

CI workflows for R3BRoot GitHub repository

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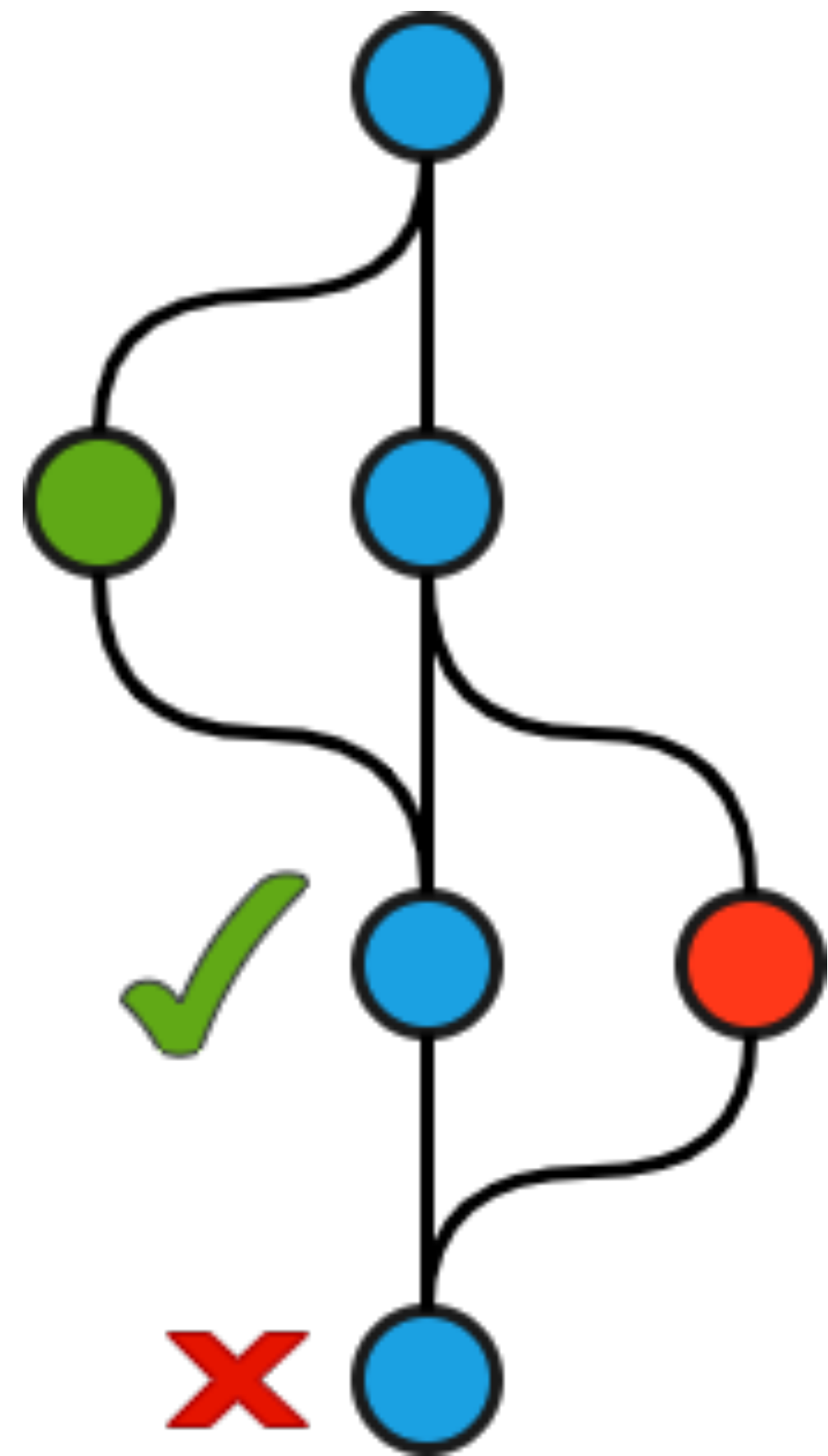
Institute for Nuclear Physics, University of Cologne

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What is CI?

