

Introduction to the Super C-Tau detector software development

Dmitry Maksimov

18 May 2020

Contents

- 1 Overview
- 2 Workflow description
- 3 Package components
- 4 Issues

Overview

Software structure and contents

Central repository <https://git.inp.nsk.su/sctau/aurora>

- All software consists of set of packages placed in directory tree
- Packages organized into set of projects (list of packages built together)
- Projects can be based on software from another Project
- Build is described using cmake (3.16)
- Carried out by gcc (8.2 now, later at some time 9.2)
- Some currently active projects:
 - ▶ AuroraExternals
 - ▶ Aurora
 - ▶ WorkDir

Directories

<Repository root>

- Build
- Common
- Control
- DetectorDescription
- Event
- External
- Farich
- Generation
- Projects
- Reconstruction
- SCTauTest
- Simulation
- Tools
- Visualization

Workflow description

Registration

- 1 Make registration at BINP/GCF cluster

Contacts:

- ▶ Dmitry Maksimov <D.A.Maksimov@inp.nsk.su>
- ▶ Andrey Suharev <A.M.Suharev@inp.nsk.su>

- 2 Login to **proxima**
Create ssh keys if absent

\$ ssh-keygen

Accept default answers for all questions

- 3 Login to <https://git.inp.nsk.su/>
Put ssh **public** key to your gitlab account

Repository

Central repository <https://git.inp.nsk.su/sctau/aurora>

First of all make a fork of Aurora project

sctau > aurora > Details



aurora

SCTau Experiment main repository for Aurora code

☆ Star 0 Ψ Fork 1 SSH git@git.inp.nsk.su:sctau/aurora [icon] [dropdown] + [dropdown] [bell] Global [dropdown]

Files (676 KB) Commits (20) Branches (3) Tags (0) Readme

Environment setup

Working environment is prepared at proxima.

```
# Basic setup  
# run this after each login  
$ setupSCTAU
```

Workdir setup

```
# Create work dir
$ mkdir workarea
$ cd workarea

# Directories for builds and run
$ mkdir build run

# Setup project, release and version
asetup Aurora, master, latest

# Run primary generators example
cd run
ctaurun GenExamples/evtgen.py
```

Initialize workdir for development

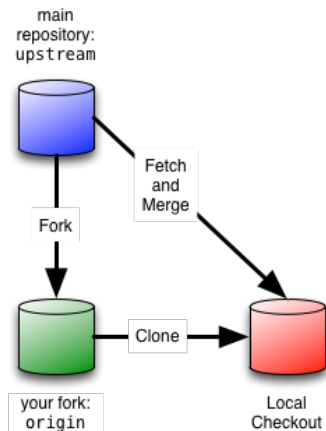
```
$ cd workarea
# Initialize empty working directory
$ git sctau init-workdir \
>     ssh://git@git.inp.nsk.su/sctau/aurora.git
$ cd aurora

# Get updates for central repository
$ git fetch upstream

# Create working branch
$ git checkout -b TopicDevBranch upstream/master --no-track

# Add some packages
$ git sctau addpkg GenExamples
$ git sctau addpkg G4SimExamples
```

Repository relations



Build and run

```
# Building
$ cd ../build/
$ cmake ../aurora/Projects/WorkDir
$ make

# Make setup to use local (!) packages
$ source x86_64-slc7-gcc8-opt/setup.sh

# Running
$ cd ../run
$ ctaurun.py GenExamples/evtgen.py
```

Save and publish results

```
$ git add ...
```

```
$ git commit -m '...'
```

```
$ git push -u origin TopicDevBranch
```

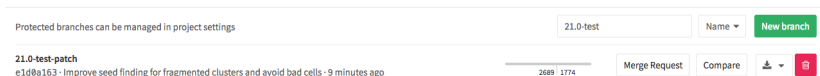
```
# or
```

```
$ git push
```

Merge requests

Create **Merge request** from GitLab interface

Go to the branch overview page on your fork by choosing Repository
-> Branches in the top menu. Then select the Merge Request button
next to your new branch.



or by link from `git push` command

Merge requests

- Make sure you are merging to the right target branch (this should be the target branch from which you started your topic branch). If GitLab didn't select the correct branch use the Change Branches option to correct it.
- Make sure that you enter a good description of your change.

New Merge Request

From `graemes/athena:21.0-test-patch` into `atlas/athena:21.0-tutorial`

[Change branches](#)

Title

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

Add [description templates](#) to help your contributors communicate effectively!

Description

Write Preview

B *I* **¶** **<>** **≡** **≡** **✉** **✕**

Add a new `EMCrackEtCut` property to to the `egammaTopoClusterCopier` class and use this to accept clusters in the crack region if they exceed the Et cut. This improves seed finding for cases of highly fragmented clusters.

