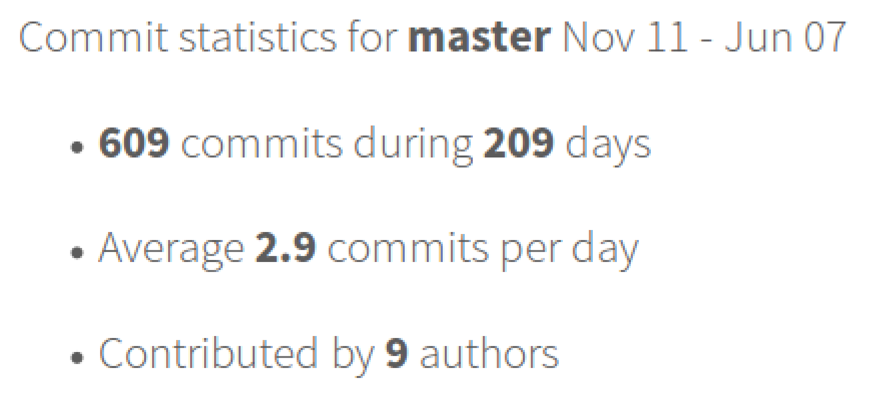
git(Lab) experience from ACTS project

Software TIM, Glasgow

June 2016

The ACTS project in a nutshell

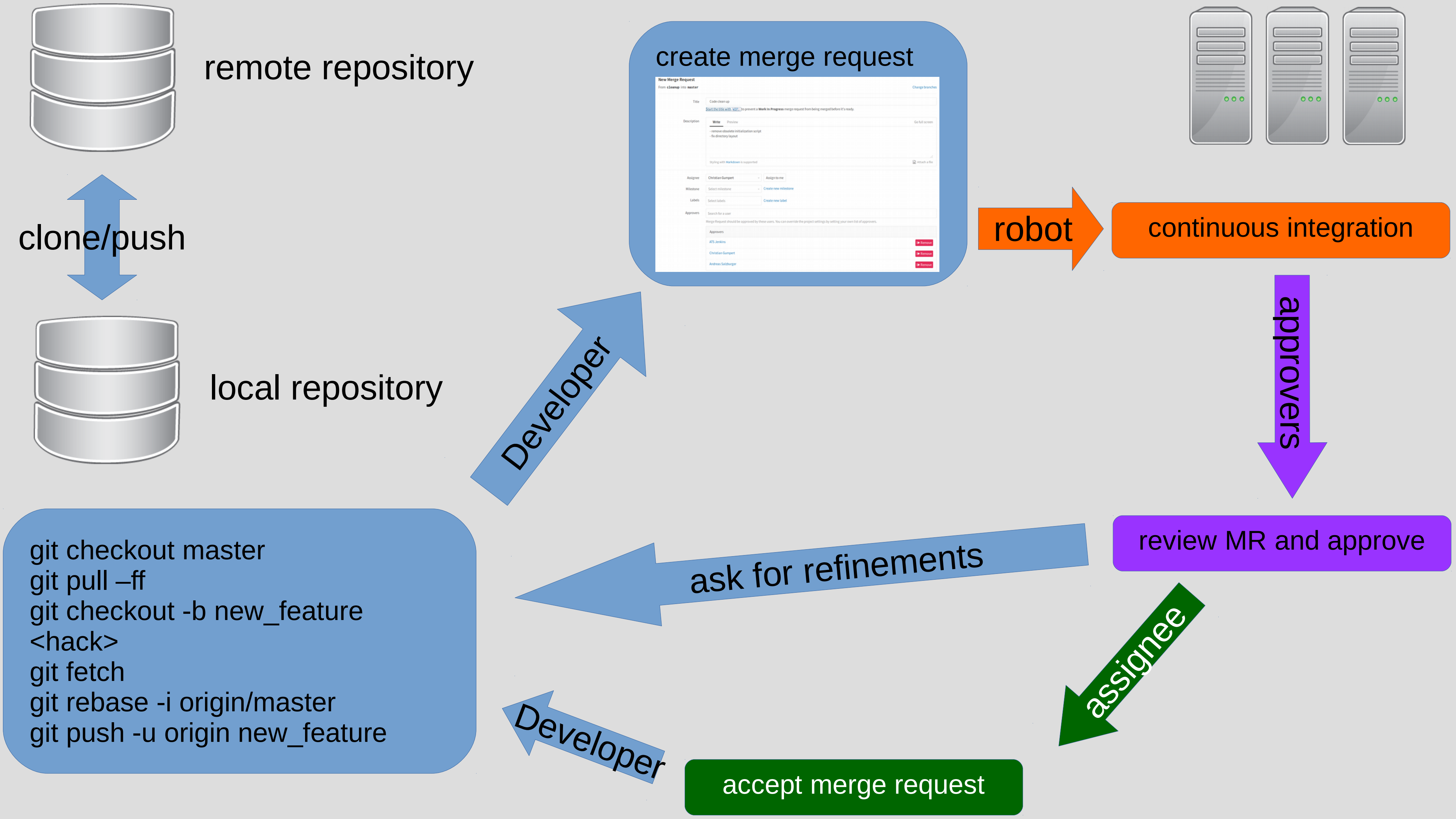
- **A C**ommon **T**racking **S**oftware:
  - set of experiment independent tracking tools/algorithms
  - e.g. geometry navigation, extrapolation, Kalman Filter, Runge Kutta propagator
- code in Gitlab repository created November 2015
  - 36k LOC, 285 files in 61 directories
  - 609 commits, 113 MR
  - 3 (main) developers
  - file size:
    - master branch 4.5M
    - .git/ 230M



Commit statistics for **master** Nov 11 - Jun 07

- **609** commits during **209** days
- Average **2.9** commits per day
- Contributed by **9** authors

Workflow overview



```
git checkout master
git pull –ff
git checkout -b new_feature
<hack>
git fetch
git rebase -i origin/master
git push -u origin new_feature
```

New Merge Request

From `cleanup` into `master`

Title: Code clean up

Start the title with `WIP:` to prevent a **Work In Progress** merge request from being merged before it's ready.

Description:

- remove obsolete initialization script
- fix directory layout

Styling with Markdown is supported

Assignee: Christian Gumpert

Milestone: Select milestone

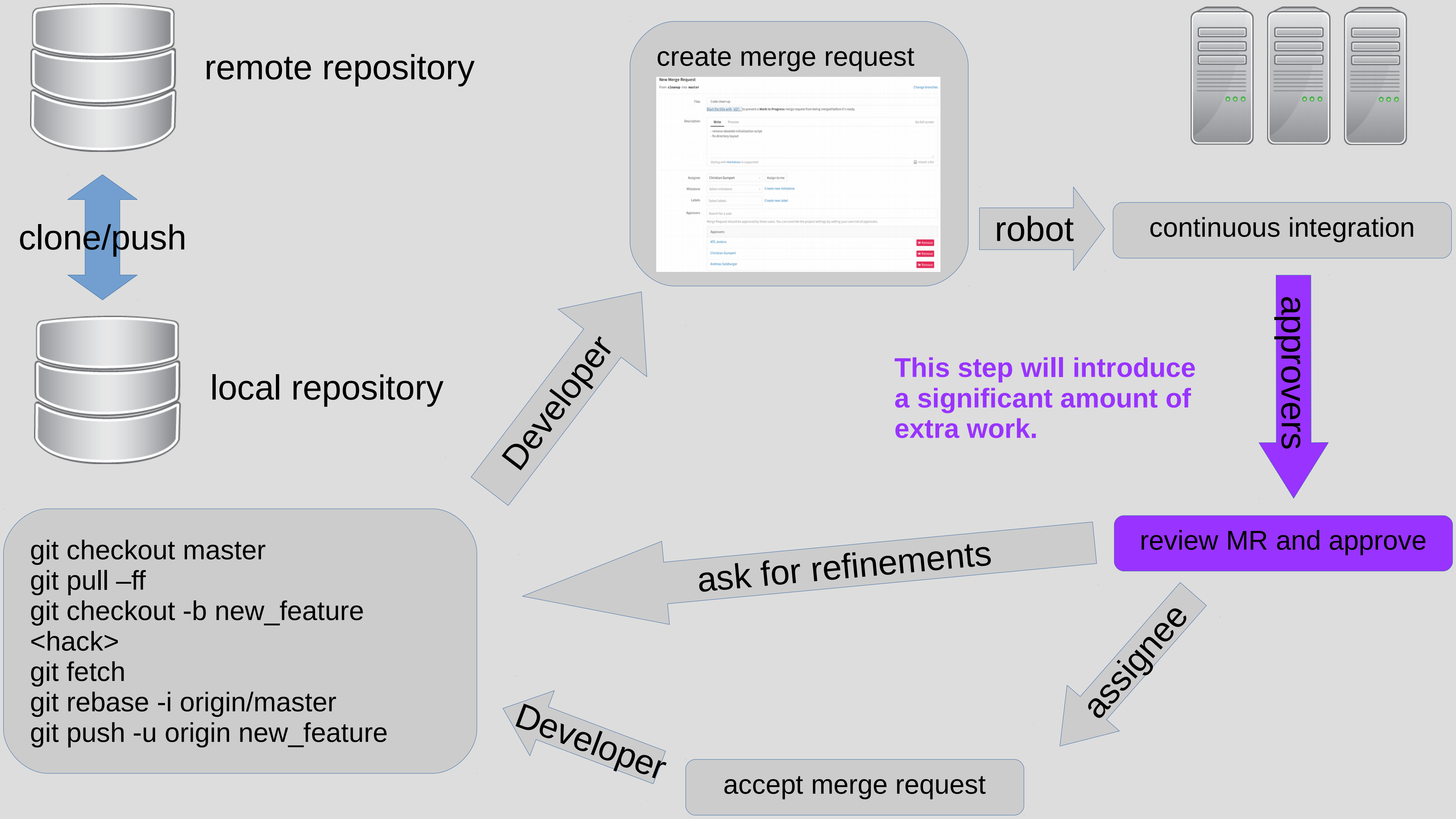
Labels: Select labels

Approvers: Search for a user

Merge Request should be approved by these users. You can override the project settings by setting your own list of approvers.

Approvers
ATS Jenkins
Christian Gumpert
Andreas Salzburger

Workflow overview



remote repository

clone/push

local repository

```
git checkout master
git pull –ff
git checkout -b new_feature
<hack>
git fetch
git rebase -i origin/master
git push -u origin new_feature
```

Developer

create merge request

New Merge Request

From **cleanup** into **master** — Change branches

Title: Code clean up

Start the title with WIP: to prevent a **Work In Progress** merge request from being merged before it's ready.

Description: Write | Preview | Go full screen

- remove obsolete initialization script
- fix directory layout

Styling with Markdown is supported | Attach a file

Assignee: Christian Gumpert | Assign to me

Milestone: Select milestone | Create new milestone

Labels: Select labels | Create new label

Approvers: Search for a user

Merge Request should be approved by these users. You can override the project settings by setting your own list of approvers.