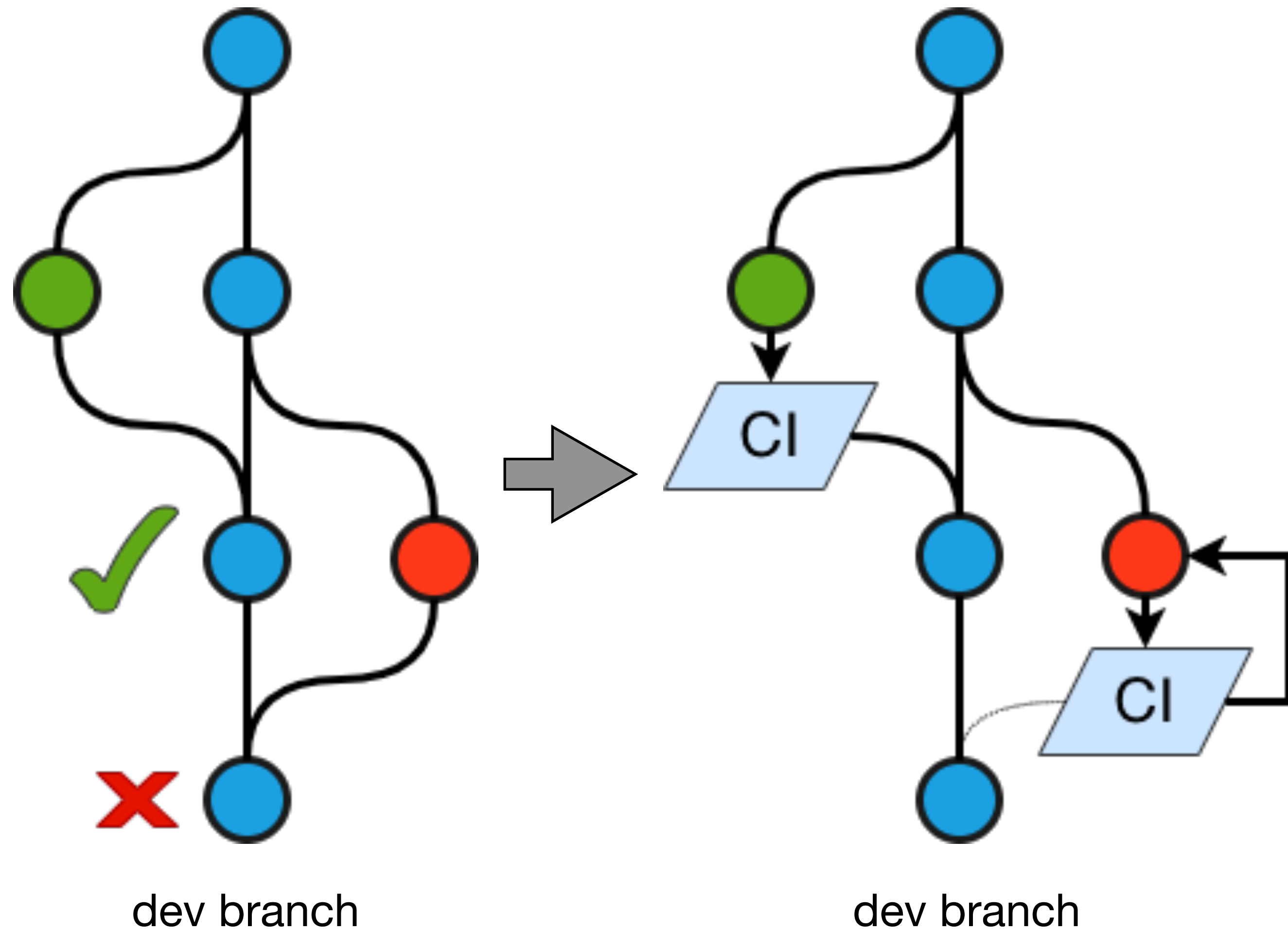
Continuous integration:



dev branch

What is CI?