Fix [ATLASRECTS-3867](#) where a WARNING was printed, but actually this happens and is harmless to downgrade to DEBUG,

Fix [ATLASRECTS-3860](#) where `LAr` properties were mistakenly asked of tile cells - just veto tile cells at the top of the loop.

Styling with [Markdown](#) and [slash commands](#) are supported

 Attach a file

Package components

Package structure

<PackageName>	
├── <PackageName>	..... C++ headers
├── src	..... C++ sources
├── python	..... python modules
├── doc	..... documentation
├── data	..... data files
├── share	..... data files, scripts, joboptions
├── joboptions	..... jobs configuration fragments
├── scripts	..... scripts
├── xml	..... xml files, Detector geometry for example
└── CMakeLists.txt	..... Package building rules description, required

New packages

Creating of new package is simple.

All you need is:

- give it a good, descriptive, globally unique name (names A/B/C and D/E/C are prohibited)
- place it in proper place in a directory tree
- put CMakeLists.txt file (and meaningfull contents into it)

CMakeLists.txt Example (1.1)

```
#####  
# Package: EvtGen_i  
#####  
# Declare the package name:  
sctau_subdir(EvtGen_i)  
  
# Declare the package's dependencies:  
sctau_depends_on_subdirs( PUBLIC  
                           Control/AuroraCommon  
                           Control/AuroraAlg  
                           External/HepMC  
                           External/EvtGen  
                           Generation/GenInterfaces  
                           PRIVATE  
                           Generation/GenTools/EvtGenExternal  
                           Tools/PathResolver )
```

CMakeLists.txt Example (1.2)

```
# Component(s) in the package:
sctau_add_component( EvtGen_i
                    src/*.cpp
                    PRIVATE_LINK_LIBRARIES AuroraAlg
                    EvtGenExternal EvtGen HepMC
                    PathResolver )

sctau_install_data( share/* )
```

CMakeLists.txt Example (2)

```
#####  
# Package: FARICH  
#####  
sctau_subdir(FARICH)  
  
sctau_depends_on_subdirs(PUBLIC  
                           External/DD4hep  
                           External/Geant4  
                           External/ROOT )  
  
sctau_add_dd4hep_component(FARICH  
                            src/*.cpp  
                            LINK_LIBRARIES GaudiKernel DD4hep ROOT Geant4)  
  
sctau_install_joboptions(share)  
sctau_install_xmls(xml)
```

cmake functions (1)

- `sctau__subdir` — declare package, set its name, **must be first** in CMakeLists.txt
- `sctau__depends_on_subdirs` — specify dependencies
- `sctau__add_library` — declare package library
- `sctau__add_component` — package library plus generate joboptions configurables, **not linkable** to other libraries
- `sctau__add_dd4hep_component` — package library plus generate DD4hep components list, **not linkable** to other libraries
- `sctau__add_executable` — declare executable
- `sctau__add_alias` — declare short script from set of commands
- `sctau__add_test` — declare package unit-tests
- `sctau__add_dictionary` — declare ROOT (Reflex) dictionary as shared library
- `sctau__add_root_dictionary` — declare ROOT (CINT) dictionary as C++ source code

cmake functions (2)

- `sctau__install_headers` — install header files (for pure interface packages)
- `sctau__install_python_modules` — install python modules
- `sctau__install_data` — install data files
- `sctau__install_joboptions` — install job configuration files or fragments
- `sctau__install_docs` — install documentation
- `sctau__install_xmls` — install XML files
- `sctau__install_scripts` — install executable scripts
- `sctau__install_runtime` — install files required at runtime, but not matching above categories

Issues

Aurora issues

If you have a work that

- Need to be tracked
- Need to be discussed
- Need to be remembered to return later
- ...

Create an issue!

The screenshot displays the GitHub interface for the 'aurora' project. The main content area shows a list of issues under the heading 'Issues'. The issues are:

- Full detector simulation using basic geometry** (#5) - opened 3 weeks ago by Dmitry Maximov. Labels: critical, Detector, Simulation, To Do.
- Start reconstructing simulated events** (#4) - opened 1 month ago by Dmitry Maximov. Labels: Detector, Reconstruction, Simulation, To Do.
- Basic detector description in DD4hep** (#3) - opened 1 month ago by Dmitry Maximov. Labels: critical, Detector, Simulation, To Do.
- Parametric detector simulation** (#2) - opened 1 month ago by Dmitry Maximov. Labels: critical, Detector, Doing, Simulation.

The left sidebar shows the project navigation menu with options like Project, Repository, Issues (4), Board, Labels, Milestones, Merge Requests (0), CI / CD, Operations, Wiki, and Collapse sidebar.