test
```

➡ Dieser Workflow testet automatisch deinen Code bei jedem `git push`.

Events

- Events sind Ereignisse die stattfinden (man könnte auch sagen -> Trigger)
- Ref: <https://docs.github.com/en/actions/using-workflows/events-that-trigger-workflows>

Beispiele für Typen von Events

- `pull_request`
 - if no activity types are specified, the workflow runs when a pull request is opened or reopened or when the head branch of the pull request is updated

Actions

- Bei einer **action** handelt es sich um eine benutzerdefinierte Anwendung für die GitHub Actions-Plattform zur Ausführung einer komplexen und häufig ausgeführten Aufgabe
- Wenn ich sie verwende, spare ich code
- Beispiele von **actions** in github actions

Action	Zweck
<code>actions/checkout</code>	Checkt den Repository-Code aus, um damit arbeiten zu können
<code>actions/setup-node</code>	Installiert Node.js in einer bestimmten Version
<code>actions/setup-python</code>	Installiert Python in einer bestimmten Version

actions/setup-java	Installiert Java / JDK
actions/cache	Caching von Abhängigkeiten (z. B. <code>node_modules</code>) für schnellere Builds
actions/upload-artifact	Speichert Build-Ergebnisse (z. B. Testberichte)
actions/download-artifact	Lädt gespeicherte Artefakte in späteren Jobs
docker/build-push-action	Baut und pusht ein Docker-Image zu DockerHub oder GHCR
github/codeql-action/init	Startet CodeQL-Analyse für Sicherheitsscans
actions/github-script	Führt beliebige JavaScript-Befehle mit Zugriff auf das GitHub-API aus

- Beispiele von von github actions aus der community

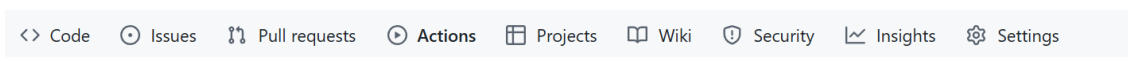
Action	Zweck
peter-evans/create-pull-request	Erstellt automatisch PRs, z. B. für aktualisierte Konfigs
JamesIves/github-pages-deploy-action	Deployment auf GitHub Pages
Azure/k8s-deploy	Deployment zu Kubernetes (AKS etc.)
softprops/action-gh-release	Erstellt Releases inkl. Assets in GitHub

github actions - Praxis I

Übung 1: Den 1. Workflow erstellen

Schritte:

1. Im Menu auf actions klicken



Get started with GitHub Actions

Build, test, and deploy your code. Make code reviews, branch management, and issue triaging work the way you want. Select a workflow to get started.

Skip this and [set up a workflow yourself](#) →


Suggested for this repository

Simple workflow

By GitHub

Start with a file with the minimum necessary structure.

[Configure](#)



2. Unter simple workflow - auf **configure** klicken

Simple workflow

By GitHub



Start with a file with the minimum necessary structure.

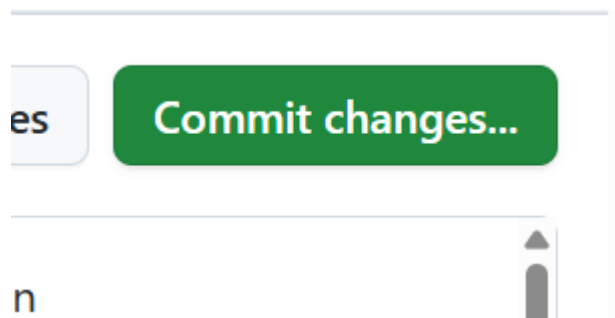
Configure

3. Es erscheint ein editor mit einem Beispiel-Workflow

Edit

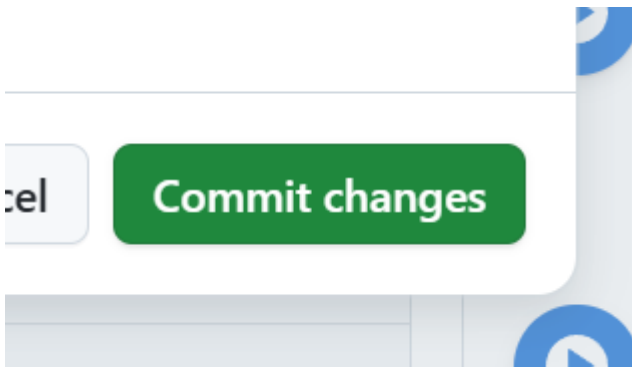
Preview

```
1    # This is a basic workflow to help you get
2
3    name: CI
4
5    # Controls when the workflow will run
6    on:
7      # Triggers the workflow on push or pull
8      push:
9        branches: [ "main" ]
10     pull_request:
11       branches: [ "main" ]
12
```



.. dann oben rechts auf **commit** klicken

.. Im Popup nochmal auf commit changes unten rechts klicken



4. Menu -> Actions

- Wenn wir jetzt nochmal auf den Menüpunkt Actions klicken, sehen wir, dass der Workflow bereits ausgeführt wird / wurde:

1 workflow run		Event ▾	Status ▾	Branch ▾	Actor ▾
✓	Create blank.yml			main	
CI #1: Commit 8e00581 pushed by jmetzger				1 minute ago	...
				11s	

Übung 2: Das repo auschecken

```
## This is a basic workflow to help you get started with Actions

name: Jochen's erster Workflow

## Controls when the workflow will run
on: push

## A workflow run is made up of one or more jobs that can run sequentially or in
parallel
jobs:
  # This workflow contains a single job called "build"
```

```
jochen-checkout-and-runs-something:
  # The type of runner that the job will run on
  runs-on: ubuntu-latest

  # Steps represent a sequence of tasks that will be executed as part of the job
  steps:

    - name: Checke repo aus
      uses: actions/checkout@v4

    - run: |
        ls -la
        pwd
        env
      # Runs a single command using the runners shell
    - run: echo Hello, world!
```

Übung 3: Workflow in Container ausführen

Example

```
## This is a basic workflow to help you get started with Actions

name: CI

## Controls when the workflow will run
on:
  # Triggers the workflow on push or pull request events but only for the "main"
  branch
  push:
    branches: [ "master" ]
  pull_request:
    branches: [ "master" ]

  # Allows you to run this workflow manually from the Actions tab
  workflow_dispatch:

## A workflow run is made up of one or more jobs that can run sequentially or in
parallel
jobs:
  # This workflow contains a single job called "build"
  build:
    # The type of runner that the job will run on
    runs-on: ubuntu-latest
    container: node:18

    # Steps represent a sequence of tasks that will be executed as part of the job
    steps:
      # Checks-out your repository under $GITHUB_WORKSPACE, so your job can access it
      - uses: actions/checkout@v4
```

```
# Runs a single command using the runners shell
- name: Run a one-line script
  run: echo Hello, world!