Continuous integration:



Criteria:

1. Successful configuration & build
2. Passing all ctests and unit tests
3. Correct clang format in changed files
4. Passing static analyser (clang-tidy) for changed LOC

CI workflows with GitHub actions

GitHub actions:

- workflow (pipeline)

Yaml files in .github/workflows/

- jobs

A workflow contains multiple jobs

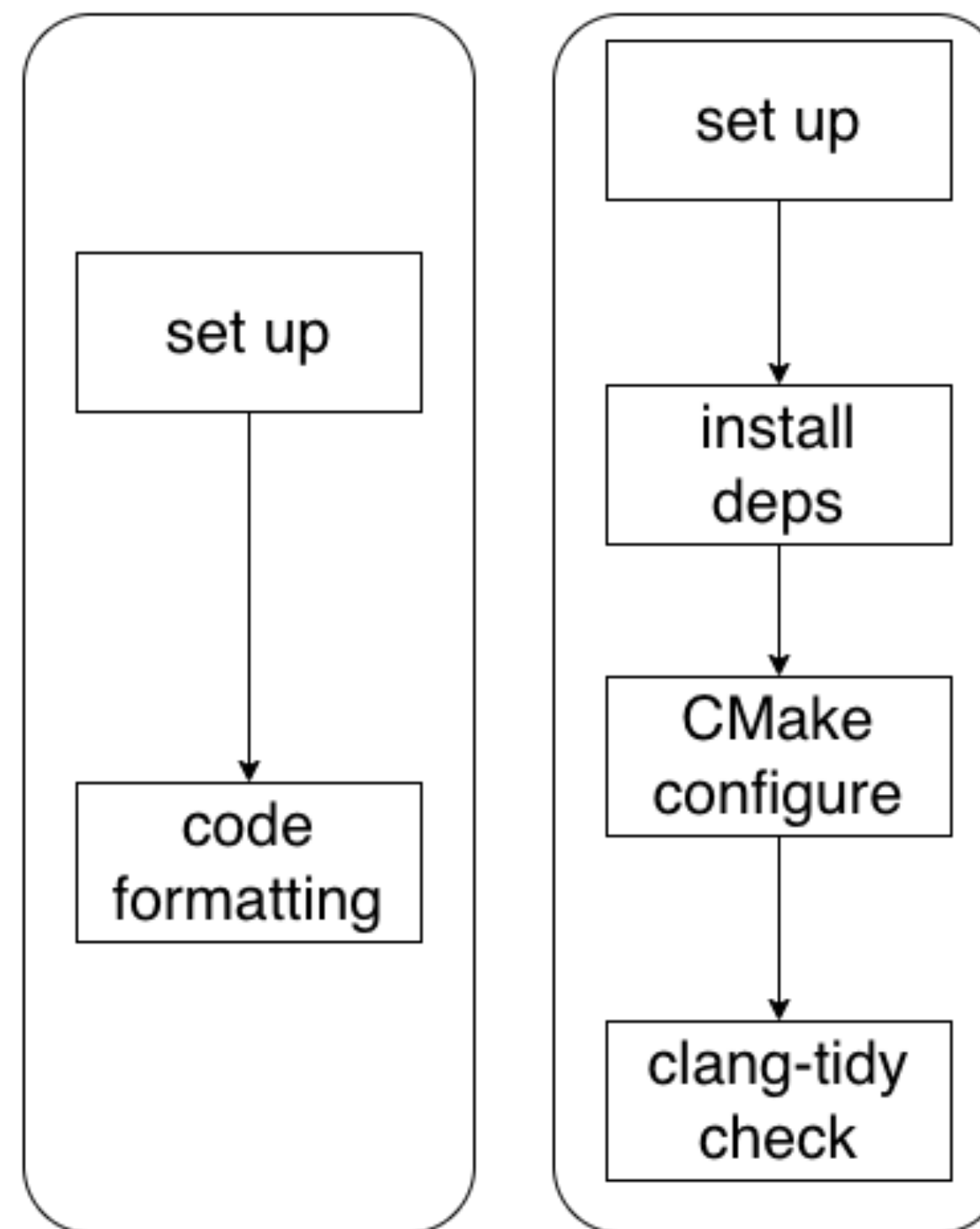
- steps

A job contains multiple steps

- run

A run is an execution of a workflow in one event

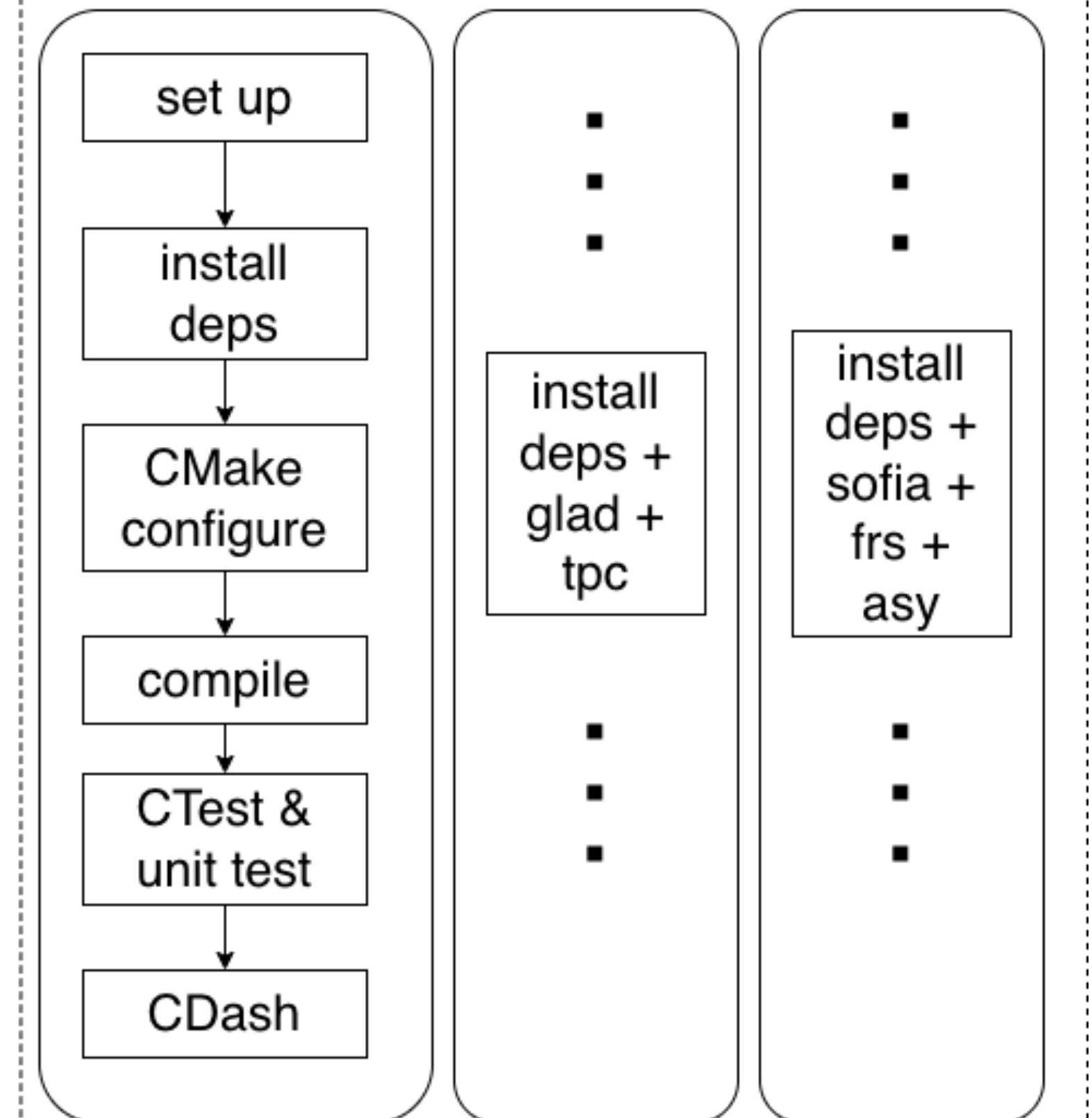
Static analysis



Clang-format

Clang-tidy

CI-CD








R3BRoot

glad-tpc

sofia-frs-asy

Runs, jobs & steps in GitHub web

Runs