Approvers	
ATS Jenkins	Remove
Christian Gumpert	Remove
Andreas Salzburger	Remove

robot

continuous integration

approvers

This step will introduce a significant amount of extra work.

review MR and approve

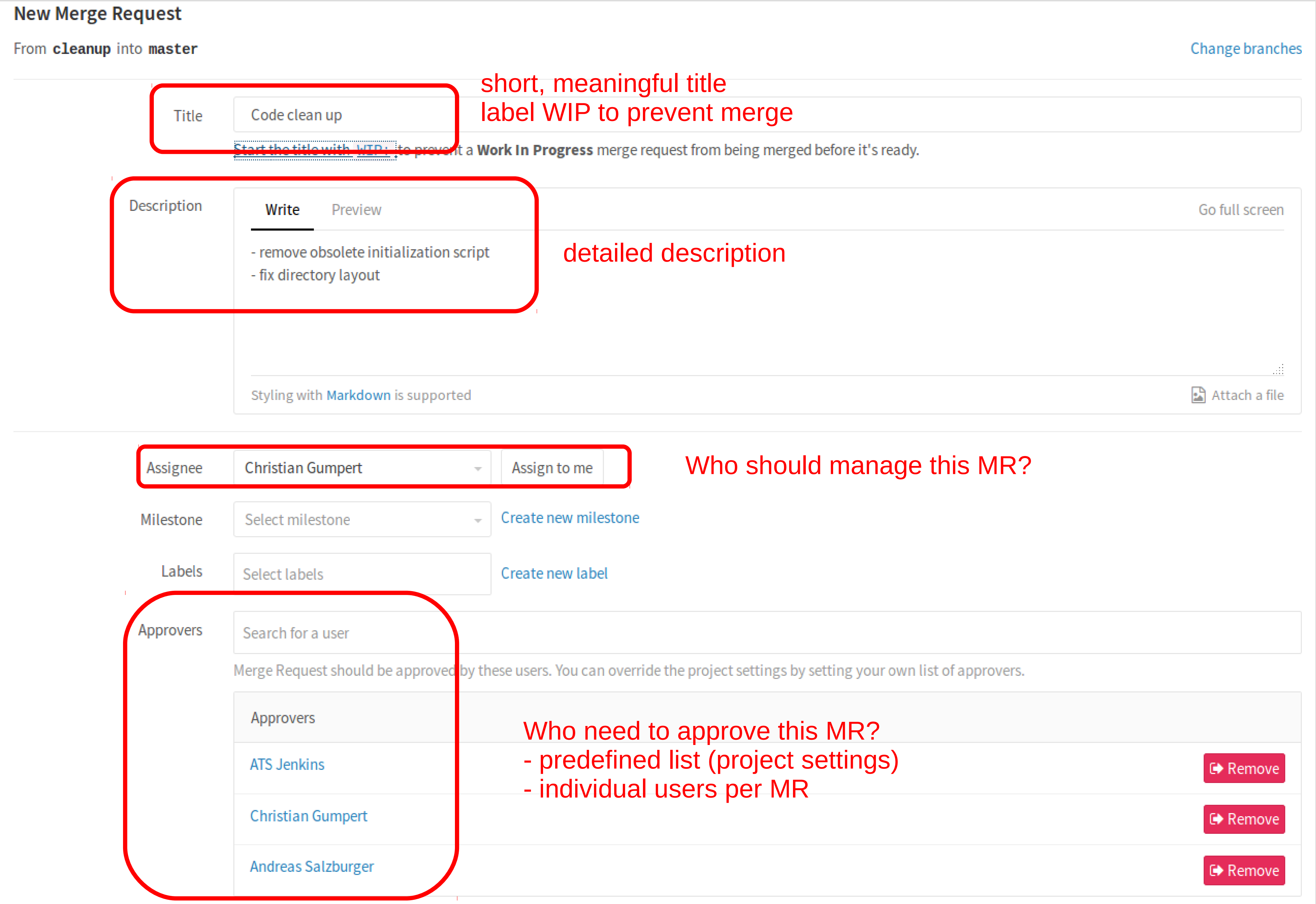
ask for refinements

assignee

accept merge request

Developer

Create merge request



New Merge Request

From **cleanup** into **master**

Change branches

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Start the title with WIP: to prevent a **Work In Progress** merge request from being merged before it's ready.

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Approvers	
ATS Jenkins	Remove
Christian Gumpert	Remove
Andreas Salzburger	Remove

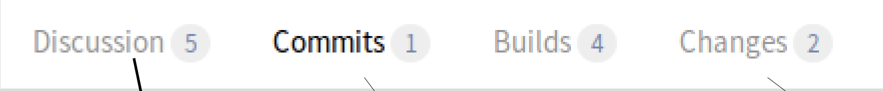
short, meaningful title
label WIP to prevent merge

detailed description

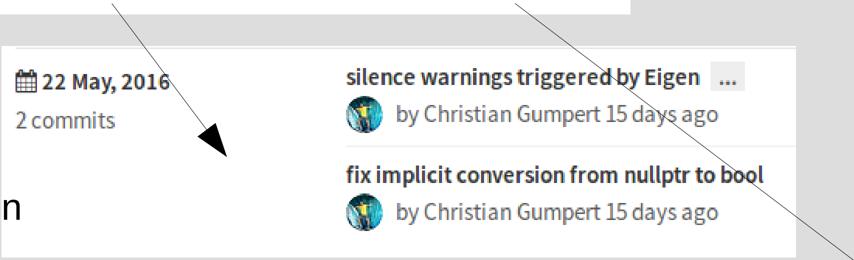
Who should manage this MR?

Who need to approve this MR?
- predefined list (project settings)
- individual users per MR

Approve merge request


Discussion 5 Commits 1 Builds 4 Changes 2

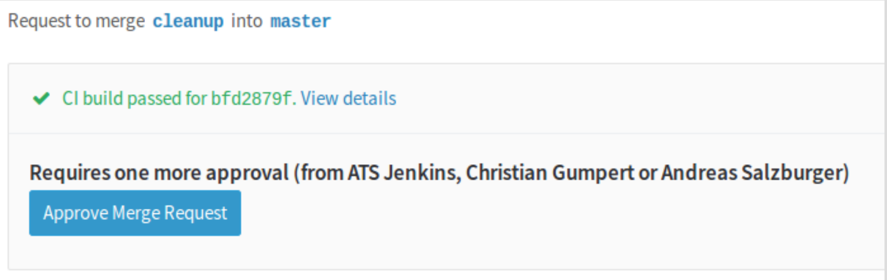
- general discussion
- addition of new commits
- results of builds
- discussions on diff


22 May, 2016
2 commits

silence warnings triggered by Eigen ...
by Christian Gumpert 15 days ago

fix implicit conversion from nullptr to bool
by Christian Gumpert 15 days ago

- list of commits with message/ build status
- links to individual commits

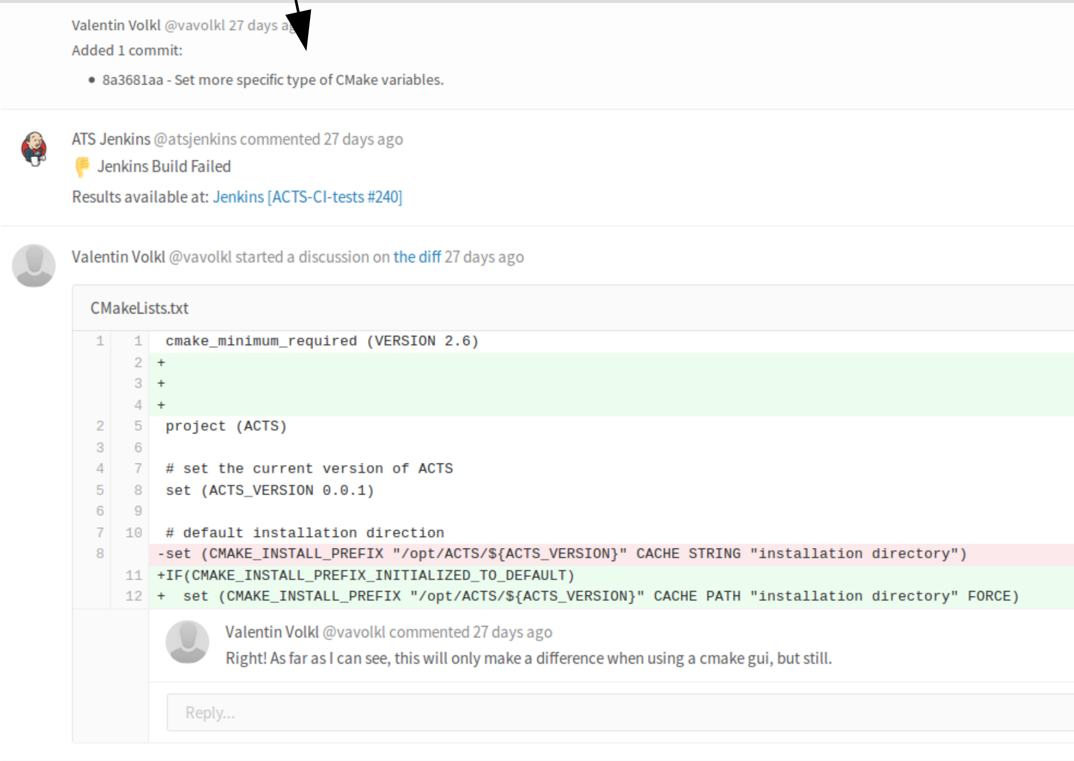

Request to merge `cleanup` into `master`

✓ CI build passed for bfd2879f. View details

Requires one more approval (from ATS Jenkins, Christian Gumpert or Andreas Salzburger)

Approve Merge Request

(no special permissions required)


Valentin Volkl @vavolkl 27 days ago
Added 1 commit:

- 8a3681aa - Set more specific type of CMake variables.

ATS Jenkins @atsjenkins commented 27 days ago
Jenkins Build Failed
Results available at: Jenkins [ACTS-CI-tests #240]

Valentin Volkl @vavolkl started a discussion on the diff 27 days ago

CMakeLists.txt

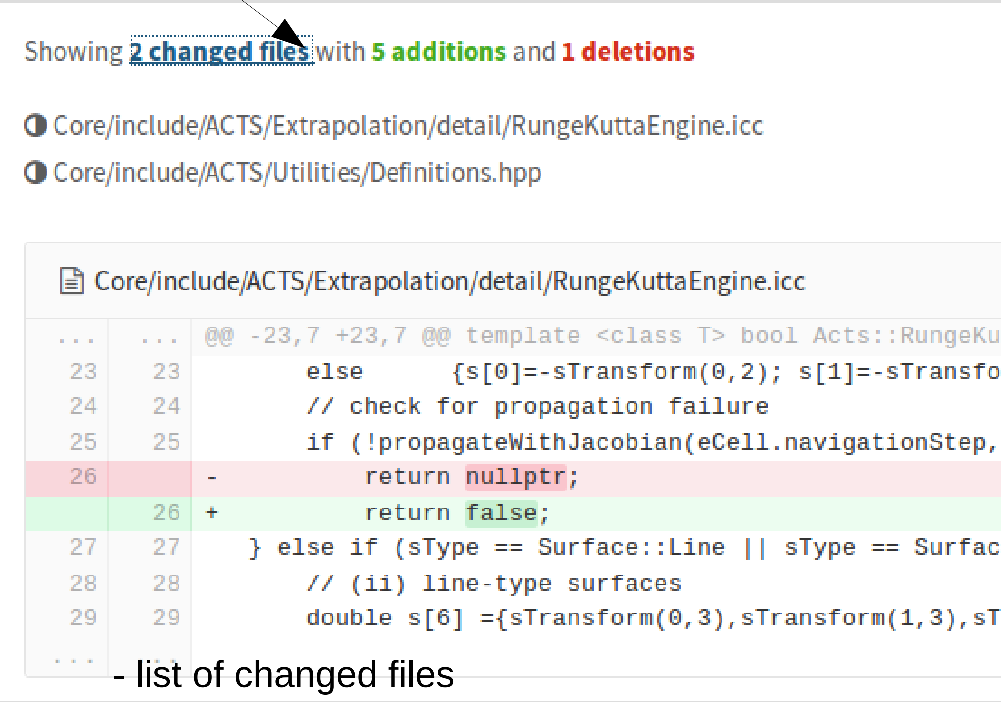
```
 cmake_minimum_required (VERSION 2.6)
+
+
+
 project (ACTS)

 # set the current version of ACTS
 set (ACTS_VERSION 0.0.1)

 # default installation direction
-set (CMAKE_INSTALL_PREFIX "/opt/ACTS/${ACTS_VERSION}" CACHE STRING "installation directory")
+IF(CMAKE_INSTALL_PREFIX_INITIALIZED_TO_DEFAULT)
+  set (CMAKE_INSTALL_PREFIX "/opt/ACTS/${ACTS_VERSION}" CACHE PATH "installation directory" FORCE)
```

Valentin Volkl @vavolkl commented 27 days ago
Right! As far as I can see, this will only make a difference when using a cmake gui, but still.

Reply...