# Runs a set of commands using the runners shell
- name: Run a multi-line script
  run: |
    echo Add other actions to build,
    echo test, and deploy your project.
    pwd
    ls -la
    env | grep GITHUB
    id
    cat /etc/os-release
    ps aux
    # docker ps
```

Reference

- <https://docs.github.com/en/actions/writing-workflows/choosing-where-your-workflow-runs/running-jobs-in-a-container>

github actions - Praxis II (Arbeiten mit Outputs / GITHUB_STEP_SUMMARY)

Outputs zwischen jobs

Vorbereitung

- Der GITHUB_TOKEN wird von Github automatisch erstellt, aber du musst dafür Sorge tragen, dass die Schreibrechte auch im Workflow möglich sind

Prüfe:

Gehe zu Repository → Settings → Actions → General Scrolle zu "Workflow permissions"

Wähle: ✓ Read and write permissions

Workflow permissions

Choose the default permissions granted to the GITHUB_TOKEN when running workflows in this repository. You can specify more granular permissions in the workflow using YAML. [Learn more about managing permissions.](#)



Read and write permissions

Workflows have read and write permissions in the repository for all scopes.



Read repository contents and packages permissions

Workflows have read permissions in the repository for the contents and packages scopes only.

Choose whether GitHub Actions can create pull requests or submit approving pull request reviews.



Allow GitHub Actions to create and approve pull requests

Beispiel 1:

```

name: Automatischer Tag

on: [push]

jobs:
  version-erzeugen:
    runs-on: ubuntu-latest
    outputs:
      version: ${ steps.create_version.outputs.version }
    steps:
      - name: Erzeuge Versionsnummer
        id: create_version
        run: |
          VERSION="v$(date +%Y.%m.%d-%H%M)"
          echo "version=$VERSION" >> $GITHUB_OUTPUT

  tag-setzen:
    needs: version-erzeugen
    runs-on: ubuntu-latest
    steps:
      - name: Checke Repo aus
        uses: actions/checkout@v4

      - name: Setze Git-Tag und pushe
        env:
          TAG_NAME: ${ needs.version-erzeugen.outputs.version }
          GITHUB_TOKEN: ${ secrets.GITHUB_TOKEN }
        run: |
          git config user.name "github-actions"
          git config user.email "github-actions@github.com"
          git tag "$TAG_NAME"
          git push origin "$TAG_NAME"

```

Zusammenfassung ausgeben

- Writing to `$GITHUB_STEP_SUMMARY` writes to a summary, that is visible on the summary of the actions - run

```

name: Jochen's nicer workflow

on:
  # Triggers the workflow on push or pull request events but only for the master
  branch
  push:
    branches: [ master ]

jobs:
  build:

    runs-on: ubuntu-latest

```

```

steps:
  - name: Run a one-line script
    run: |
      echo "### Hello world! :rocket:" >> $GITHUB_STEP_SUMMARY
      pwd
      ls -la
      #/bin/false
      echo "### Hello world in build after false ! :rocket:" >>
$GITHUB_STEP_SUMMARY

deploy:

  # needs a succesful build
  # THAT IS IMPORTANT
  needs: build
  runs-on: ubuntu-latest

  # Steps represent a sequence of tasks that will be executed as part of the job
  steps:
    - name: Starting the deploy
      run: |
        echo "starting the deployment process"
        ls -la
        echo "### Hello world in deploy after false ! :rocket:" >>
$GITHUB_STEP_SUMMARY

```

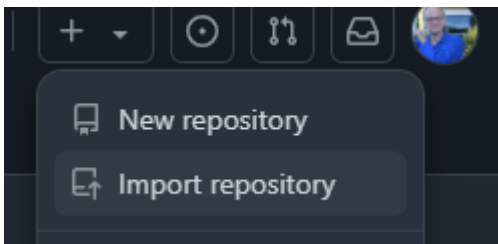
github actions - Praxis III (Tests)

Tests über python script durchführen

Step 1: Simple Version

- Import <https://github.com/jmetzger/github-actions-python-test>

1.1 Neues Repo als import



The url for your source repository:
<https://github.com/jmetzger/github-actions-python-test>

Your new repository detail:
 Bei Repository name:
 z.B. --> jm-github-actions-python-test

Begin import -> Button

Info 2: This workflow is included

```
name: Python Tests

on:
  push:
    branches: [ main ]
  pull_request:
    branches: [ main ]

jobs:
  test:
    runs-on: ubuntu-latest

    steps:
      - name: Checkout Code
        uses: actions/checkout@v4

      - name: Set up Python
        uses: actions/setup-python@v5
        with:
          python-version: '3.11'

      - name: Install Dependencies
        run: |
          python -m pip install --upgrade pip
          pip install -r requirements.txt

      - name: Run Tests
        run: |
          pytest
```

Step 3: We want more info:

- Does not work because of missing permissions

```
name: Python Tests with Report

on:
  push:
    branches: [ main ]
  pull_request:
    branches: [ main ]

jobs:
  test:
    runs-on: ubuntu-latest
```



```

steps:
  - name: Checkout Code
    uses: actions/checkout@v4

  - name: Set up Python
    uses: actions/setup-python@v5
    with:
      python-version: '3.11'

  - name: Install Dependencies
    run: |
      python -m pip install --upgrade pip
      pip install -r requirements.txt

  - name: Run Tests and Generate Report
    run: |
      pytest --junitxml=pytest-results.xml

  - name: Upload Test Results
    uses: actions/upload-artifact@v4
    with:
      name: pytest-results
      path: pytest-results.xml

  - name: Publish Test Results
    uses: EnricoMi/publish-unit-test-result-action@v2
    if: always()
    with:
      files: pytest-results.xml

```

Step 4: With correct permissions

- Does not work because of missing permissions

```

name: Python Tests with Report

permissions:
  checks: write
  pull-requests: write

on:
  push:
    branches: [ main ]
  pull_request:
    branches: [ main ]

jobs:
  test:
    runs-on: ubuntu-latest

    steps:
      - name: Checkout Code

```

```

    uses: actions/checkout@v4

- name: Set up Python
  uses: actions/setup-python@v5
  with:
    python-version: '3.11'

- name: Install Dependencies
  run: |
    python -m pip install --upgrade pip
    pip install -r requirements.txt

- name: Run Tests and Generate Report
  run: |
    pytest --junitxml=pytest-results.xml

- name: Upload Test Results
  uses: actions/upload-artifact@v4
  with:
    name: pytest-results
    path: pytest-results.xml

- name: Publish Test Results
  uses: EnricoMi/publish-unit-test-result-action@v2
  if: always()
  with:
    files: pytest-results.xml

```

github actions - needs (Abhängige Abläufe)

Arbeiten mit needs und if always()

Beispiel ohne needs

- alle stages (jobs) laufen parallel

```

name: Ohne needs

on: [push]

jobs:
  build:
    runs-on: ubuntu-latest
    steps:
      - run: |
          echo " Baue etwas"
          sleep 30

  test:
    runs-on: ubuntu-latest
    steps:
      - run: |

```

```
    echo "✔ Teste etwas"
    sleep 30

deploy:
  runs-on: ubuntu-latest
  steps:
    - run: |
        echo "  Deploy"
        sleep 30
```

Beispiel mit needs

- Erst wenn das need erfüllt ist, kann der nächste Job gestartet werden

```
name: Mit needs

on: [push]

jobs:
  build:
    runs-on: ubuntu-latest
    steps:
      - run: |
          echo "  Baue etwas"
          sleep 30

  test:
    needs: build
    runs-on: ubuntu-latest
    steps:
      - run: |
          echo "✔ Teste etwas"
          sleep 30

  deploy:
    needs: [test]
    runs-on: ubuntu-latest
    steps:
      - run: |
          echo "  Deploy"
          sleep 30
```

Beispiel weitermachen (auch bei Fehler)

```
name: Mit needs

on: [push]

jobs:
```

```
build:
  runs-on: ubuntu-latest
  steps:
    - run: |
        xecho "  Baue etwas"
        sleep 30

test:
  if: always()
  needs: build
  runs-on: ubuntu-latest
  steps:
    - run: |
        echo "✔ Teste etwas"
        sleep 30

deploy:
  needs: [test]
  runs-on: ubuntu-latest
  steps:
    - run: |
        echo "  Deploy"
        sleep 30
```

github actions - Use Cases

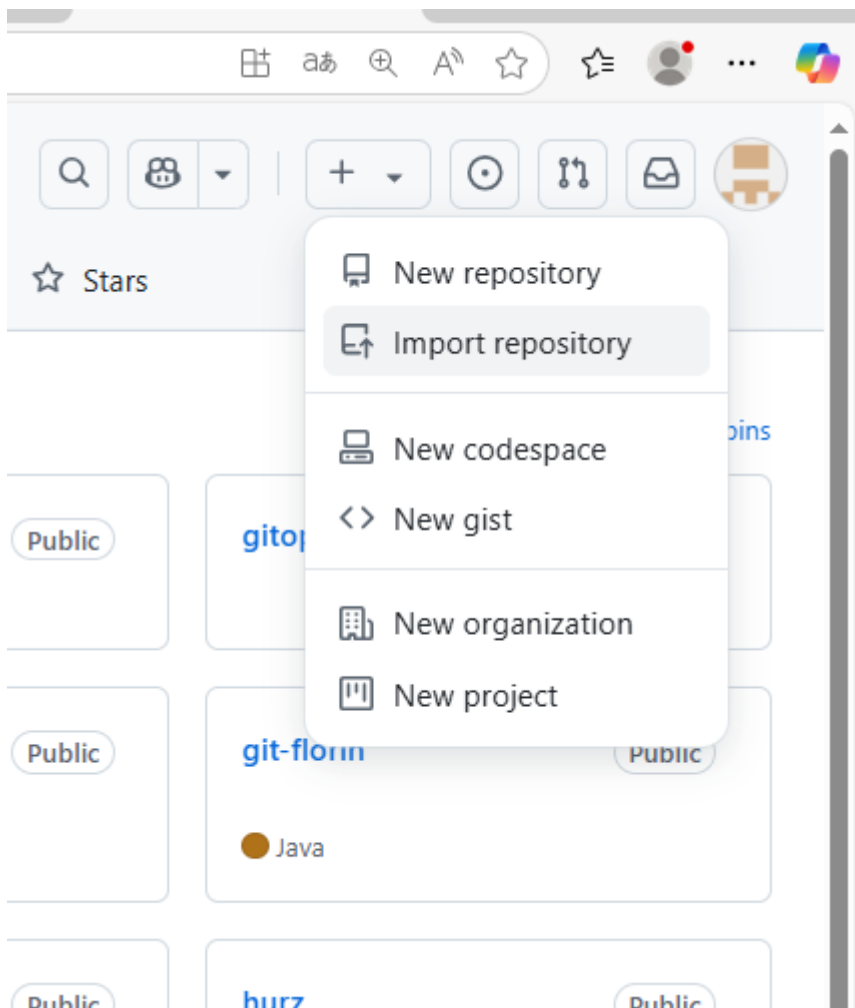
helm-chart aus repo in Kubernetes Cluster installieren

Prerequisites

```
.kubeconfig als base64
cat .kube/config | base64 > .kubeconfig.b64
```

Step 1: Klonen eines Beispiels

- Erstellen eines Repo aber über import mit folgender URL
 - <https://gitlab.com/jmetzger/training-helm-chart-kubernetes-gitlab-ci-cd.git>



Step 2: Secret erstellen

Settings -> Security -> Secrets & variables -> Actions -> New Repository Secret

```
##  
KUBECONFIG  
  
## anlegen mit Inhalt von .kubeconfig.b64
```

Step 3: Workflow erstellen

- Actions -> New Workflow -> Setup up a workflow yourself

Get started with GitHub Actions

Build, test, and deploy your code. Make code reviews, branch management, and issue triaging work the way you want. Select a workflow to get started.

Skip this and [set up a workflow yourself](#) →

Search workflows

Suggested for this repository

Simple workflow

By GitHub

Start with a file with the minimum necessary structure.

Configure

```
name: Deploy Helm Chart

on:
  push:
    branches:
      - main

jobs:
  helm-deploy:
    runs-on: ubuntu-latest

    steps:
      - name: Checkout Repository
        uses: actions/checkout@v4

      - name: Set up Kubeconfig
        run: |
          mkdir -p $HOME/.kube
          echo "${{ secrets.KUBECONFIG }}" | base64 -d > $HOME/.kube/config

      - name: Install Helm
        uses: azure/setup-helm@v4

      - name: Deploy with Helm
        run: |
          ## bitte euren namespace eintragen anstelle von default , z.B. euren namen
          ## muss eindeutig sein
```

