# Update on ROOT Documentation

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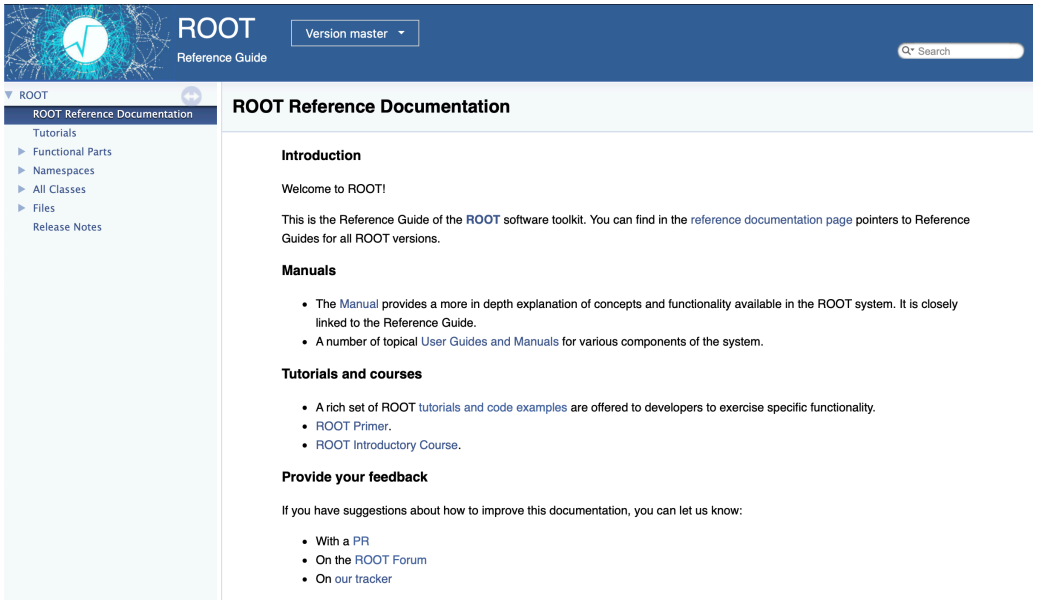
# Overview

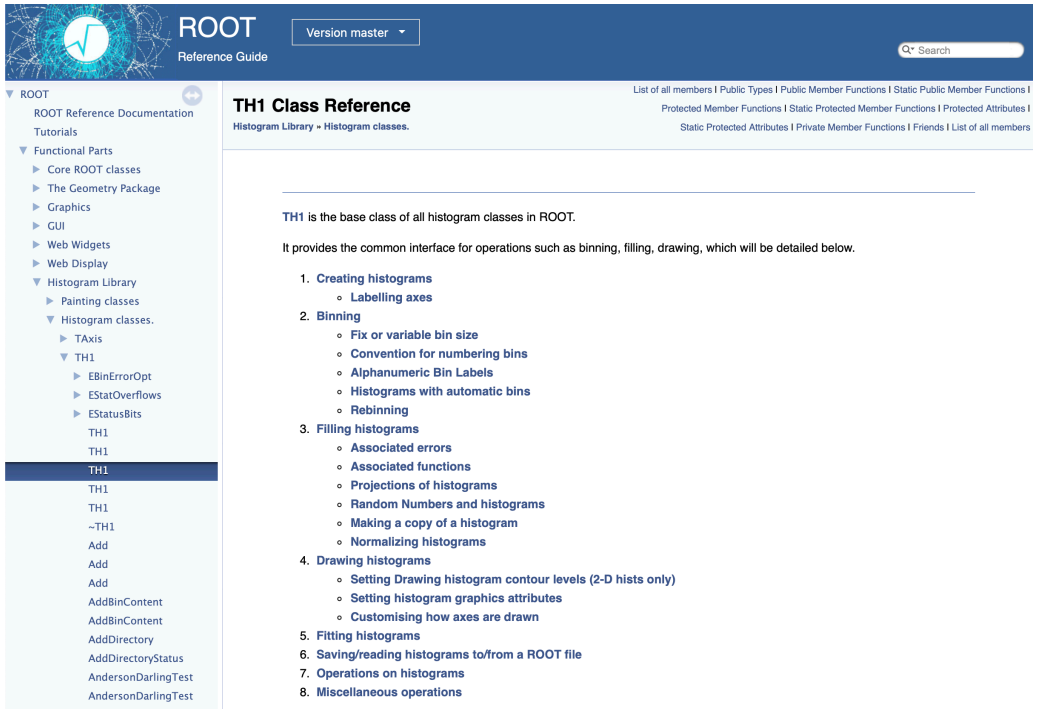
Overview of the ROOT main sources of documentation.

