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
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
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

Days 3, 4, 5
Experiment specific
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

- 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- Material is never more than a year out of date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
- 2 Organisers (same since 2014)
- 1 ALICE helper/teacher in each room
- 0(25) participants (first year was a trial: lower limit for testing)

LHCb
- 2 Organisers (always different)
- 1 teacher + at least 2 helpers/room
- 0(45) participants split into two rooms (over 50% of new students)

NEW IN 2017!
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
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
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!