```
helm upgrade --install my-release ./charts/my-app --namespace default --
create-namespace
kubectl -n default get all
```

jar bauen und über scp an den Server übertragen

Step 1: Neues Repo in gittrainereu / gittrainereu2 durch import

- mit beliebigen Namen: jm-sein-java
- <https://github.com/yhayashi30/maven-jar-sample.git>

Step 2: Workflow erstellen

```
name: Build and Deploy Aya GlassFish Jar

on:
  push:
    branches:
      - master

jobs:
  build-and-deploy:
    runs-on: ubuntu-latest

    steps:
      - name: Checkout repository
        uses: actions/checkout@v4

      - name: Set up JDK 17
        uses: actions/setup-java@v4
        with:
          java-version: '17'
          distribution: 'temurin'

      - name: Build JAR with Maven
        run: mvn clean package

      - name: Copy JAR to Aya-GlassFish via SCP
        run: |
          ls -la
          cd target
          ls -la
```

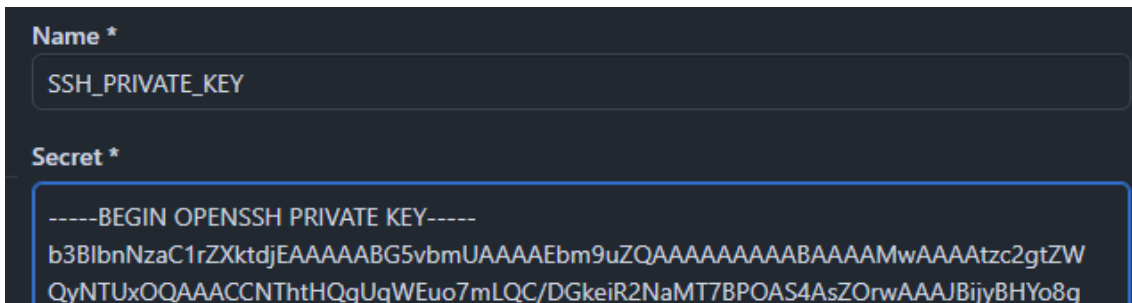
Step 3: Für Zielsystem Schlüsselpaar erstellen

```
## auf dem client
ssh-keygen
## Bitte bei Passwort nur bestätigen (mit Enter)
## Es darf kein Passwort hinterlegt
```

```
## Den .pub-key nach ~/.ssh/authorized_keys schreiben
## z.B. id_ed25519.pub
```

Step 4: adding scp

```
## SECRET -> SSH_PRIVATE_KEY mit private_key anlegen
https://github.com/gittrainereu/jm-sein-java/settings/secrets/actions/new
```



The screenshot shows the GitHub Actions secrets page. The 'Name' field is labeled 'Name *' and contains the text 'SSH_PRIVATE_KEY'. The 'Secret' field is labeled 'Secret *' and contains a long string of characters, including '-----BEGIN OPENSSH PRIVATE KEY-----' and 'b3BlbnNzaC1rZXktdjEAAAABG5vbmUAAAAEbm9uZQAAAAAAAAABAAAAMwAAAAAtzc2gtZWQyNTUxOQAAACCNThtHQqUqWEuo7mLQC/DGkeiR2NaMT7BPOAS4AsZOrwAAAJBijyBHYo8q'.

```
name: Build and Deploy Aya GlassFish Jar

on:
  push:
    branches:
      - master

jobs:
  build-and-deploy:
    runs-on: ubuntu-latest

    steps:
      - name: Checkout repository
        uses: actions/checkout@v4

      - name: Set up JDK 17
        uses: actions/setup-java@v4
        with:
          java-version: '17'
          distribution: 'temurin'

      - name: Build JAR with Maven
        run: mvn clean package

      - name: Copy JAR to Aya-GlassFish via SCP
        uses: appleboy/scp-action@v1
        with:
          host: 164.92.167.148

## ändern
  username: tln1
  key: ${ secrets.SSH_PRIVATE_KEY }
  port: 22
```



```
source: "target/*.jar"
## hier bitte eure eigene tln-nr statt tln1 eintragen
target: "/home/tln1/"
```

github actions - Schedule

schedule mit variablen verwenden

Remark

- In the free version, this is not exact
- Scheduled jobs on private only if they are starred or in other plan

Exercise

- Anpassen auf die aktuelle Zeit (Fall 1 in 2 Minute, Falls in 4 minuten)

```
name: Ein Job mit dynamischer Variable je nach Zeitplan

on:
  schedule:
    - cron: '*/* * * * *' # alle 5 Minuten
    - cron: '* * * * *' # jede Minute

jobs:
  dynamic-message:
    runs-on: ubuntu-latest
    steps:
      - name: Setze MESSAGE je nach Zeitplan
        id: set-message
        run: |
          case "${{ github.event.schedule }}" in
            '*/* * * * *')
              echo "message=Guten Morgen am Montag!" >> $GITHUB_OUTPUT
              ;;
            '* * * * *')
              echo "message=Guten Abend am Freitag!" >> $GITHUB_OUTPUT
              ;;
            *)
              echo "message=Unbekannter Zeitplan" >> $GITHUB_OUTPUT
              ;;
          esac

      - name: Ausgabe der Nachricht
        run: echo "${{ steps.set-message.outputs.message }}"
```

github actions - Inputs (Formular)

Manueller Start Pipeline mit Formular (Inputs)

Version 1: mit if-Abfragen

```

## .github/workflows/deployment.yml
name: Deploy Application

on:
  workflow_dispatch:
    inputs:
      environment:
        description: 'Deployment environment'
        required: true
        default: 'staging'
        type: choice
        options:
          - development
          - staging
          - production
      version:
        description: 'Version/tag to deploy (e.g., v1.2.3)'
        required: true
        default: 'v1.0.0'
      deploy_notes:
        description: 'Optional deployment notes'
        required: false
      dry_run:
        description: 'Run in dry-run mode'
        required: false
        default: 'false'
        type: boolean

jobs:
  deploy:
    name: Deploy to ${ github.event.inputs.environment }
    runs-on: ubuntu-latest

    steps:
      - name: Checkout Code
        uses: actions/checkout@v4

      - name: Display Input Values
        run: |
          echo "Environment: ${ github.event.inputs.environment }"
          echo "Version: ${ github.event.inputs.version }"
          echo "Deploy Notes: ${ github.event.inputs.deploy_notes }"
          echo "Dry Run: ${ github.event.inputs.dry_run }"

      - name: Run Deployment Script
        run: |
          if [ "${ github.event.inputs.dry_run }" = "true" ]; then
            echo "Performing dry-run deployment to ${ github.event.inputs.environment }"
            # simulate deployment here
          else

```

```
    echo "Deploying version ${github.event.inputs.version} to ${github.event.inputs.environment}..."
    # real deployment commands go here
fi
```

Version 2 mit Case