Showing 2 changed files with 5 additions and 1 deletions

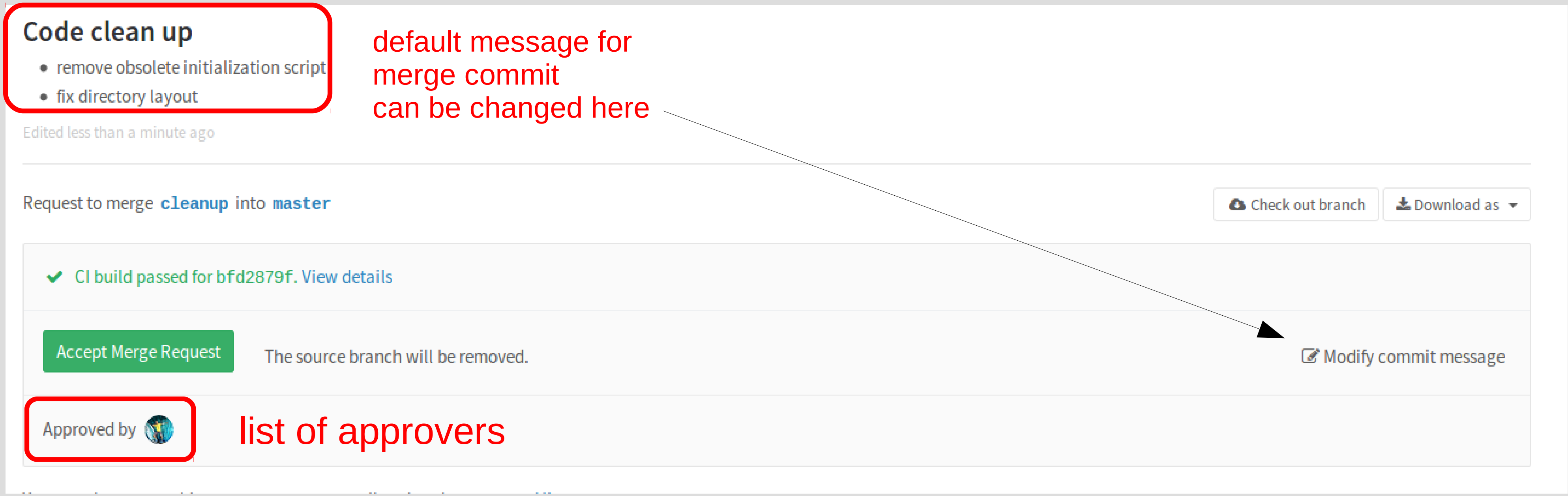
◑ Core/include/ACTS/Extrapolation/detail/RungeKuttaEngine.icc
◑ Core/include/ACTS/Utilities/Definitions.hpp

Core/include/ACTS/Extrapolation/detail/RungeKuttaEngine.icc

```
@@ -23,7 +23,7 @@ template <class T> bool Acts::RungeKu
        else      {s[0]=-sTransform(0,2); s[1]=-sTransfo
        // check for propagation failure
        if (!propagateWithJacobian(eCell.navigationStep,
-           return nullptr;
+           return false;
     } else if (sType == Surface::Line || sType == Surfac
        // (ii) line-type surfaces
        double s[6] ={sTransform(0,3),sTransform(1,3),sT
```

- list of changed files
- coloured diff
- ability to comment on individual lines of code

Accept merge requests



Code clean up

- remove obsolete initialization script
- fix directory layout

Edited less than a minute ago

Request to merge `cleanup` into `master`

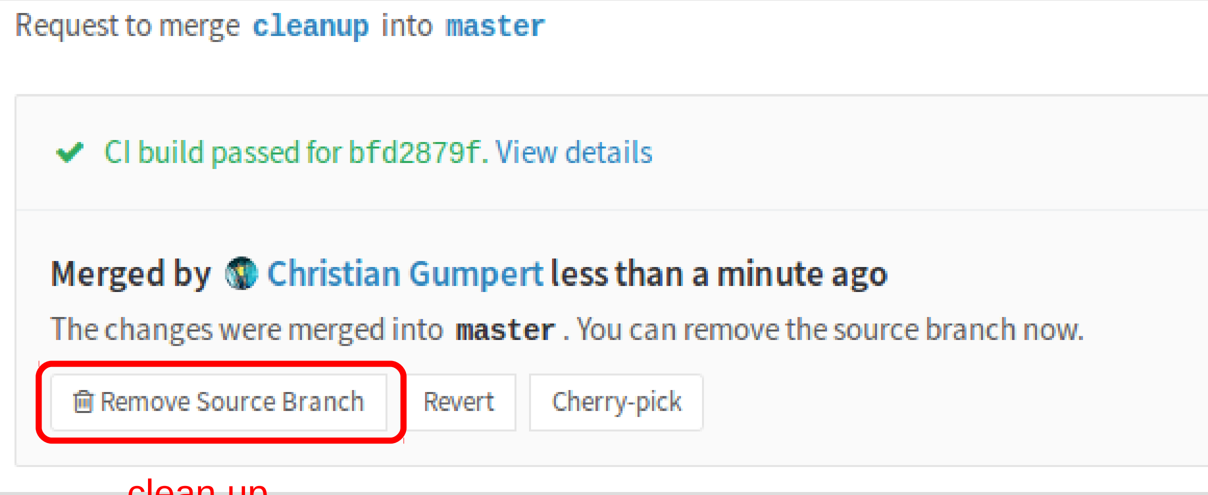
✓ CI build passed for `bfd2879f`. View details

The source branch will be removed.

Approved by

default message for merge commit can be changed here

list of approvers



Request to merge `cleanup` into `master`

✓ CI build passed for `bfd2879f`. View details

Merged by Christian Gumpert less than a minute ago

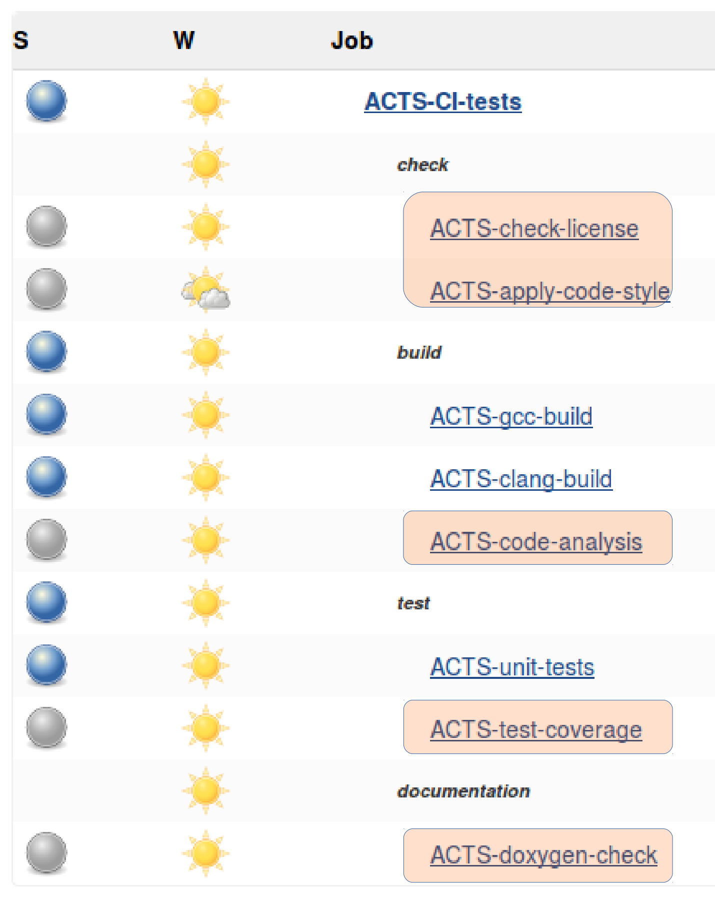
The changes were merged into `master` . You can remove the source branch now.

clean up

- assignees need commit rights for target branch
  => master permissions for protected branches
- limited number of people who can sign off on merge requests
- however, mostly administrative task
- largest part of work done by approvers during code review

Help code reviewers

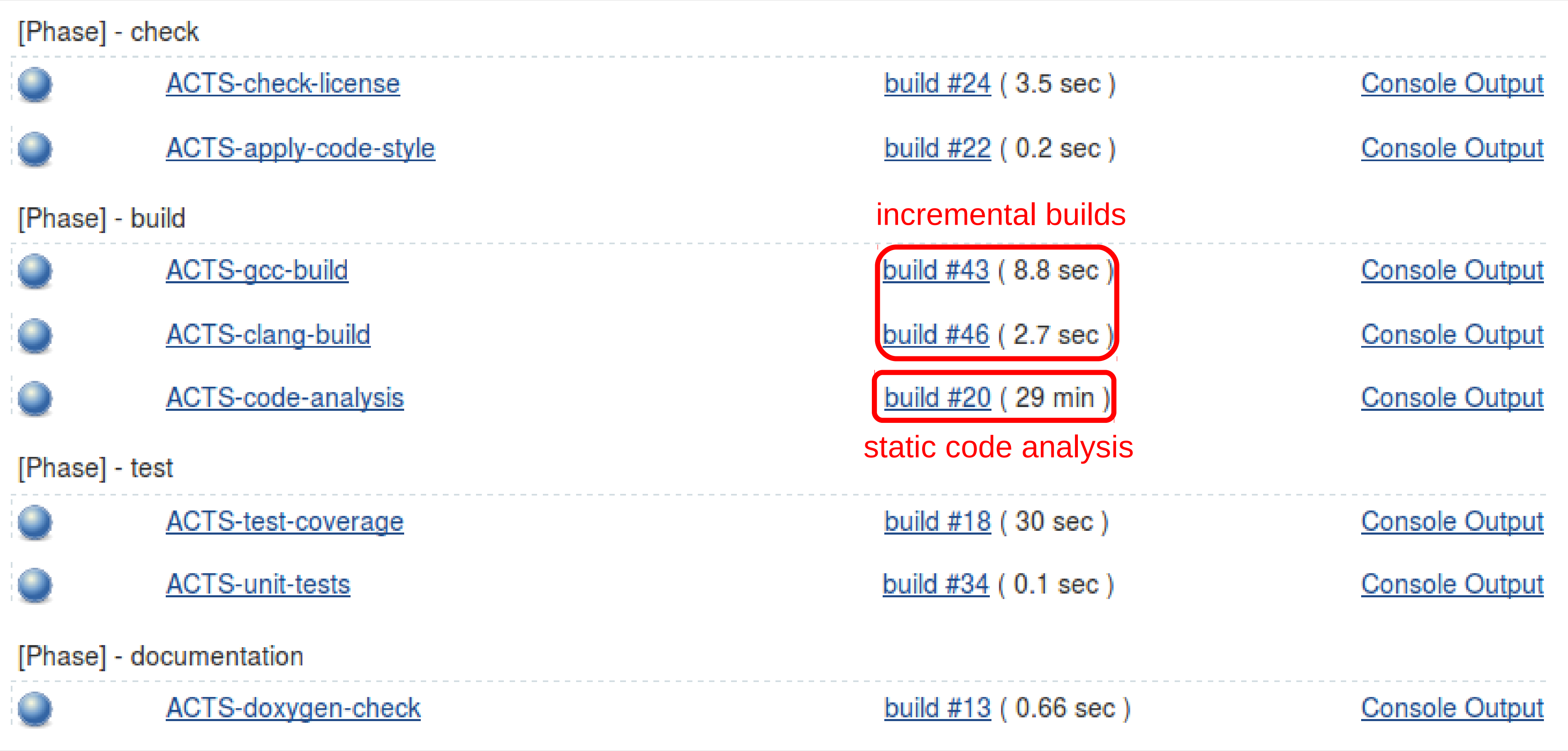
- code review = significant amount of work, (imho) totally worth it
- help code reviewers by using available tools for diagnostics
- ACTS uses Jenkins as CI framework



S	W	Job
●	☀	ACTS-CI-tests
	☀	*check*
○	☀	ACTS-check-license
○	⛅	ACTS-apply-code-style
●	☀	*build*
●	☀	ACTS-gcc-build
●	☀	ACTS-clang-build
○	☀	ACTS-code-analysis
●	☀	*test*
●	☀	ACTS-unit-tests
○	☀	ACTS-test-coverage
	☀	*documentation*
○	☀	ACTS-doxygen-check

- multistage Jenkins project
- check all files for license statement
- apply coding style (if needed)
- run builds for different compilers
- perform static code analysis
- run unit tests
- perform test coverage analysis
- check for undocumented functions/classes