✓		CI-CD / build-test (r3broot) (pull_request)	Successful in 23m
✓		static analysis / clang-format (pull_request)	Successful in 2m
✓		CI-CD / build-test (glad-tpc) (pull_request)	Successful in 25m
✓		CI-CD / build-test (sofia-frs-asy) (pull_request)	Successful in 29m
✓		static analysis / clang-tidy (pull_request)	Successful in 2m

Jobs

✓	CI-CD on: pull_request	
✓	build-test (r3broot)	
✓	build-test (glad-tpc)	
✓	build-test (sofia-frs-asy)	
✓	static analysis on: pull_request	2
✓	clang-format	
✓	clang-tidy	

build-test (r3broot)

succeeded 2 weeks ago in 23m 38s

- > ✓ Set up job
- > ✓ Initialize containers
- > ✓ Run actions/checkout@v3
- > ✓ pre-build
- > ✓ install dependencies
- > ✓ configure-build
- > ✓ ctest-cdash
- > ⌚ save-cache
- > ✓ ccache stats
- > ✓ Post Run actions/checkout@v3
- > ✓ Stop containers
- > ✓ Complete job

Steps

Time reduction

Steps:

Time consumption:

install deps:



1+ hours

cmake
configure:



~ 2 mins

compile:



~ 30 mins

CTest:



~ 4 mins

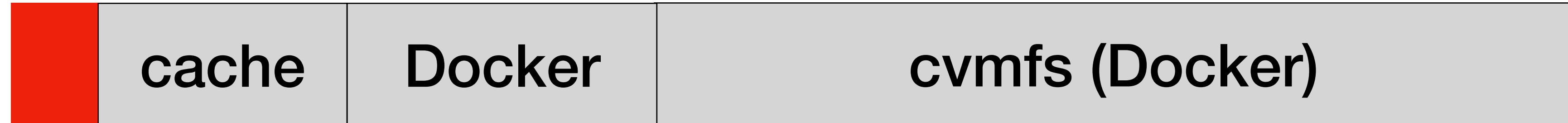
Takes too LONG!

Time reduction

Steps:

Time consumption:

install deps:



< 2 mins

cmake
configure:



~ 2 mins

compile:



~ 30 mins

CTest:



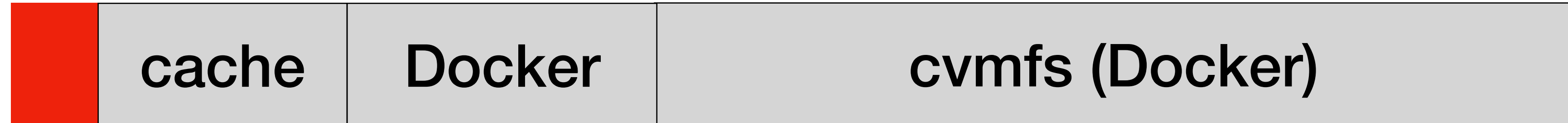
~ 4 mins

Time reduction

Steps:

Time consumption:

install deps:



< 2 mins

cmake
configure:



~ 2 mins

compile:



~ 4 mins

CTest:



~ 4 mins

~ **10 mins in total!**

Clang-tidy

```
48 52
49 - R3BTofD::R3BTofD(const TString& geoFile, const TGeoCombiTrans& combi)
50 - : R3BDetector("R3BTofD", kTOFD, geoFile, combi)
53 + R3BTofD::R3BTofD(const TString& geoFile, DetectorId type, const TGeoCombiTrans& combi, const TString& namedetId)
```

⚠ Check warning on line 53 in tofd/sim/R3BTofD.cxx

 **GitHub Actions / clang-tidy**

constructor does not initialize these fields: fTrackID, fPlaneID, fPaddleID, fTime_in, fTime_out, fTime, fLength_in, fLength

```
54 + : R3BDetector(namedetId == "NULL" ? "R3BTofD" : "R3BTofD" + namedetId, type, geoFile, combi)
51 55 , fTofdCollection(new TClonesArray("R3BTofdPoint"))
```

```
45 50 */
46 - R3BTofD(const TString& geoFile, const TGeoCombiTrans& combi = TGeoCombiTrans());
51 + R3BTofD(const TString& geoFile,
```

⚠ Check warning on line 51 in tofd/sim/R3BTofD.h

 **GitHub Actions / clang-tidy**

constructors that are callable with a single argument must be marked explicit to avoid unintentional implicit conversions [gcc

```
52 + DetectorId type = kTOFD1,
53 + const TGeoCombiTrans& combi = TGeoCombiTrans(),
54 + const TString& namedetId = "NULL");
```

CDash

Experimental										
Site	Build Name	Configure		Build		Test				Sta
		Error	Warn	Error	Warn ▼	Not Run	Fail	Pass	Time	
Github hosted (R3BRootGroup/R3BRoot)	sofia-frs-asy (pull request No.813)	0	0	0	437 ⁺⁵ ₋₃	0	0	31 ⁺¹² ₋₂	4m	
Github hosted (R3BRootGroup/R3BRoot)	glad-tpc (pull request No.813)	0	0	0	376 ⁺⁵ ₋₃	0	0	30 ⁺¹² ₋₂	2m 51s	
Github hosted (R3BRootGroup/R3BRoot)	r3broot (pull request No.813)	0	0	0	355 ⁺⁵ ₋₃	0	0	30 ⁺¹² ₋₂	2m 49s	
Github hosted (R3BRootGroup/R3BRoot)	glad-tpc (pull request No.861)	0	0	0	9	0	0	30	9 2m 53s	
Github hosted (R3BRootGroup/R3BRoot)	glad-tpc (pull request No.861)	0	0	0	9	0	0	30	9 2m 54s	
Github hosted (R3BRootGroup/R3BRoot)	glad-tpc (pull request No.849)	0	0	0	9	0	0	30	9 3m 42s	
Github hosted (R3BRootGroup/R3BRoot)	glad-tpc (pull request No.849)	0	0	0	9	0	0	30	4m 38s	
Github hosted (R3BRootGroup/R3BRoot)	glad-tpc (pull request No.849)	0	0	0	9	0	0	30	2m 52s	
Github hosted (R3BRootGroup/R3BRoot)	glad-tpc (pull request No.849)	0	0	0	9	0	0	30	4m 37s	
Github hosted (R3BRootGroup/R3BRoot)	glad-tpc (pull request No.861)	0	0	0	9	0	0	30 ⁺¹² ₋₂	3m 41s	
Github hosted (R3BRootGroup/R3BRoot)	sofia-frs-asy (pull request No.861)	0	0	0	1	0	0	31 ⁺³¹	4m 42s	

Go to <https://cdash.gsi.de/index.php?project=R3BRoot>

What else needs to be done?

- **More unit tests**
 1. New features added must have unit tests before being merged
 2. Add unit tests for unpacker readers, calibration, simulation
- **Dynamic analyser**
 1. More compiler checks
 2. Sanitizers
 3. Profiling
- **Package manager? (conan, vcpkg)**

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Philosophical battle:

