Software training for the next generation of physicists
Joint experience of LHCb and ALICE

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Overview

ALICE

- Base analysis task is a C++ class based on ROOT

- Central analysis repository on GitHub with daily tags on CVMFS

- Organized via Analysis Trains

- Software stack needs to be built on user laptop

LHCb

- Most analysts configure software with Python

- Core software stored on GitLab and distributed with CVMFS

- Individual analysis repositories

- Analysis done locally with C++ macros or Python

Teaching activities

ALICE

- Since 2014. Focus: Physics analysis

- 3 times a year: one full day at the end of ALICE Weeks at CERN

- How to run your analysis from coding to the Grid (hands-on)

- Thematic lectures on specific topics

- Illustrate new official tools and procedures (e.g. plain git → GitHub)

LHCb

- TWiki lessons replaced by Starterkit

- Each Starterkit: two parts, each ran annually at CERN

- Courses on C++/framework during the 5 upgrade hackathons each year

- 4 "Startertalks" about physics a year

- Presentations in meeting to major changes (e.g. svn → git)

Starterkit origins

- Started in 2015 by a small group of "young" people in LHCb
- 5 day workshop based at CERN
    - Plus a 3 day Impactkit (advanced topics + hackathon)
- Participants are encouraged to help in the next year
    - 1 year in: Participants started teaching
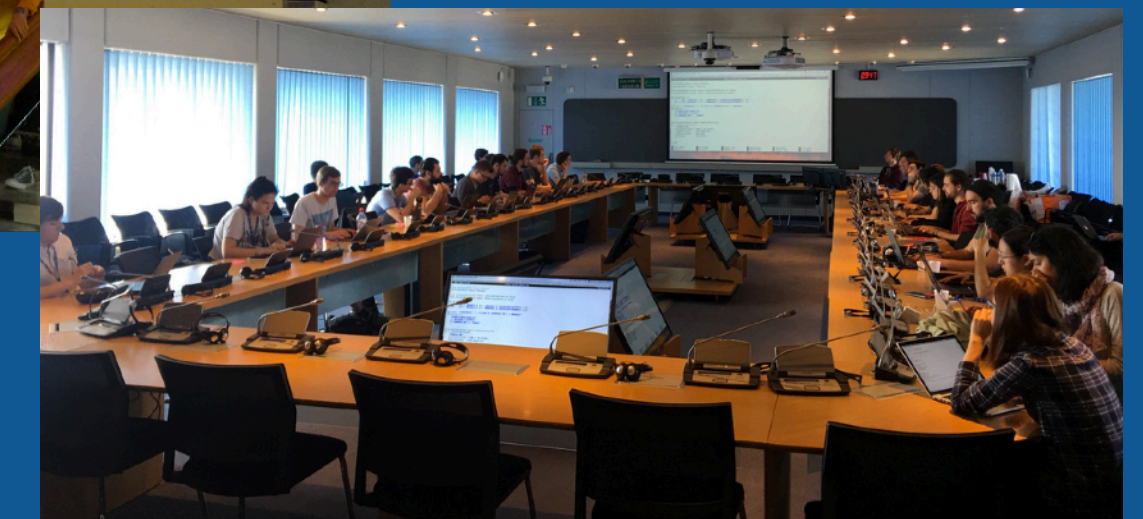   - 2.5 years in: Participants started organising

STARTERKIT

LHCb

Estd. 2015

Nov 2015

Nov 2016

Oct 2017

June 2015

May 2016

May 2017

May 2018

{Christopher.Burr,Dario.Berzano}@cern.ch - CHEP 2018 - Software training for the next generation of physicists: joint experience of LHCb and ALICE

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Skills taught

- Social event on Day 4 🍺 🍕 important for networking!

- General computing lessons: teachers and students shared between ALICE and LHCb

- Instructions on preparing user environment are sent beforehand to save time

Days 1, 2
General computing

python

BASH
THE BOURNE-AGAIN SHELL

git

Days 3, 4, 5
Experiment specific

ALICE   LHCb

ALICE   LHCb
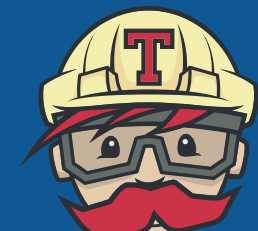
ALICE   LHCb

Material

Publicly available on the Web

- General HEP: lhcb.github.io/analysis-essentials
- LHCb specific: lhcb.github.io/starterkit-lessons
- ALICE specific: alice-doc.github.io/alice-analysis-tutorial

CC BY

+
MIT for
code snippets
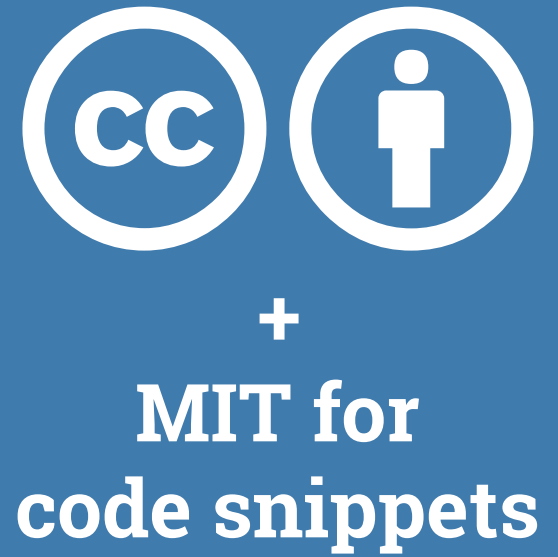
- Source on **GitHub** and tested/deployed via **Travis CI**
  - Anyone can contribute via Pull Requests: always reviewed by somebody else
  - Code snippets extracted from the doc and tested daily:
    ensure the instructions/examples always work! 🎉
- Material is never more than a year out of date
- This is the main source of documentation for both experiments
- Last day: session fixing minor issues in the lesson

Organisation

- Hosted at CERN to minimise the cost

- Fee: just 25 CHF for coffee, biscuits, and the social event

- Three teaching rooms: ALICE and LHCb students spread randomly across them

ALICE

NEW IN 2017!

- 2 Organisers (same since 2014)

- 1 ALICE helper/teacher in each room

- O(25) participants (first year was a trial: lower limit for testing)

LHCb

- 2 Organisers (always different)

- 1 teacher + at least 2 helpers/room

- O(45) participants split into two rooms (over 50% of new students)

Remote participation

ALICE

- Vidyo available
    - More geographically diverse
    - Less travel opportunities
- Extremely high remote attendance
- Lower engagement

LHCb

- Not available in the past so we can
    - Provide personalised support
    - Give networking opportunities
    - Help with other problems
- May risk lower attendance?

2017 joint strategy

- Webcast with remote mics muted required by ALICE
- Mattermost channel: questions filtered/reported to teachers
- ~30 people connected though few questions asked

Demographics

ALICE

- Mostly students with some experience to consolidate

- Even some well known, not-so-young members attended!

- Hopefully will recruit some of the first year students for the next joint Starterkits

LHCb

- Students have < 1 year experience

- More experienced students can "attend" as helpers

    - Reinforces the material

    - Gain experience teaching and organising

Ensuring engagement

- Every participant is given a post-it*:

  - Green: I'm ready to continue

  - Red: I need help

- Allow discreet communication

- Helpers ensure everyone keeps up (even when no post-it is displayed)

- Borrowed from Software Carpentry

  software-carpentry.org

*Other brands are available

Feedback from our surveys

- Students really like the one-to-one help

  - Also with solving other issues they have

- Generally well paced

  - Some rare cases almost require personal assistance

  - Even advanced students learn new tricks

- Students would like longer classes

- Enjoyed networking between ALICE and LHCb

Starterkit feedback

*Required

Which experiment are you from? *

○ ALICE

○ LHCb

Who was your teacher during this session? *

Your answer

What was being taught? *

Your answer

What was one thing you liked about the session? *

Your answer

What was one thing you didn't like about the session? *

Your answer

SUBMIT

Never submit passwords through Google Forms.

Advice for others

Material

- Writing is hard, but maintaining is harder

- Pull Requests make contributors more comfortable

- Regular workshops help keep the material fresh

Teaching

- Need a mixture of experience levels to teach well:
  - Young people know what is initially difficult
  - Experienced people understand the subtleties

- Encourage interactivity instead of lecturing

- Helpers are key to keeping everyone up to speed

How to properly recognize teaching?

Teaching is time-consuming

- Find suitable teachers: able and capable

- Review and refresh the teaching material

- Have a coherent message and know the hard bits

Too often regarded as a side task

- Your boss will not be happy if your teaching activities delay your paper!

- Teaching may not be rewarding for your career

- Recognising it as a service task may help?

Sustainability

Build a community of teachers

- Organization and maintenance are time consuming
- Engage students: mention "next year" during the session
- Motivate and encourage to help building teaching confidence

Documentation is a common resource

- Documentation belongs to everyone, not the authors
- Ensure continuity when teachers leave
- Share common documentation across experiments

Reach out and engage

- Decentralised Starterkits: off-site TEDx-like events?
- Provide for communities and experiments away from CERN
- Would allow for more frequent Starterkits

Thank you!