The Jenkins view

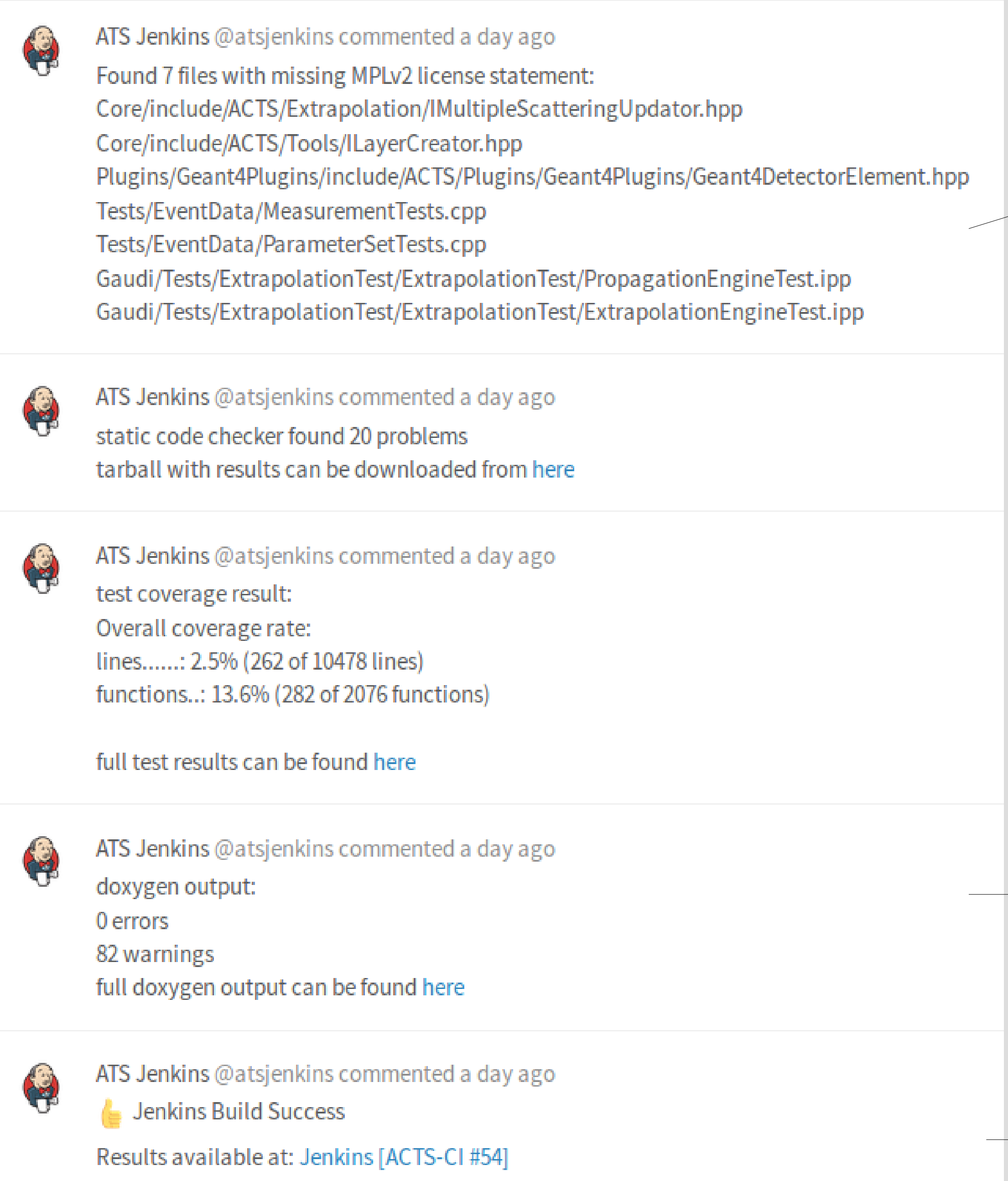


[Phase] - check			
●	ACTS-check-license	build #24 (3.5 sec)	Console Output
●	ACTS-apply-code-style	build #22 (0.2 sec)	Console Output
[Phase] - build			
●	ACTS-gcc-build	build #43 (8.8 sec)	Console Output
●	ACTS-clang-build	build #46 (2.7 sec)	Console Output
●	ACTS-code-analysis	build #20 (29 min)	Console Output
[Phase] - test			
●	ACTS-test-coverage	build #18 (30 sec)	Console Output
●	ACTS-unit-tests	build #34 (0.1 sec)	Console Output
[Phase] - documentation			
●	ACTS-doxygen-check	build #13 (0.66 sec)	Console Output

incremental builds

static code analysis

So how does it look like?



ATS Jenkins @atsjenkins commented a day ago

Found 7 files with missing MPLv2 license statement:
Core/include/ACTS/Extrapolation/IMultipleScatteringUpdator.hpp
Core/include/ACTS/Tools/ILayerCreator.hpp
Plugins/Geant4Plugins/include/ACTS/Plugins/Geant4Plugins/Geant4DetectorElement.hpp
Tests/EventData/MeasurementTests.cpp
Tests/EventData/ParameterSetTests.cpp
Gaudi/Tests/ExtrapolationTest/ExtrapolationTest/PropagationEngineTest.ipp
Gaudi/Tests/ExtrapolationTest/ExtrapolationTest/ExtrapolationEngineTest.ipp

ATS Jenkins @atsjenkins commented a day ago

static code checker found 20 problems
tarball with results can be downloaded from here

ATS Jenkins @atsjenkins commented a day ago

test coverage result:
Overall coverage rate:
lines......: 2.5% (262 of 10478 lines)
functions..: 13.6% (282 of 2076 functions)

full test results can be found here

ATS Jenkins @atsjenkins commented a day ago

doxygen output:
0 errors
82 warnings
full doxygen output can be found here

ATS Jenkins @atsjenkins commented a day ago

👍 Jenkins Build Success

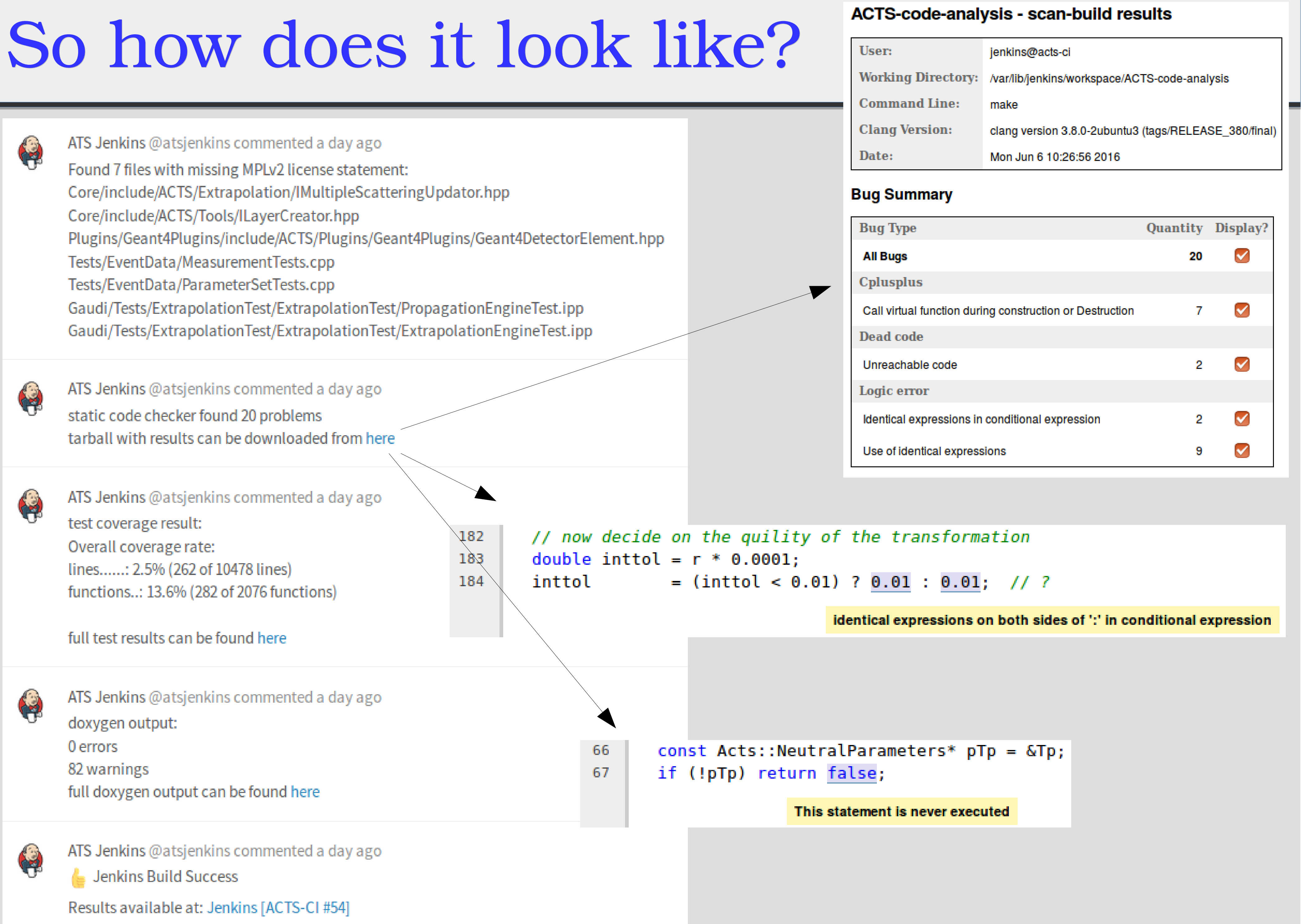
Results available at: Jenkins [ACTS-CI #54]

some files are missing license statements

we should fix some documentation issues

build result

So how does it look like?



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Plugins/Geant4Plugins/include/ACTS/Plugins/Geant4Plugins/Geant4DetectorElement.hpp
Tests/EventData/MeasurementTests.cpp
Tests/EventData/ParameterSetTests.cpp
Gaudi/Tests/ExtrapolationTest/ExtrapolationTest/PropagationEngineTest.ipp
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ATS Jenkins @atsjenkins commented a day ago

Jenkins Build Success

Results available at: Jenkins [ACTS-CI #54]

ACTS-code-analysis - scan-build results

User:	jenkins@acts-ci
Working Directory:	/var/lib/jenkins/workspace/ACTS-code-analysis
Command Line:	make
Clang Version:	clang version 3.8.0-2ubuntu3 (tags/RELEASE_380/final)
Date:	Mon Jun 6 10:26:56 2016

Bug Summary

Bug Type	Quantity	Display?
All Bugs	**20**	☑
Cplusplus		
Call virtual function during construction or Destruction	7	☑
Dead code		
Unreachable code	2	☑
Logic error		
Identical expressions in conditional expression	2	☑
Use of identical expressions	9	☑

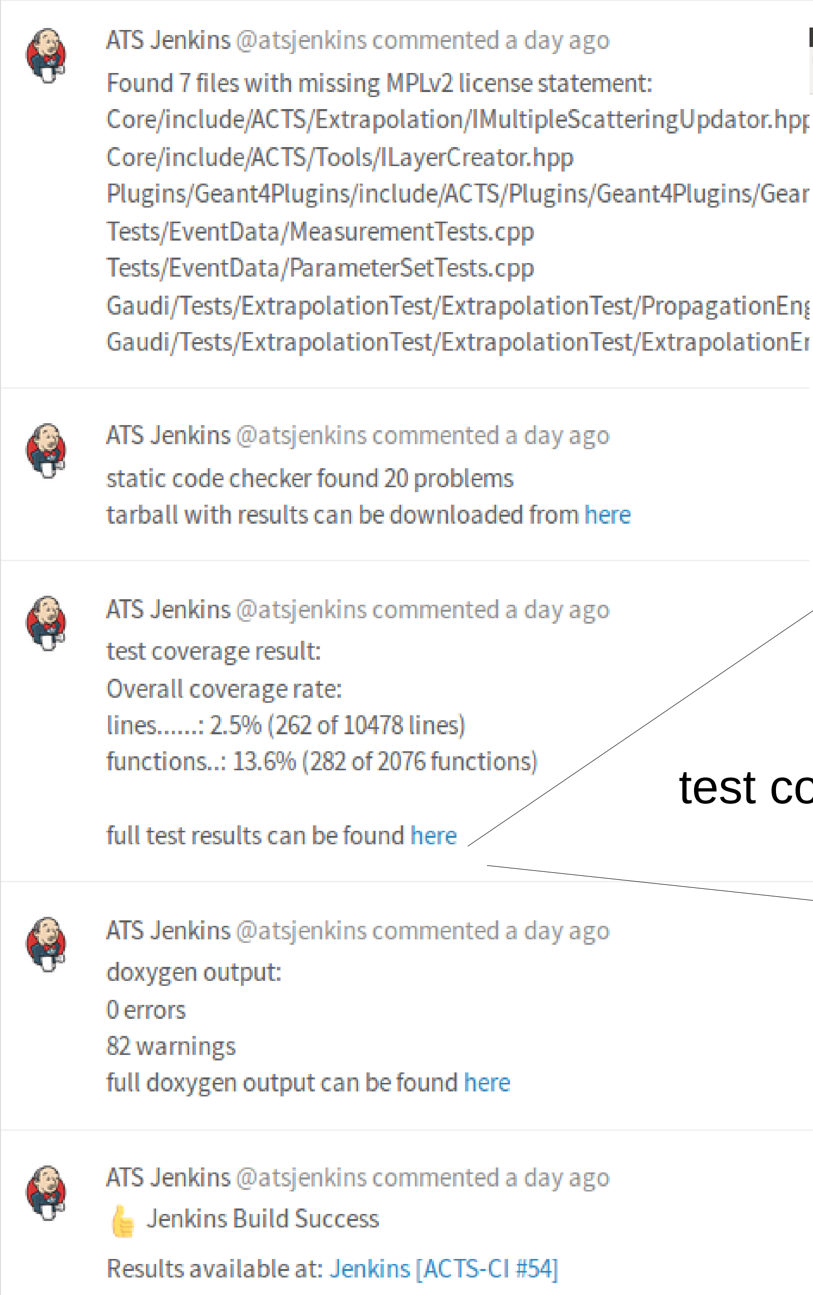
```
// now decide on the quility of the transformation
double inttol = r * 0.0001;
inttol        = (inttol < 0.01) ? 0.01 : 0.01;  // ?
```

identical expressions on both sides of ':' in conditional expression

```
const Acts::NeutralParameters* pTp = &Tp;
if (!pTp) return false;
```

This statement is never executed

So how does it look like?



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Plugins/Geant4Plugins/include/ACTS/Plugins/Geant4Plugins/Gear
Tests/EventData/MeasurementTests.cpp
Tests/EventData/ParameterSetTests.cpp
Gaudi/Tests/ExtrapolationTest/ExtrapolationTest/PropagationEng
Gaudi/Tests/ExtrapolationTest/ExtrapolationTest/ExtrapolationEr

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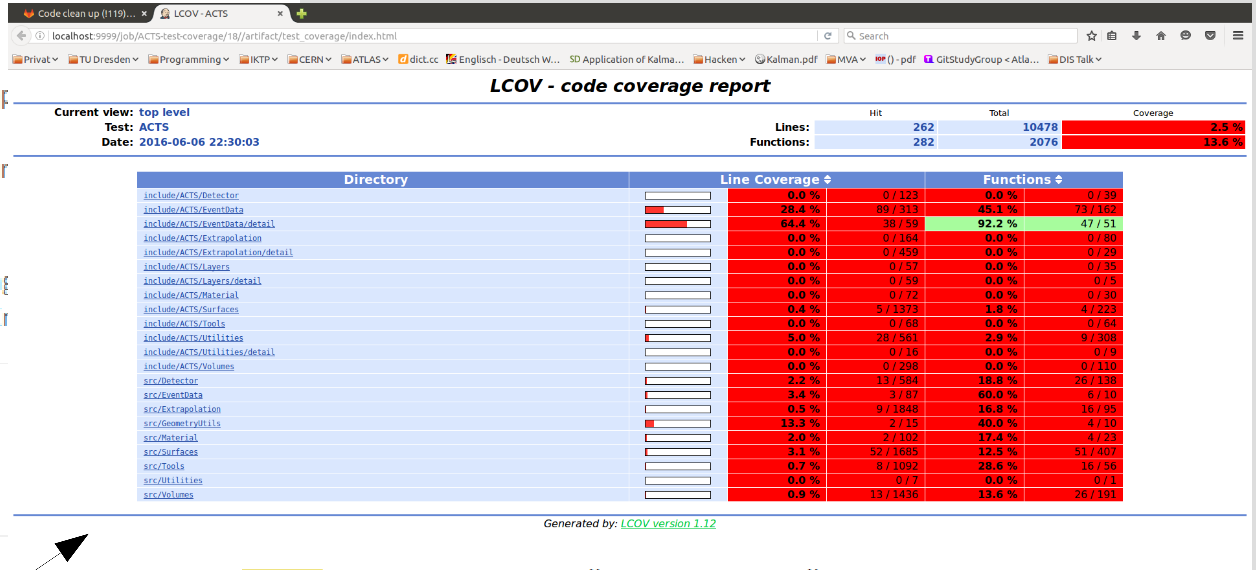
Results available at: Jenkins [ACTS-CI #54]

test coverage



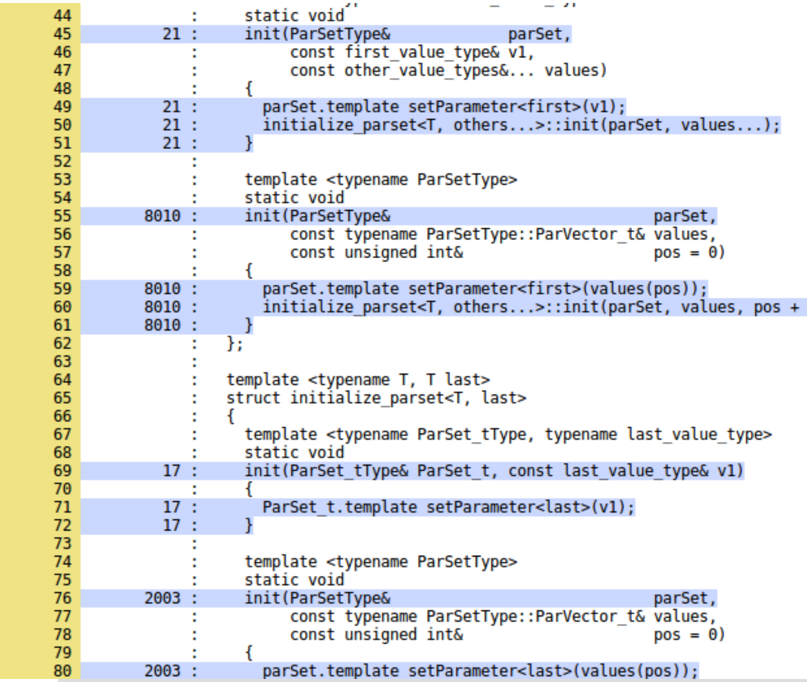
LCOV - code coverage report

Current view: top level
Test: ACTS
Date: 2016-06-06 22:30:03

	Hit	Total	Coverage
Lines:	262	10478	2.5 %
Functions:	282	2076	13.6 %

Directory	Line Coverage ⇕		Functions ⇕	
include/ACTS/Detector	0.0 %	0 / 123	0.0 %	0 / 39
include/ACTS/EventData	28.4 %	89 / 313	45.1 %	73 / 162
include/ACTS/EventData/detail	64.4 %	38 / 59	92.2 %	47 / 51
include/ACTS/Extrapolation	0.0 %	0 / 164	0.0 %	0 / 80
include/ACTS/Extrapolation/detail	0.0 %	0 / 459	0.0 %	0 / 29
include/ACTS/Layers	0.0 %	0 / 57	0.0 %	0 / 35
include/ACTS/Layers/detail	0.0 %	0 / 59	0.0 %	0 / 5
include/ACTS/Material	0.0 %	0 / 72	0.0 %	0 / 30
include/ACTS/Surfaces	0.4 %	5 / 1373	1.8 %	4 / 223
include/ACTS/Tools	0.0 %	0 / 68	0.0 %	0 / 64
include/ACTS/Utilities	5.0 %	28 / 561	2.9 %	9 / 308
include/ACTS/Utilities/detail	0.0 %	0 / 16	0.0 %	0 / 9
include/ACTS/Volumes	0.0 %	0 / 298	0.0 %	0 / 110
src/Detector	2.2 %	13 / 584	18.8 %	26 / 138
src/EventData	3.4 %	3 / 87	60.0 %	6 / 10
src/Extrapolation	0.5 %	9 / 1848	16.8 %	16 / 95
src/GeometryUtils	13.3 %	2 / 15	40.0 %	4 / 10
src/Material	2.0 %	2 / 102	17.4 %	4 / 23
src/Surfaces	3.1 %	52 / 1685	12.5 %	51 / 407
src/Tools	0.7 %	8 / 1092	28.6 %	16 / 56
src/Utilities	0.0 %	0 / 7	0.0 %	0 / 1
src/Volumes	0.9 %	13 / 1436	13.6 %	26 / 191

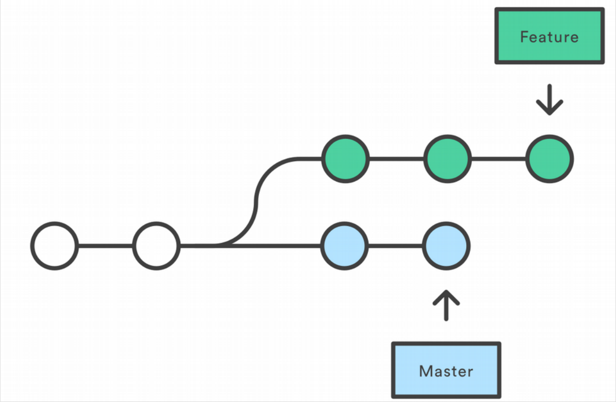
Generated by: LCOV version 1.12



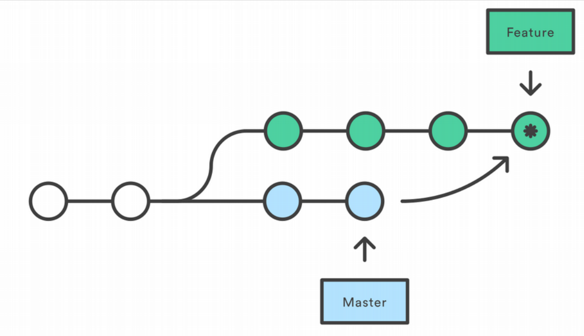
```
          :     static void
       21 :     init(ParSetType&             parSet,
          :          const first_value_type& v1,
          :          const other_value_types&... values)
          :     {
       21 :       parSet.template setParameter<first>(v1);
       21 :       initialize_parset<T, others...>::init(parSet, values...);
       21 :     }
          :
          :     template <typename ParSetType>
          :     static void
     8010 :     init(ParSetType&                          parSet,
          :          const typename ParSetType::ParVector_t& values,
          :          const unsigned int&                  pos = 0)
          :     {
     8010 :       parSet.template setParameter<first>(values(pos));
     8010 :       initialize_parset<T, others...>::init(parSet, values, pos +
     8010 :     }
          :   };
          :
          :   template <typename T, T last>
          :   struct initialize_parset<T, last>
          :   {
          :     template <typename ParSet_tType, typename last_value_type>
          :     static void
       17 :     init(ParSet_tType& ParSet_t, const last_value_type& v1)
          :     {
       17 :       ParSet_t.template setParameter<last>(v1);
       17 :     }
          :
          :     template <typename ParSetType>
          :     static void
     2003 :     init(ParSetType&                          parSet,
          :          const typename ParSetType::ParVector_t& values,
          :          const unsigned int&                  pos = 0)
          :     {
     2003 :       parSet.template setParameter<last>(values(pos));
```

Merge vs. rebase workflow

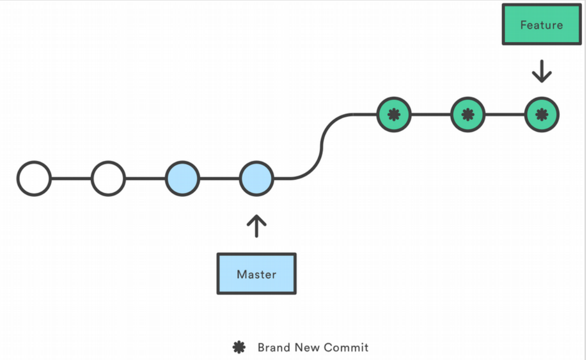
- Atlassian tutorial



merge



rebase (ff-merge)