```
## .github/workflows/deployment.yml
name: Deploy Application

on:
  workflow_dispatch:
    inputs:
      environment:
        description: 'Deployment environment'
        required: true
        default: 'staging'
        type: choice
        options:
          - development
          - staging
          - production
      version:
        description: 'Version/tag to deploy (e.g., v1.2.3)'
        required: true
        default: 'v1.0.0'
      deploy_notes:
        description: 'Optional deployment notes'
        required: false
      dry_run:
        description: 'Run in dry-run mode'
        required: false
        default: 'false'
        type: boolean

jobs:
  deploy:
    name: Deploy to ${github.event.inputs.environment}
    runs-on: ubuntu-latest

    steps:
      - name: Checkout Code
        uses: actions/checkout@v4

      - name: Set Deployment Variables
        id: set-vars
        run: |
          case "${github.event.inputs.environment}" in
            development)
              echo "DEPLOY_URL=https://dev.example.com" >> $GITHUB_ENV
              echo "CONFIG_PATH=./configs/dev.json" >> $GITHUB_ENV
```

```

        ;;
    staging)
        echo "DEPLOY_URL=https://staging.example.com" >> $GITHUB_ENV
        echo "CONFIG_PATH=./configs/staging.json" >> $GITHUB_ENV
        ;;
    production)
        echo "DEPLOY_URL=https://example.com" >> $GITHUB_ENV
        echo "CONFIG_PATH=./configs/prod.json" >> $GITHUB_ENV
        ;;
    esac

- name: Display Input Values
  run: |
    echo "Environment: ${github.event.inputs.environment}"
    echo "Version: ${github.event.inputs.version}"
    echo "Deploy Notes: ${github.event.inputs.deploy_notes}"
    echo "Dry Run: ${github.event.inputs.dry_run}"
    echo "DEPLOY_URL: $DEPLOY_URL"
    echo "CONFIG_PATH: $CONFIG_PATH"

- name: Run Deployment Script
  run: |
    if [ "${github.event.inputs.dry_run}" = "true" ]; then
        echo "Dry-run deploying to $DEPLOY_URL using $CONFIG_PATH"
    else
        echo "Deploying version ${github.event.inputs.version} to $DEPLOY_URL
using config $CONFIG_PATH"
        # Actual deployment logic here
    fi

```

Git - Server

Git-Server auf Synology NAS installieren

- Um auf einem **Synology NAS** einen Git-Server einzurichten, kannst du dies entweder über den **Paketmanager** mit vorhandenen Tools oder manuell über SSH und `git init --bare` tun. Hier ist eine **Schritt-für-Schritt-Anleitung** für beide Methoden:

Variante 1: Mit dem Paket "Git Server" (einfachste Methode)

Voraussetzungen:

- DSM (DiskStation Manager) installiert
- Administratorrechte
- SSH-Zugriff (optional für erweiterte Nutzung)

Schritte:

1. Git Server installieren

- Öffne das **Paket-Zentrum** auf deinem Synology NAS.
- Suche nach „**Git Server**“ (von Synology).

- Klicke auf **Installieren**.

2. Benutzerrechte für Git einrichten

- Gehe zu **Systemsteuerung > Benutzer > Benutzer bearbeiten**.
- Aktiviere bei gewünschten Benutzern unter dem Tab **Anwendungen** die **Git Server**-Berechtigung.
- (Optional: SSH-Zugriff erlauben unter „Terminal & SNMP“)

3. SSH aktivieren (für Push-Zugriff nötig)

- Öffne **Systemsteuerung > Terminal & SNMP**.
- Aktiviere **SSH-Dienst aktivieren**.

4. Repository erstellen

- Verbinde dich per SSH mit dem NAS:

```
ssh benutzername@dein-nas-ip
```

- Erstelle ein „bare“-Repository:

```
mkdir -p /volume1/git/projektnamen.git
cd /volume1/git/projektnamen.git
git init --bare
```

5. Repository vom Client klonen

```
git clone ssh://benutzername@dein-nas-ip/volume1/git/projektnamen.git
```

Referenz:

- <https://kb.synology.com/de-de/DSM/help/Git/git?version=7>

github - actions - reviewer eintragen

Feature github: nur bestimmte Reviewer zählen zu den approval-Zählungen

Situation

- Nur bestimmte Personen sollen als Approval zählen
- Achtung: Approven können alle, die mindestens Leserechte für das Repo haben, sie zählen dann aber nicht mit

3 Bausteine

1. Team in der Organisation anlegen mit den gewünschten Benutzer: z.B. team_reviewer
2. 2 Haken bei branch-protection - rule setzen

github.com/jmetzger/training-gitops/settings/branch_protection_rules/new

Collaborators
Moderation options
Code and automation
Branches
Tags
Rules
Actions
Models
Webhooks
Environments
Codespaces
Pages
Security
Advanced Security
Deploy keys
Secrets and variables
Integrations
GitHub Apps
Email notifications

Protect your most important branches

Branch protection rules define whether collaborators can delete or force push to the branch and set requirements for any pushes to the branch, such as passing status checks or a linear commit history.

Your GitHub Free plan can only enforce rules on its public repositories, like this one.

Branch name pattern *

Protect matching branches

☒ **Require a pull request before merging**
When enabled, all commits must be made to a non-protected branch and submitted via a pull request before they can be merged into a branch that matches this rule.

☒ **Require approvals**
When enabled, pull requests targeting a matching branch require a number of approvals and no changes requested before they can be merged.
Required number of approvals before merging: 1

☐ **Dismiss stale pull request approvals when new commits are pushed**
New reviewable commits pushed to a matching branch will dismiss pull request review approvals.

☒ **Require review from Code Owners**
Require an approved review in pull requests including files with a designated code owner.

☐ **Require approval of the most recent reviewable push**
Whether the most recent reviewable push must be approved by someone other than the person who pushed it.

☐ **Require status checks to pass before merging**
Choose which status checks must pass before branches can be merged into a branch that matches this rule. When enabled, commits must first be pushed to another branch, then merged or pushed directly to a branch that matches this rule after status checks have

3. Dann müssen im Repo unter `.github/CODEOWNERS` diese noch eingetragen werden

```
## Datei: .github/CODEOWNERS

## Alle Dateien im Projekt sollen von einem Team geprüft werden
* @gitmeisterei/team-reviewer
```

mit github actions reviewer eintragen

`.github/workflows/auto-reviewer-eintragen.yml`

```
name: "Reviewer mit gh CLI hinzufügen"

on:
  pull_request:
    types: [opened, reopened, ready_for_review]

jobs:
  assign-reviewers:
    runs-on: ubuntu-latest

    permissions:
      pull-requests: write # Notwendig für gh CLI

    steps:
      - name: Checkout Code
        uses: actions/checkout@v4

      - name: GitHub CLI installieren
        uses: cli/cli-action@v2

      - name: Reviewer hinzufügen
```

```
env:
  GH_TOKEN: ${ secrets.GITHUB_TOKEN } # Automatischer Token
run: |
  gh pr edit ${ github.event.pull_request.number } \
    --repo ${ github.repository } \
    --add-reviewer user1 \
    --add-reviewer user2
```

Git - Best practices

Die 5 goldenenen Regeln - nix kaputtmachen so gehts

1. Kein git commit --amend auf bereits veröffentlicht (gepushed) commit.
2. Kein git reset vor bereits veröffentlichte (gepushed/gepushten) 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

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

Git - Advanced Commands

github - actions - runner

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>

github actions

Create dependant jobs

Execute job, if referred (by: needs) was succesful

```
name: Jochen's nicer workflow

on:
  # Triggers the workflow on push or pull request events but only for the master
  branch
  push:
    branches: [ master ]

jobs:
  build:

    runs-on: ubuntu-latest

    steps:
      - name: Run a one-line script
        run: |
          pwd
          ls -la
          /bin/false

  deploy:

    # needs a succesful build
    # THAT IS IMPORTANT
    needs: build
    runs-on: ubuntu-latest

    # Steps represent a sequence of tasks that will be executed as part of the job
    steps:
      - name: Starting the deploy
        run: |
          echo "starting the deployment process"
          ls -la
```

Ref:

- https://www.edwardthomson.com/blog/github_actions_17_dependent_jobs.html

Create custom composite action

Walkthrough

Step 1: create new repo

```
## new repo - e.g. <tl>-bash-action  
## z.B. fl-bash-action
```

Step 2: create action.yml in repo (oplevel)

```
## action.yml - im toplevel
```

```
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:  
    - uses: actions/checkout@v4  
    - run: echo Hello ${{ inputs.who-to-greet }}.  
      shell: bash  
    - id: random-number-generator  
      run: echo "random-id=$RANDOM" >> $GITHUB_OUTPUT  
      shell: bash  
    - run: |  
        env  
        chmod u+x ${{ github.action_path }}/goodbye.sh  
        ${{ github.action_path }}/goodbye.sh  
      shell: bash
```

Step 3: Create script

```
## goodbye.sh  
echo "Goodbye"
```

Step 4: workflow erstellen

```
### 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 "time=$time" >> $GITHUB_OUTPUT

```

```

## .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>

If example

```

steps:
  - name: Check for outdated packages
    id: vars
    run: |
      OUTDATED=$(npm outdated) || true

      echo "OUTDATED='$OUTDATED'" >> $GITHUB_OUTPUT

  - name: Upgrade
    if: ${{ steps.vars.outputs.OUTDATED != '' }}
    run: npm upgrade

```

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/>

Deploy to server with ssh

Deploying to server (without additional action)

Step 0: Setup Server with apache2 (Debian / Ubuntu)

```
apt install httpd
```

Step 1:

```
## Auf Zielsystem (Linux-Server Ubuntu/Debian) public / private key erstellt
## und pub-key in authorized_keys eingetragen.
```

```

cd /root/.ssh
## Achtung bitte rsa und 4096 nehmen, Beschreibung von github
## zum Erstellen eines pub/private keys funktioniert für github runner nicht
## be nachfrage name key-> github-actions
ssh-keygen -t rsa -b 4096 -C "foo@foo.com"

cat github-actions.pub >> authorized_keys
## Kopieren dieses Inhalt in die Secrets des repositories, von dem aus
## ihr deployen wollt
cat github-actions

```

Step 2: Eintrag in die Secretes

```

## Repository -> Settings -> Secrets -> Actions -> New Secret for Repo
SSH_PRIVATE_KEY
## Hier dann der Wert von github-actions

```

Step 2.5: add files to repo in dist

```

##add file with content
dist/test.html

```

Step 3: Workflow

```

on:
  push:
    branches:
      - main
      - master
  workflow_dispatch:

jobs:
  run_pull:
    name: run pull
    # That is the image we are running on
    runs-on: ubuntu-latest

    steps:
      - name: checkout
        uses: actions/checkout@v4
      - name: install ssh keys
        # check this thread to understand why its needed:
        # https://stackoverflow.com/a/70447517
        run: |
          install -m 600 -D /dev/null ~/.ssh/id_rsa
          echo "${{ secrets.SSH_PRIVATE_KEY }}" > ~/.ssh/id_rsa
          ssh-keyscan -H "${{ secrets.SSH_HOST }}" > ~/.ssh/known_hosts
      - name: connect and execute
        run: ssh "${{ secrets.SSH_USER }}"@${{ secrets.SSH_HOST }} "ls -la"
      - name: infos
        run: |

```

```

    ls -la
    env
  - name: synchronize
    run: rsync -avz dist/ root@${ secrets.SSH_HOST }:/var/www/html/

  - name: cleanup
    run: rm -rf ~/.ssh

```

Requirements (OLD VERSION from here)

```

## apache is installed with php
## ssh runs
## DocumentRoot /var/www/html

```

Steps

```

Step 1:
=====
Auf Zielsystem (Webserver) public / private key erstellt
und pub-key in authorized_keys eingetragen.

cd /root/.ssh
## Achtung bitte rsa und 4096 nehmen, Beschreibung von github
## zum Erstellen eines pub/private keys funktioniert für github runner nicht
ssh-keygen -t rsa -b 4096 -C "foo@foo.com"
cat github-actions.pub >> authorized_keys
## Kopieren dieses Inhalt in die Secrets des repositories, von dem aus
## ihr deployen wollt
cat github-actions

Step 2: Eintrag in die Secretes
=====
## Repository -> Settings -> Secrets -> Actions -> New Secret for Repo
SSH_PRIVATE_KEY
## Hier dann der Wert von github-actions

## Host (IP Eintragen)
SSH_HOST

Step 3: Workflow einrichten in Repo unter
.github/workflows/deinworkflow.yml

## This is a basic workflow to help you get started with Actions

name: Jochen's nicer workflow

## Controls when the workflow will run
on:
  # Triggers the workflow on push or pull request events but only for the master
  branch
  push:

```



```

    branches: [ master ]
pull_request:
    branches: [ master ]

# Allows you to run this workflow manually from the Actions tab
workflow_dispatch:

## A workflow run is made up of one or more jobs that can run sequentially or in
parallel
jobs:
    # This workflow contains a single job called "build

deploy:

    # needs a succesful build
    needs: build
    runs-on: ubuntu-latest

    env:
    # Beispiel, jedoch nicht notwendig
    SSH_PRIVATE_KEY: ${ secrets.SSH_PRIVATE_KEY }}

# Steps represent a sequence of tasks that will be executed as part of the job
steps:
    # Checks-out your repository under $GITHUB_WORKSPACE, so your job can access it
    - uses: actions/checkout@v2

    # Runs a single command using the runners shell
    - name: Starting the deploy
      run: |
        echo "starting the deployment process"
        ls -la
    - name: Install SSH Key
      uses: shimatara/ssh-key-action@v2
      with:
        key: ${ secrets.SSH_PRIVATE_KEY }}
        known_hosts: 'placeholder'
    - name: Adding Known Hosts
      run: ssh-keyscan -H ${ secrets.SSH_HOST }} >> ~/.ssh/known_hosts
    - name: Show known hosts
      run: ls -la ~/.ssh/known_hosts
    - name: synchronize
      run: rsync -avz ./dist root@${ secrets.SSH_HOST }}:/var/www/html/

### Schritt 3: Testen und debuggen

```

Ref:

- <https://zellwk.com/blog/github-actions-deploy/>

github actions - passing data

passing data from step to step

```
name: stepscheck

on:
  push:

jobs:
  job1:
    runs-on: ubuntu-latest
    steps:

      - name: Set color
        id: color-selector
        run: |
          echo $GITHUB_OUTPUT # test
          echo "SELECTED_COLOR=green" >> "$GITHUB_OUTPUT"
      - name: Get color
        env:
          SELECTED_COLOR: ${ steps.color-selector.outputs.SELECTED_COLOR }
        run: echo "The selected color is $SELECTED_COLOR"
```

github actions - events (IMHO trigger)

Events

```
9. events

9.1. Nur triggern, wenn bestimmte Dateien geändert wurden

on:
  pull_request:
    paths:
      - '**.js'

9.2 Branches ausschliessen

on:
  push:
    # Sequence of patterns matched against refs/heads
    branches-ignore:
      - 'mona/octocat'
      - 'releases/**-alpha'
    # Sequence of patterns matched against refs/tags
    tags-ignore:
      - v2
      - v1.*
```

Refs:

- https://docs.github.com/en/actions/using-workflows/events-that-trigger-workflows#pull_request
- <https://docs.github.com/en/actions/using-workflows/events-that-trigger-workflows#push>

Required Status Checks

You can find this setting under your repository's **Settings** > **Branches**.

The screenshot shows the 'Require status checks to pass before merging' section in the GitHub repository settings. It includes two options: 'Require status checks to pass before merging' (checked) and 'Require branches to be up to date before merging' (unchecked). Below these is a table of status checks found in the last week for the repository.

Status checks found in the last week for this repository	
<input type="checkbox"/>	.github/workflows/link-checker-on-pr.yml
<input checked="" type="checkbox"/>	.github/workflows/on-pull-request.yml Required

There are further details about these settings in the documentation.

<https://help.github.com/en/github/administering-a-repository/enabling-required-status-checks>

github actions - examples

Simple Workflow Test

```
## This is a basic workflow to help you get started with Actions
## .github/workflows/workflow-test.yml

name: Jochen's erster Workflow

## Controls when the workflow will run
on: push

## A workflow run is made up of one or more jobs that can run sequentially or in
parallel
jobs:
  # This workflow contains a single job called "build"
  jochen-runs-something:
    # The type of runner that the job will run on
    runs-on: ubuntu-latest

    # Steps represent a sequence of tasks that will be executed as part of the job
    steps:

      # Runs a single command using the runners shell
      - run: echo Hello, world!
```

Push to repo

```
## This is a basic workflow to help you get started with Actions

name: Jochen's erster Workflow

## Controls when the workflow will run
on: push

## A workflow run is made up of one or more jobs that can run sequentially or in
parallel
jobs:
  # This workflow contains a single job called "build"
  jochen-checksout-and-runs-something:
    # The type of runner that the job will run on
    runs-on: ubuntu-latest

    # Steps represent a sequence of tasks that will be executed as part of the job
    steps:

      - name: Checke repo aus
        uses: actions/checkout@v2

      - run: |
          ls -la
          pwd
          env
        # Runs a single command using the runners shell
      - run: echo Hello, world!
      - name: In repo schreiben
        run: |
          env > umgebung.txt
          ls -la >> umgebung.txt
          ls -la $GITHUB_WORKSPACE
          ls -la

      - name: Commit files
        run: |
          git config --local user.email "41898282+github-
actions[bot]@users.noreply.github.com"
          git config --local user.name "github-actions[bot]"
          git add .
          git commit -m "Add changes" -a

      - name: Push changes
        uses: ad-m/github-push-action@master
```

Write secret to file and push to repo

Vorbereitung

- SECRET_SUPER_SECRET setzen über GUI

Workflow

```
name: secret and push

on: [push]

jobs:
  job1:
    runs-on: ubuntu-latest
    permissions:
      # Job-level permissions configuration starts here
      contents: write      # 'write' access to repository contents
      pull-requests: write  # 'write' access to pull requests
    steps:
      - uses: actions/checkout@v4
        with:
          fetch-depth: 0 # otherwise, there would be errors pushing refs to the
destination repository.
      - name: Create local changes 1
        run: |
          touch somefile.txt
      - name: Create local secret
        shell: bash
        env:
          SUPER_SECRET: ${ secrets.SECRET_SUPER_SECRET }
        run: |
          echo "$SUPER_SECRET"
          echo "foo" > myfile
          echo
          echo "OUTPUT 1: -----"
          cat myfile
          echo "EOF OUTPUT1"
          echo
          echo "OUTPUT 2: -----"
          echo "$SUPER_SECRET" >> myfile
          cat myfile
          echo "EOF OUTPUT 2"
          echo
          echo "OUTPUT 3: -----"
          echo "foo2" >> myfile
          cat myfile
          echo "EOF OUTPUT 3"
      - name: Commit files
        run: |
          git config --local user.email "41898282+github-
actions[bot]@users.noreply.github.com"
          git config --local user.name "github-actions[bot]"
          git add -A
          git commit -a -m "Add changes"
      - name: Push changes
        uses: ad-m/github-push-action@master
```

```
with:
  github_token: ${ secrets.GITHUB_TOKEN }
  branch: ${ github.ref }
```

