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LHCb Software Training

LHCb Starterkit

- StarterKit: First Steps in LHCb - LHCb data flow, DST exploration, LoKi Functors, DaVinci and Ganga introductions.
- **NEW** ImpactKit: Second Analysis Steps in LHCb - Using git in LHCb, various analysis topics, HLT, more Ganga.
- **NEW** DevelopKit: Developing for the Upgrade in LHCb - Advanced git in LHCb, various development topics, Gaudi tutorials, upgrade topics, modern C++.

Hackathon and LHCb/software/computing week tutorials

- C++ course by Sebastien Ponce at the 5th LHCb software hackathon, January 2017
- Up to date version of the C++ course by Sebastien Ponce
- Introduction to Gaudi and the new LHCb framework by Gerhard Raven at the 5th LHCb software hackathon, January 2017
- LHCb new framework Tutorial by Sebastien Ponce, initially at the 5th LHCb software hackathon, January 2017
- How to structure efficient algorithms by Christopher Jones at the 6th LHCb software hackathon, March 2017
- the GIT tool and best practices by Sebastien Ponce at the 7th LHCb software hackathon, June 2017
- emacs and vim extensions for the new framework by Adam Davis at the 7th LHCb software hackathon, June 2017
- Sharing terminals with TMATE by Manuel Schiller at the 9th LHCb software hackathon, December 2017
- Hackathon software setup by Sebastien Ponce at the 9th LHCb software hackathon, December 2017
- Vectorization tools and examples by Florian Lemaitre at the 9th LHCb software hackathon, December 2017
- Monitoring software performance with PR2 by Maciej Pawel Szymanski at the 9th LHCb software hackathon, December 2017, updated June 2018 12th (Krakow) hackathon
- Processor architectures by Omar Awile at the 9th LHCb software hackathon, December 2017
- Tools for measuring code performance by Monir Hadji at the 9th LHCb software hackathon, December 2017
- Optimisation of memory allocations by Sebastien Ponce at the 10th LHCb software hackathon, February 2018
- New counters in Gaudi by Sebastien Ponce, initially at the 11th LHCb software hackathon, April 2018
- C++ course at the 12th LHCb software hackathon in Krakow, June 2018.
- LHCb upgrade software framework at the 92th LHCb week at CERN, June 2019.
- Efficiently exploit multicore architecture - the LHCb experience at the HSF Reconstruction and Software Triggers WG, June 5th 2019 and at 1st Real Time Analysis workshop, July 15th 2019
- SIMD and data structures for efficient reconstruction algorithms at the HSF Reconstruction and Software Triggers WG, June 5th 2019.
- Gaudi CMake modernization end of intership presentation, August 16th 2019.

Other hands on tutorials

- CMake Configuration for CMT users - (DEPRECATED) Basic instructions on the CMake configuration of projects for developers used to CMT.
- CMake for Gaudi-based projects - CMake configuration of Gaudi based on CMake 3.15
LHCb Tutorials < LHCb < TWiki

- DaVinci Tutorials - Getting started with DaVinci. Requires all of the above!
- Grid and Grid Data Tutorial - Getting the most out of the grid, and saving your time. Requires all of the above! (assumes you use Ganga).
- ROOT vs. POOL Tutorial - Using ROOT or POOL persistency, the differences and the how-to
- Python Configurables - Getting started with Configurables (last updated 2008-12-09). Also:
  - Job configuration using Python (last updated 2008-03-18)
  - Brunel and Reconstruction Configurables (last updated 2009-03-17)
  - DaVinci Configurable (last updated 2009-03-17) and WiKi
  - Gauss Configurable
  - TupleToolsAndConfigurables, understanding the differences between configurables and their C++ classes.
- Introduction to Panoramix - Getting started with Panoramix
- GaudiPython tutorial
- Introduction to Ostap - New GitHub-based Ostap tutorials
- Ostap (formerly known as PyPaw) - set of useful extensions for PyROOT
- Introduction to LoKi - Getting started with LoKi
- Getting started with Bender - New GitHub-based Bender & BenderScript tutorials
- Introduction to Bender - Getting started with Bender
- Introduction to BenderScript - Getting started with BenderScript
- MicroDST tutorial
- Tutorial on Hlt2 - last updated 2010-03-12
- Simulation, Digitization and Reconstruction - An example of simulating, digitizing and reconstructing a specific signal event file
- Book-keeping tutorial (last presented 2009-06-15). See also the presentation given on 2008-12-10 (from slide 6).
- Tutorial for MC Production contacts - last updated 2010-12-15
  - Guidelines on running Gauss at Generator level
  - Writing decfiles and analysing the results
  - Filling production requests and necessary checks
  - Obtaining the generator statistics
- Analysis preservation and reproducibility - tutorials, examples and tools

Advanced tutorials

- Simulation Advanced Tutorial: how to simulate detectors: two days tutorial covering Gauss, Boole, geometry, event model and much more
- Conditions Database Usage (pdf)
- Event model and GaudiObjDesc tutorial (pdf)
- The agendas and contents of tutorial sessions both at CERN and elsewhere are listed here.
- Running LHCb software in the CernVM virtual machine.
- EclipseTutorial
- SwimmingTutorial
- RooStats Tutorial
- GPU programming: Introduction to CUDA and GooFit

Older material

These are mostly obsolete but contain useful background material

- Introduction to LHCb software - part 1 - Software organisation, environment setup and CMT (Eclipse Version)

Other hands on tutorials
Third party tutorials and courses

CERN Technical Training Programme

The full catalog is available here (CERN authentication required). In particular the following courses are recommended:

- Python: Hands-On Introduction
- Python: Advanced Hands-On
- Course ID 3935 C++ Part 1 - Hands-On Introduction
- Course ID 3936 C++ Part 2: Object-Oriented
- Course ID 4308 C++ Part 3: Hands-On Generic Programming in C++ and the STL
- Course ID 4883 C++ Part 4: Hands-On Large Scale in C++
- Course ID 4718 Hands-On Modern C++: Making the most of the 11/14 standards
- CERN openlab / Intel Parallelism, Compiler and Performance Workshop
- CERN openlab / Intel Workshop on Numerical Computing (07-07 February 2012 session)
  - Understand floating-point arithmetic (Jeff Arnold) slides
  - Floating-point control in the Intel C/C++ compiler and relevant libraries (Martyn Corden) slides

Advanced C++ lectures

Slides from the advanced C++ lectures given by Walter Brown at CERN in July 2009

Public domain

- Python tutorial from python.org (version specific)
- Online Python tutor

-- MarcoCattaneo - 16-Dec-2010