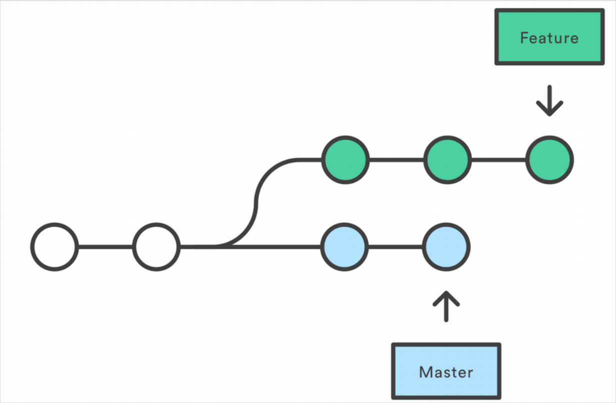
+ non-destructive operation
+ shows exactly what was done
+ can remove whole feature by reverting merge commit
- resolving conflicts leads to additional commits
- cluttered git log output

+ nice linear history
+ allows to cleanup commits
+ no additional commits for merges/ resolving conflicts
- destructive operation
- remove feature by reverting all individual commits

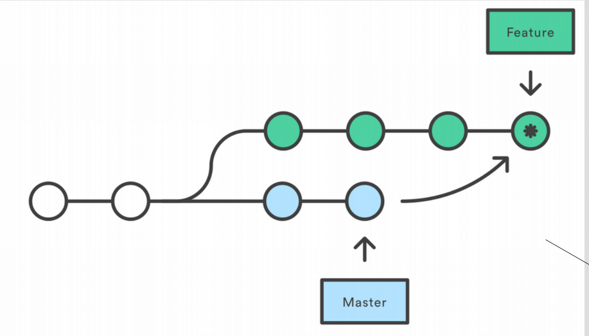
Merge vs. rebase workflow

- Atlassian tutorial

all 3 strategies
supported by GitLab

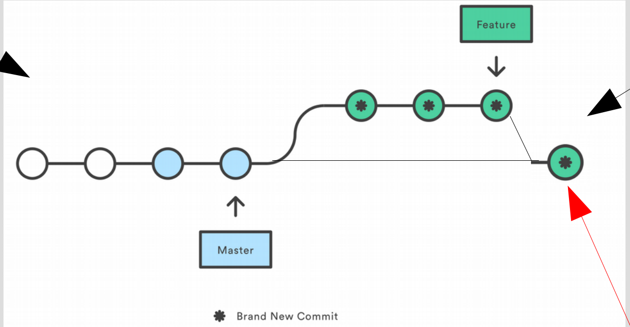


merge



+ non-destructive operation
+ shows exactly what was done
+ can remove whole feature
  by reverting merge commit
- resolving conflicts leads to
  additional commits
- cluttered git log output

semi-ff



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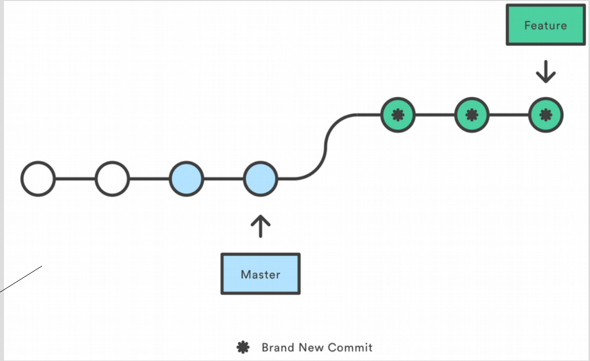
  merge commit
- destructive operation

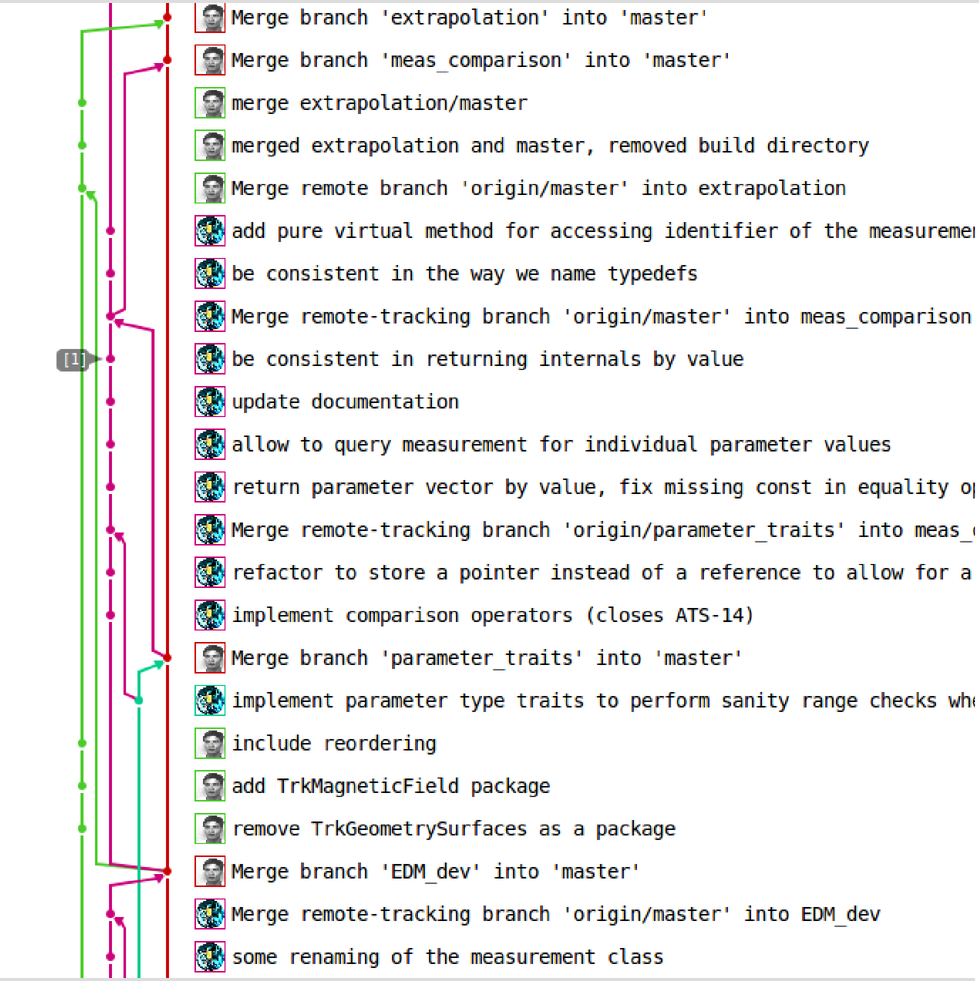
rebase (ff-merge)



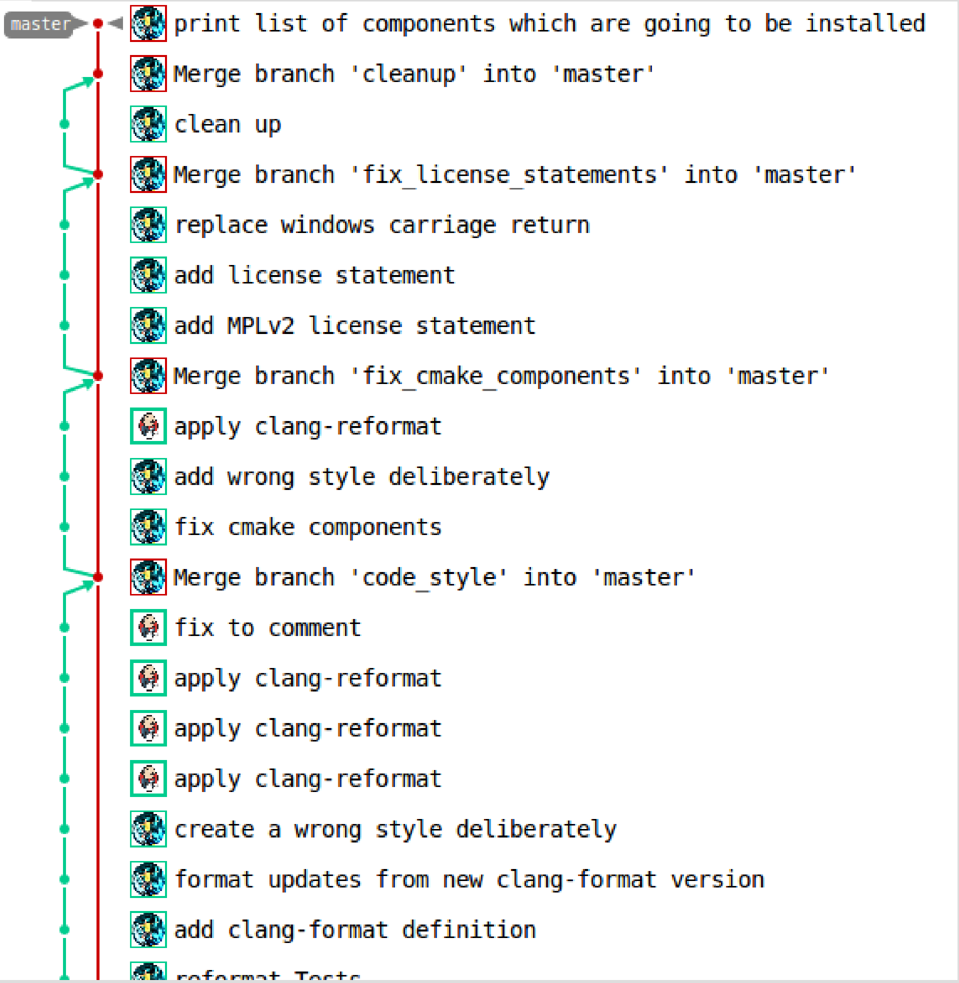
+ nice linear history
+ allows to cleanup commits
+ no additional commits for
  merges/ resolving conflicts
- destructive operation
- remove feature by reverting all
  individual commits

overhead due to extra commit
for CI tests is small

Merge vs rebase workflow



```
Merge branch 'extrapolation' into 'master'
Merge branch 'meas_comparison' into 'master'
merge extrapolation/master
merged extrapolation and master, removed build directory
Merge remote branch 'origin/master' into extrapolation
add pure virtual method for accessing identifier of the measureme
be consistent in the way we name typedefs
Merge remote-tracking branch 'origin/master' into meas_comparison
be consistent in returning internals by value
update documentation
allow to query measurement for individual parameter values
return parameter vector by value, fix missing const in equality o
Merge remote-tracking branch 'origin/parameter_traits' into meas_
refactor to store a pointer instead of a reference to allow for a
implement comparison operators (closes ATS-14)
Merge branch 'parameter_traits' into 'master'
implement parameter type traits to perform sanity range checks wh
include reordering
add TrkMagneticField package
remove TrkGeometrySurfaces as a package
Merge branch 'EDM_dev' into 'master'
Merge remote-tracking branch 'origin/master' into EDM_dev
some renaming of the measurement class
```



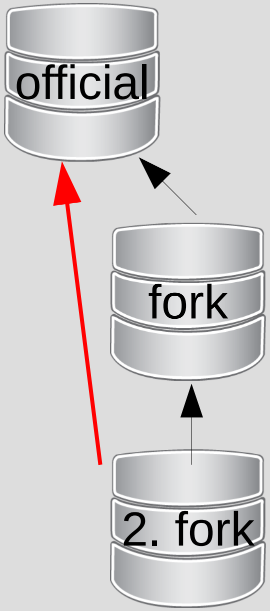
```
print list of components which are going to be installed
Merge branch 'cleanup' into 'master'
clean up
Merge branch 'fix_license_statements' into 'master'
replace windows carriage return
add license statement
add MPLv2 license statement
Merge branch 'fix_cmake_components' into 'master'
apply clang-reformat
add wrong style deliberately
fix cmake components
Merge branch 'code_style' into 'master'
fix to comment
apply clang-reformat
apply clang-reformat
apply clang-reformat
create a wrong style deliberately
format updates from new clang-format version
add clang-format definition
reformat Tests
```

- semi-ff merge workflow works fine for ACTS, though it required some getting used to
- requires advanced understanding of git
  => probably not feasible for projects with many developers with different levels of git experience
- compromise: recommend to rebase local feature branches before pushing them to the remote repo