github actions - use case

Check lang-file before merging and disallow merging

Step 1: Prerequisites (in master)

```
## only or locally
## create files in master
dist/index.html
dist/en/index.html
```

```
## workflow yaml
.github/workflows/lang.yaml
```

```
name: langchecker

on:
  push:
    branches:
      - 'feature/**'
    paths:
      - 'dist/index.html'

jobs:
  translation-check:
    runs-on: ubuntu-latest
    steps:
      - uses: actions/checkout@v4
        with:
          fetch-depth: 0 # otherwise, there would be errors pushing refs to the
destination repository.
      - run: |
          ls -la
          git branch
          git branch -r
          # grep always returns 1 by design if does not find a result
          echo "--HEADER--" > ANALYZER
          git diff --name-only HEAD origin/master -- dist/en/index.html >> ANALYZER
          COUNT=$(cat ANALYZER | grep -cE "(--HEADER--|dist/en/index.html)")
          # 1 - Only HEADER line will be present
          if [ $COUNT -eq 1 ] ; then echo "dist/en/index.html not changed"; exit 1;
          else echo "Change in lang detected - Happy"; fi
```

```
git add -A; git commit -am "lang files"; git push
```

Step 2: create feature

```
''' git checkout -b feature/6 '''
```

```
## change  
dist/index.html
```

```
git add -A; git commit -am "new version2"  
git push -u origin feature/6
```

Workflow müsste jetzt unter actions triggern und fehler werden, weil dist/en/index.html (englische Version) nicht geändert wurde

Run script from repo

Deploy with ansible using ssh

Create files

```
## infrastructure/ansible/setup-prod.yml
```

```
---  
- hosts: all  
  tasks:  
    - name: install packages  
      become: true  
      become_user: root  
      apt:  
        state: present  
        name:  
          - htop
```

```
## infrastructure/ansible/hosts  
## anpassen mit deinem host und der ip (Trainer fragen ;o))
```

```
gr1.t3isp.de ansible_host=167.172.179.197
```

Create workflow

```
name: CI  
  
## Controls when the workflow will run  
on:  
  # Triggers the workflow on push or pull request events but only for the "master"  
  branch  
  push:  
    branches: [ "master" ]  
  
  # Allows you to run this workflow manually from the Actions tab  
  workflow_dispatch:
```

```

## A workflow run is made up of one or more jobs that can run sequentially or in
parallel
jobs:
  run-playbooks:
    runs-on: ubuntu-latest
    steps:
      - uses: actions/checkout@v4
      - name: Setup SSH
        shell: bash
        run: |
          eval `ssh-agent -s`
          mkdir -p /home/runner/.ssh/
          touch /home/runner/.ssh/id_rsa
          echo -e "${{secrets.SSH_PRIVATE_KEY}}" > /home/runner/.ssh/id_rsa
          chmod 700 /home/runner/.ssh/id_rsa
          ssh-keyscan -t rsa,dsa,ecdsa,ed25519 ${{secrets.SSH_HOST}} >>
/home/runner/.ssh/known_hosts
      - name: Run ansible script
        shell: bash
        run: |
          cd infrastructure/ansible
          cat setup-prod.yml
          ansible-playbook -vvv --private-key /home/runner/.ssh/id_rsa -u
${{secrets.SSH_USER}} -i hosts setup-prod.yml

```

github - actions - docker

Was darf in das Dockerfile rein

- <https://docs.github.com/de/actions/creating-actions/dockerfile-support-for-github-actions>

github - actions GITHUB_OUTPUT - GITHUB_SUMMARY

Write to summary page from within jobs

- Writing to \$GITHUB_STEP_SUMMARY writes to a summary, that is visible on the summary of the actions - run

```

name: Jochen's nicer workflow

on:
  # Triggers the workflow on push or pull request events but only for the master
  branch
  push:
    branches: [ master ]

jobs:
  build:

    runs-on: ubuntu-latest

    steps:

```



```

- name: Run a one-line script
  run: |
    echo "### Hello world! :rocket:" >> $GITHUB_STEP_SUMMARY
    pwd
    ls -la
    #/bin/false
    echo "### Hello world in build after false ! :rocket:" >>
$GITHUB_STEP_SUMMARY

deploy:

  # needs a succesful build
  # THAT IS IMPORTANT
  needs: build
  runs-on: ubuntu-latest

  # Steps represent a sequence of tasks that will be executed as part of the job
  steps:
    - name: Starting the deploy
      run: |
        echo "starting the deployment process"
        ls -la
        echo "### Hello world in deploy after false ! :rocket:" >>
$GITHUB_STEP_SUMMARY

```

github - actions - documentations

github actions repo

- <https://github.com/actions/checkout>

github actions marketplace

- <https://github.com/marketplace?category=&query=&type=actions&verification=>

default environment variables

- <https://docs.github.com/en/actions/learn-github-actions/variables#default-environment-variables>

Documentation github actions

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

Docker

Install docker on Ubuntu

Walkthrough

```

sudo su -
apt update && apt install -y apt-transport-https ca-certificates curl software-
properties-common && curl -fsSL https://download.docker.com/linux/ubuntu/gpg | apt-key
add -;
add-apt-repository "deb [arch=amd64] https://download.docker.com/linux/ubuntu focal

```

```
stable" && apt-get update && apt-cache policy docker-ce && apt-get install -y docker-  
ce && systemctl status --no-pager docker
```

Important commands

Volume 1

```
mkdir testdir  
cd testdir  
## Dockerfile anlegen  
docker build -t meincontainer .  
docker images  
## interactive starten  
## nach exit wird er beendet  
docker run -it meincontainer  
## im container exit  
docker ps -a
```

Volume 2

```
## image von docker hub download . hier ubuntu:latest  
docker pull ubuntu  
  
## Alle lokalen images anzeigen (auf dem Server vorhandene)  
## z.B. die auf dem Server mit docker build . erstellt wurden  
## ohne downgeloaded von docker hub  
docker images  
  
## Neues docker container starten auf basis das ubuntu:latest images  
## Im Hintergrund (Daemonized) und an ein Terminal  
docker run -dt ubuntu:latest  
  
## Alle laufenden docker-container anzeigen  
docker ps  
  
## Alle docker - container (auch beendete anzeigen)  
docker ps -a  
  
## Alle laufenden Container anzeigen  
docker exec -it e1a1d3 bash  
  
## Laufenden Docker container beendet und löschen  
docker rm -f e21  
  
## docker images anzeigen  
docker images  
  
## docker image lokal löschen  
docker rmi ubuntu:latest
```

Git - 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>

Git - Tipps & Tricks

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

Always do pull --rebase for master branch

```
git config --global branch.master.rebase true
```

Git - 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

Git - Documentation (Tools)

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
```

Kubernetes

Installation micro8ks (Ubuntu)

Reference:

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