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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 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.

Other hands on tutorials

- CMake Configuration for CMT users - Basic instructions on the CMake configuration of projects for developers used to CMT.
- 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
- NEW 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
- NEW 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)
- Introduction to LHCb software - part 2 - Algorithms, Printing, Job Options (Eclipse Version)

**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:

Other hands on tutorials
• 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