Using forks or branches

- merge requests can be created from branches within in the same repository or from forks
- problems:
  - fork relation is not inherited => no merge request to “grand-parent”
  - Jenkins setup for forked workflow a bit more involved
  - first push of a local branch to a fork triggers all JIRA references => duplicated comments in JIRA issues (one duplicate per fork…CMS has >1.5k forks)
  - forks do not really support a rebase workflow as the MR assignee needs developers permissions on the fork (for doing a git push -f)
- advantages:
  - different forks can have different CI setups
  - different forks can have different roles/permissions/approver settings

=> for ACTS working with branches in one repo was found to be more convenient



Summary

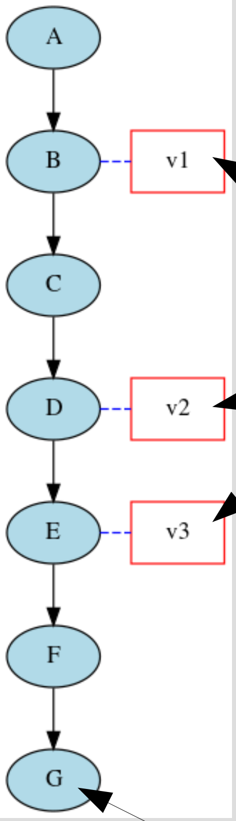
- git is great, MR are **THE** place for code review
- support of code reviewers with automated tools is essential
- best workflow depends on number and experience of developers
- requires discipline and some change in mentality:
  - split development in many small work packages
  - keep features branches concise and short-lived
  - use one branch per feature
- GitLab provides (for us) all necessary features (Jenkins CI, JIRA integration)
- found some pitfalls:
  - non-CERN users can't commit to gitlab.cern.ch
  - make sure to set (otherwise, commits will be rejected)
    git config --global user.email <login>@cern.ch
  - …

Backup

Changing habits

- branching/merging in git is simple, cheap and fast
  => use feature branches for developments/bug fixes

svn: merging can be a mess
=> develop on trunk

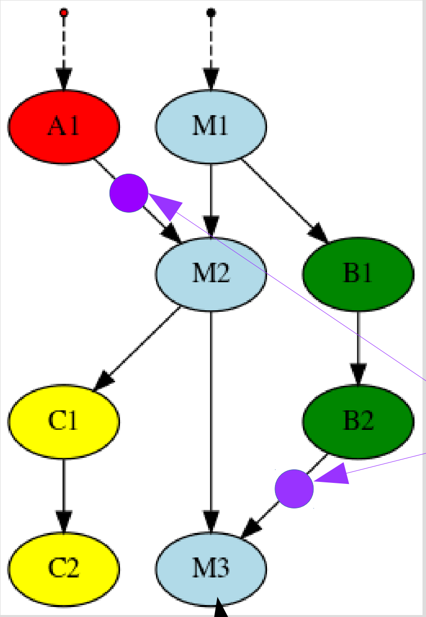


use tags to mark working state

(in ATLAS: tag not necessarily indicates working state)

current trunk often not stable
=> complicated to fix bugs

git: branches are fun



possible to develop in parallel (and independent of other changes)

merge requests

master can be protected

Changing habits – another layer

- branching/merging in git is simple, cheap and fast

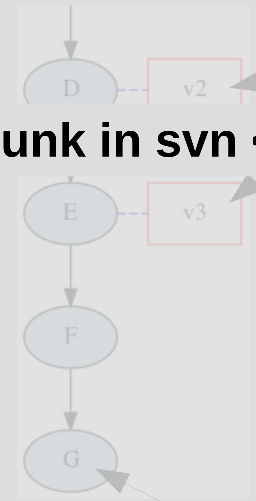
  => use feature branches for developments/bug fixes

in ATLAS we currently have **ONE** svn repository **per package**
=> impossible to bundle logically connected changes in several packages into one commit

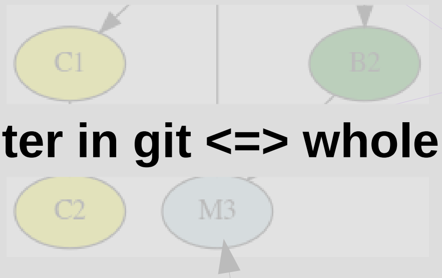
with git we may move to **ONE** repository **for all packages**
=> no problem committing changes spanning multiple packages

svn:
=> (

n
ident



working state



merge requests

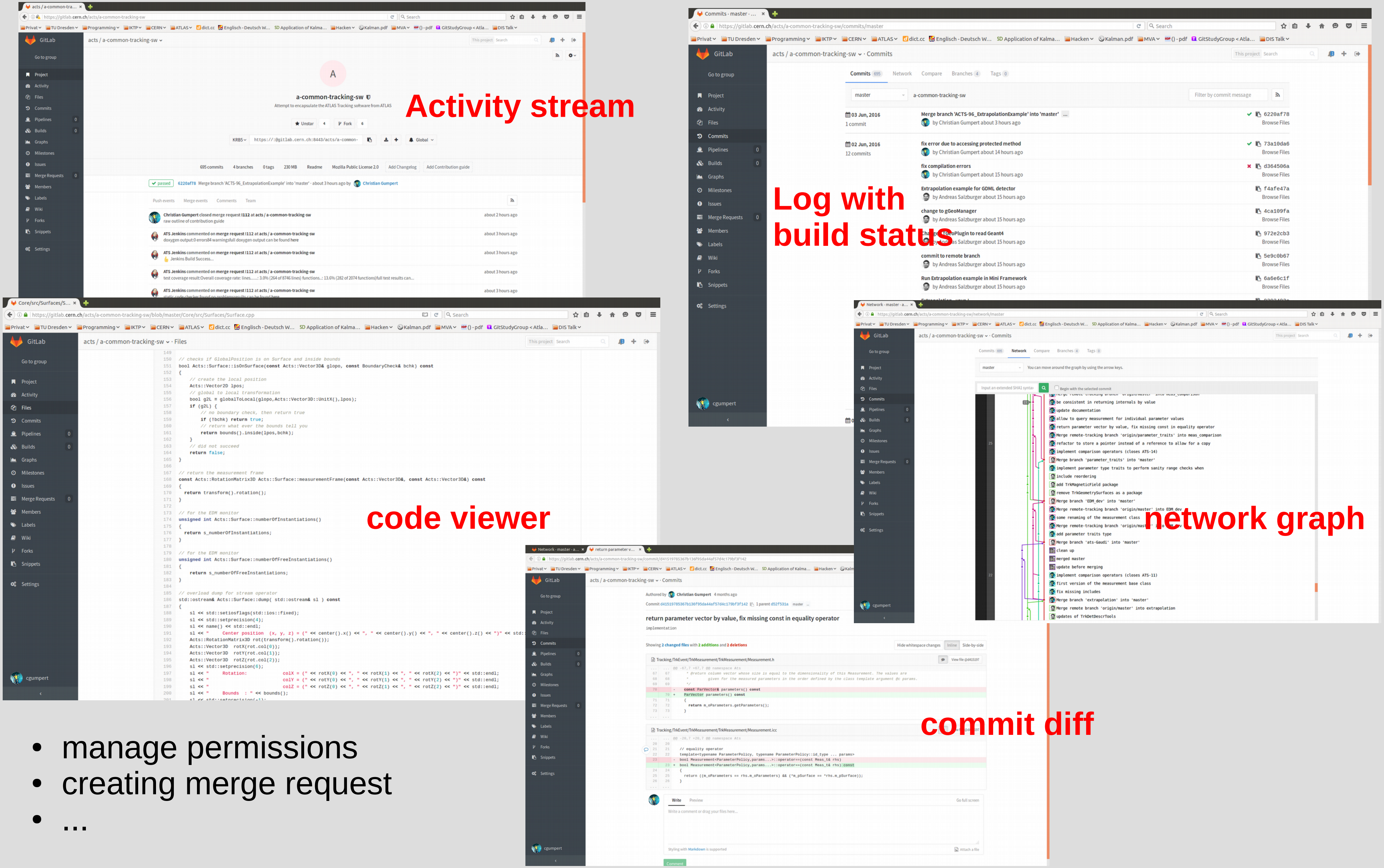
trunk in svn <=> one package while **master in git <=> whole ATLAS software**

(in ATLAS: tag not necessarily indicates working state)

master can be protected

current trunk often not stable
=> complicated to fix bugs

GitLab web interface



Activity stream

acts / a-common-tracking-sw

a-common-tracking-sw

Attempt to encapsulate the ATLAS Tracking software from ATLAS

★ Unstar 4 Fork 6

KRB5 https://:@gitlab.cern.ch:8443/acts/a-common-

695 commits 4 branches 0 tags 230 MB Readme Mozilla Public License 2.0 Add Changelog Add Contribution guide

✓ passed 6220af78 Merge branch 'ACTS-96_ExtrapolationExample' into 'master' · about 3 hours ago by Christian Gumpert

Christian Gumpert closed merge request !112 at acts / a-common-tracking-sw — about 2 hours ago
raw outline of contribution guide

ATS Jenkins commented on merge request !112 at acts / a-common-tracking-sw — about 3 hours ago
doxygen output:0 errors84 warningsfull doxygen output can be found here

ATS Jenkins commented on merge request !112 at acts / a-common-tracking-sw — about 3 hours ago
Jenkins Build Success...

ATS Jenkins commented on merge request !112 at acts / a-common-tracking-sw — about 3 hours ago
test coverage result:Overall coverage rate: lines......: 3.0% (264 of 8746 lines) functions..: 13.6% (282 of 2074 functions)full test results can...

ATS Jenkins commented on merge request !112 at acts / a-common-tracking-sw — about 3 hours ago
static code checker found no problemsresults can be found here

Log with build status

acts / a-common-tracking-sw · Commits

master a-common-tracking-sw

03 Jun, 2016 — 1 commit

- Merge branch 'ACTS-96_ExtrapolationExample' into 'master' … by Christian Gumpert about 3 hours ago ✓ 6220af78 Browse Files

02 Jun, 2016 — 12 commits

- fix error due to accessing protected method by Christian Gumpert about 14 hours ago ✓ 73a10da6 Browse Files
- fix compilation errors by Christian Gumpert about 15 hours ago ✗ d364506a Browse Files
- Extrapolation example for GDML detector by Andreas Salzburger about 15 hours ago f4afe47a Browse Files
- change to gGeoManager by Andreas Salzburger about 15 hours ago 4ca109fa Browse Files
- Change TGeoPlugin to read Geant4 by Andreas Salzburger about 15 hours ago 972e2cb3 Browse Files
- commit to remote branch by Andreas Salzburger about 15 hours ago 5e9c0b67 Browse Files
- Run Extrapolation example in Mini Framework by Andreas Salzburger about 15 hours ago 6a6e6c1f Browse Files

code viewer

acts / a-common-tracking-sw · Files

```
// checks if GlobalPosition is on Surface and inside bounds
bool Acts::Surface::isOnSurface(const Acts::Vector3D& glopo, const BoundaryCheck& bchk) const
{
    // create the local position
    Acts::Vector2D lpos;
    // global to local transformation
    bool g2L = globalToLocal(glopo,Acts::Vector3D::UnitX(),lpos);
    if (g2L) {
        // no boundary check, then return true
        if (!bchk) return true;
        // return what ever the bounds tell you
        return bounds().inside(lpos,bchk);
    }
    // did not succeed
    return false;
}

// return the measurement frame
const Acts::RotationMatrix3D Acts::Surface::measurementFrame(const Acts::Vector3D&, const Acts::Vector3D&) const
{
  return transform().rotation();
}

// for the EDM monitor
unsigned int Acts::Surface::numberOfInstantiations()
{
  return s_numberOfInstantiations;
}

// for the EDM monitor
unsigned int Acts::Surface::numberOfFreeInstantiations()
{
    return s_numberOfFreeInstantiations;
}

// overload dump for stream operator
std::ostream& Acts::Surface::dump( std::ostream& sl ) const
{
    sl << std::setiosflags(std::ios::fixed);
    sl << std::setprecision(4);
    sl << name() << std::endl;
    sl << "     Center position  (x, y, z) = (" << center().x() << ", " << center().y() << ", " << center().z() << ")" << std:
    Acts::RotationMatrix3D rot(transform().rotation());
    Acts::Vector3D  rotX(rot.col(0));
    Acts::Vector3D  rotY(rot.col(1));
    Acts::Vector3D  rotZ(rot.col(2));
    sl << std::setprecision(6);
    sl << "     Rotation:             colX = (" << rotX(0) << ", " << rotX(1) << ", " << rotX(2) << ")" << std::endl;
    sl << "                           colY = (" << rotY(0) << ", " << rotY(1) << ", " << rotY(2) << ")" << std::endl;
    sl << "                           colZ = (" << rotZ(0) << ", " << rotZ(1) << ", " << rotZ(2) << ")" << std::endl;
    sl << "     Bounds  : " << bounds();
```

network graph

You can move around the graph by using the arrow keys.

```
be consistent in returning internals by value
update documentation
allow to query measurement for individual parameter values
return parameter vector by value, fix missing const in equality operator
Merge remote-tracking branch 'origin/parameter_traits' into meas_comparison
refactor to store a pointer instead of a reference to allow for a copy
implement comparison operators (closes ATS-14)
Merge branch 'parameter_traits' into 'master'
implement parameter type traits to perform sanity range checks when
include reordering
add TrkMagneticField package
remove TrkGeometrySurfaces as a package
Merge branch 'EDM_dev' into 'master'
Merge remote-tracking branch 'origin/master' into EDM_dev
some renaming of the measurement class
Merge remote-tracking branch 'origin/master' into EDM_dev
add parameter traits type
Merge branch 'ats-Gaudi' into 'master'
clean up
merged master
update before merging
implement comparison operators (closes ATS-11)
first version of the measurement base class
fix missing includes
Merge branch 'extrapolation' into 'master'
Merge remote branch 'origin/master' into extrapolation
updates of TrkDetDescrTools
```

commit diff

Authored by Christian Gumpert 4 months ago

Commit d41519785367b136f95da44af57d4c179bf3f142 1 parent d52f531a master

return parameter vector by value, fix missing const in equality operator

implementation

Showing 2 changed files with 2 additions and 2 deletions

Tracking/TrkEvent/TrkMeasurement/TrkMeasurement/Measurement.h

```
@@ -67,7 +67,7 @@ namespace Ats
       * @return column vector whose size is equal to the dimensionality of this Measurement. The values are
       *         given for the measured parameters in the order defined by the class template argument @c params.
       */
-     const ParVector& parameters() const
+     ParVector parameters() const
      {
        return m_oParameters.getParameters();
      }
```

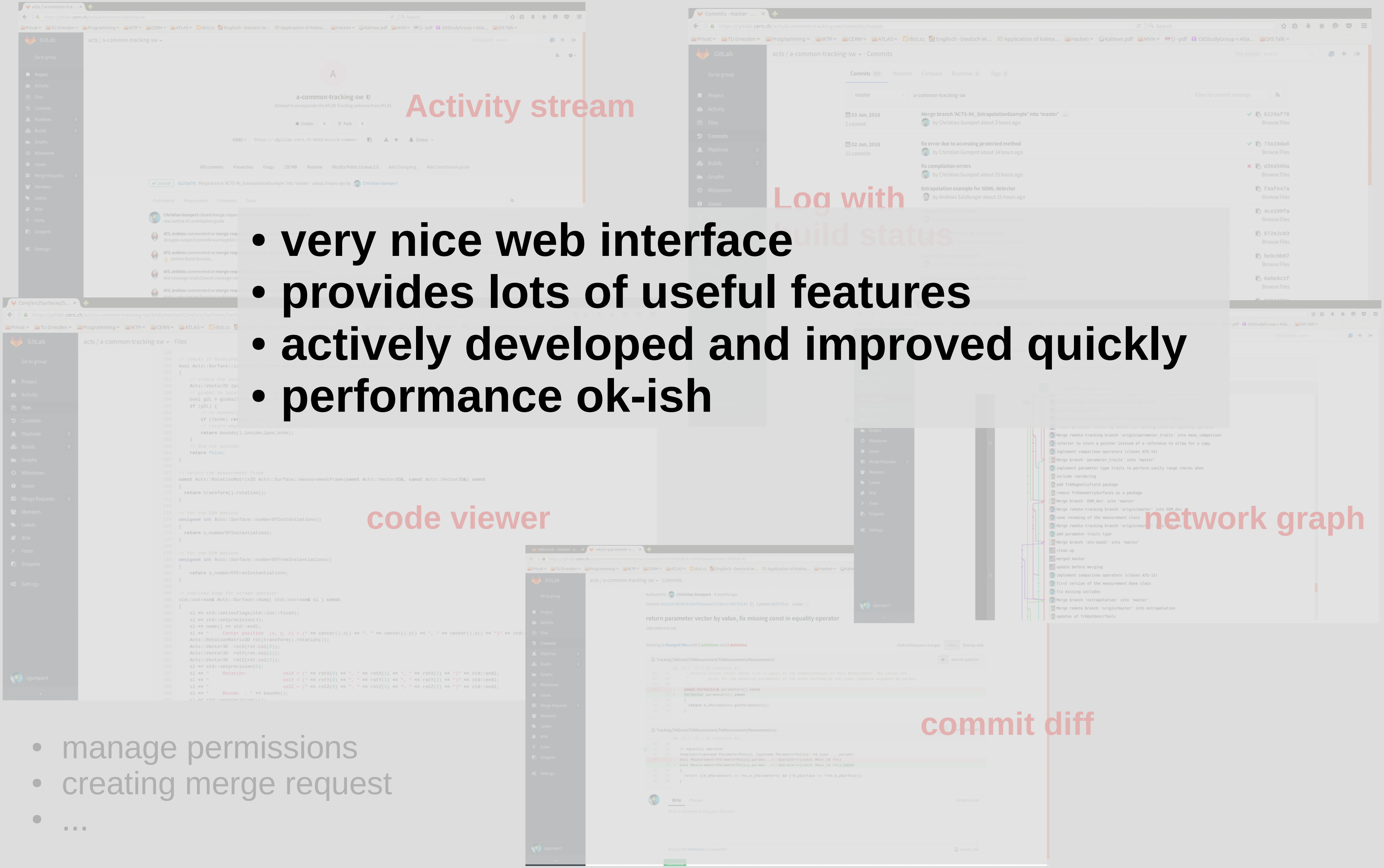
Tracking/TrkEvent/TrkMeasurement/TrkMeasurement/Measurement.icc

```
@@ -20,7 +20,7 @@ namespace Ats

    // equality operator
    template<typename ParameterPolicy, typename ParameterPolicy::id_type ... params>
-   bool Measurement<ParameterPolicy,params...>::operator==(const Meas_t& rhs)
+   bool Measurement<ParameterPolicy,params...>::operator==(const Meas_t& rhs) const
    {
      return ((m_oParameters == rhs.m_oParameters) && (*m_pSurface == *rhs.m_pSurface));
    }
```

- manage permissions
- creating merge request
- …

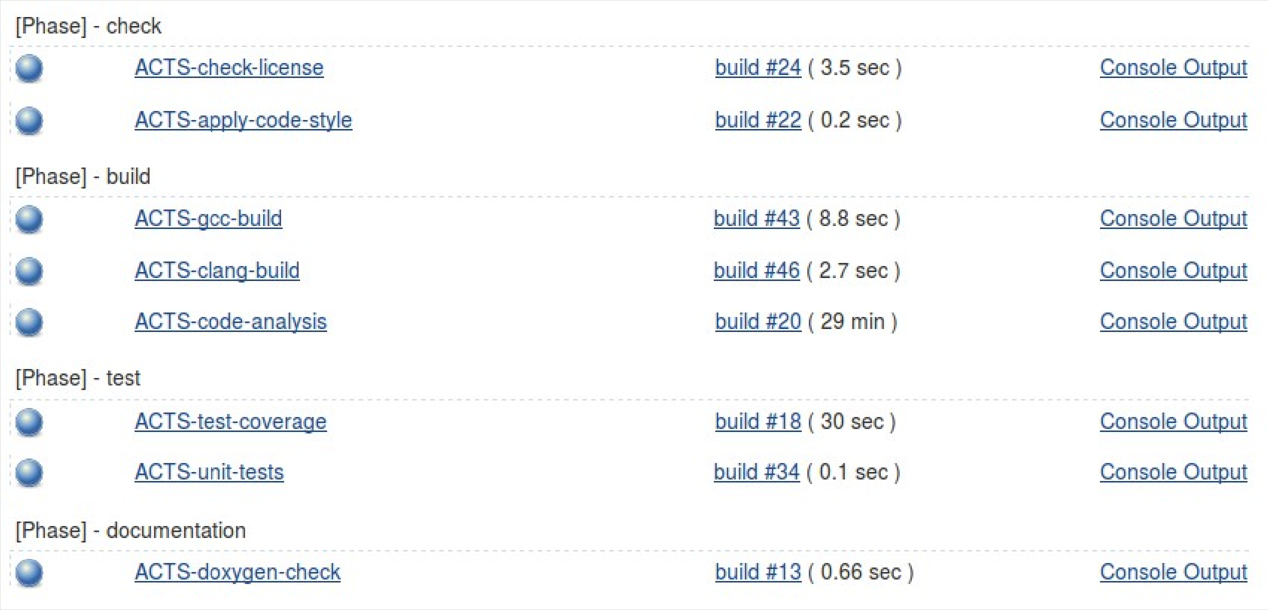
GitLab web interface



- very nice web interface
- provides lots of useful features
- actively developed and improved quickly
- performance ok-ish

- manage permissions
- creating merge request
- …

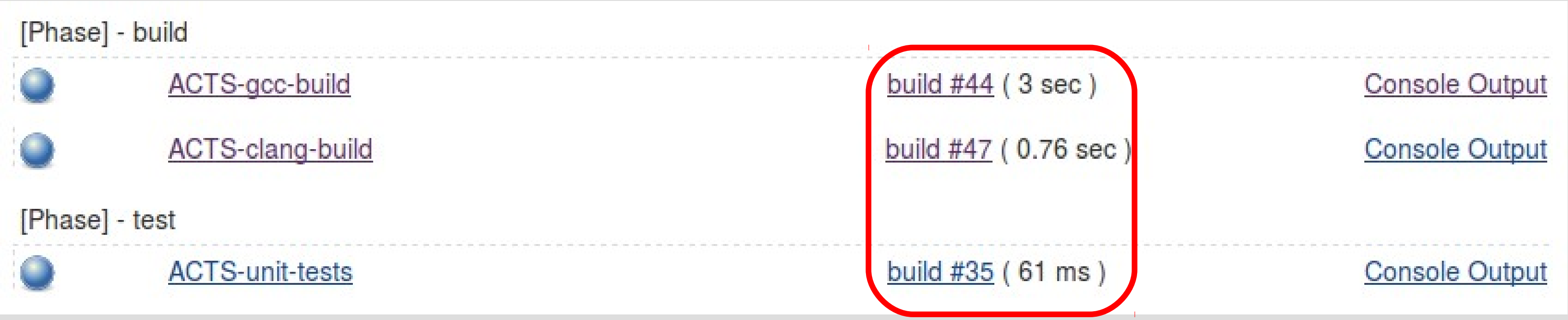
CI overhead due to semi-ff workflow



[Phase] - check			
●	ACTS-check-license	build #24 (3.5 sec)	Console Output
●	ACTS-apply-code-style	build #22 (0.2 sec)	Console Output
[Phase] - build			
●	ACTS-gcc-build	build #43 (8.8 sec)	Console Output
●	ACTS-clang-build	build #46 (2.7 sec)	Console Output
●	ACTS-code-analysis	build #20 (29 min)	Console Output
[Phase] - test			
●	ACTS-test-coverage	build #18 (30 sec)	Console Output
●	ACTS-unit-tests	build #34 (0.1 sec)	Console Output
[Phase] - documentation			
●	ACTS-doxygen-check	build #13 (0.66 sec)	Console Output

CI jobs from merge request

CI jobs for subsequent push to target branch



[Phase] - build			
●	ACTS-gcc-build	build #44 (3 sec)	Console Output
●	ACTS-clang-build	build #47 (0.76 sec)	Console Output
[Phase] - test			
●	ACTS-unit-tests	build #35 (61 ms)	Console Output