- Reference Guide
- Tutorials
- The "Manual" on web site
- Further information (Primer, Topical manuals …)

# Reference Guide

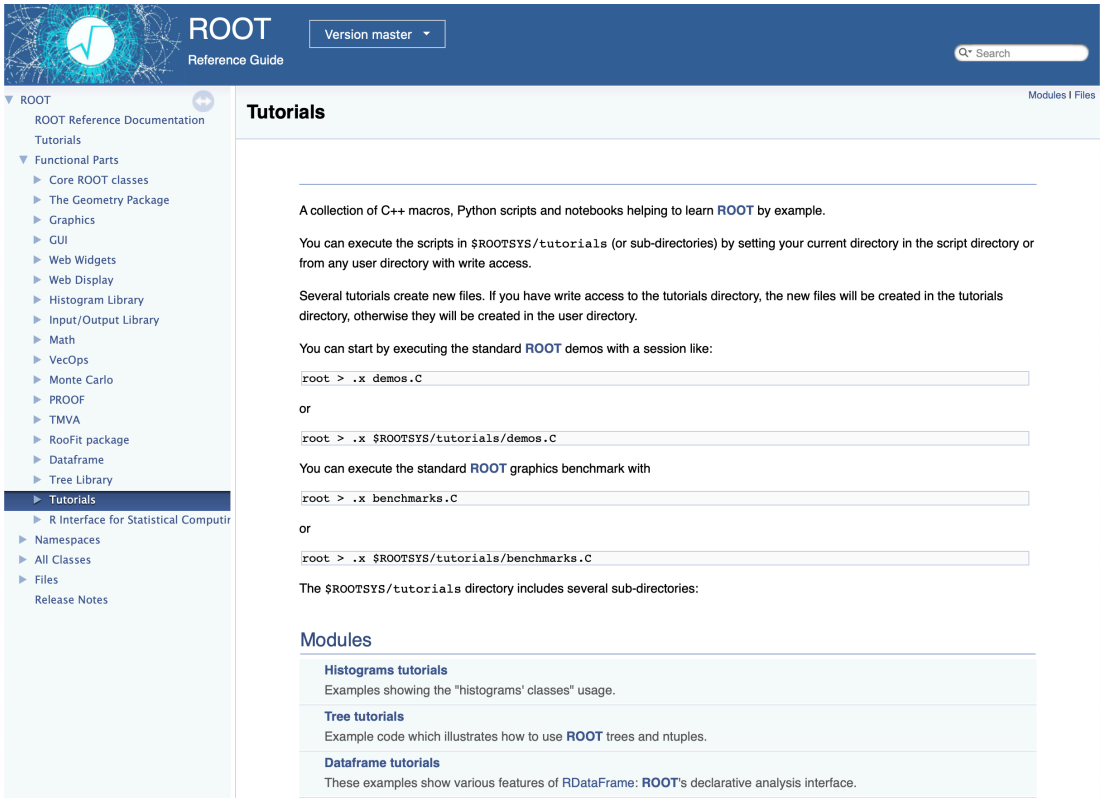
The Reference Guide is the main source of documentation.
It provides detailed information about each ROOT class or function.



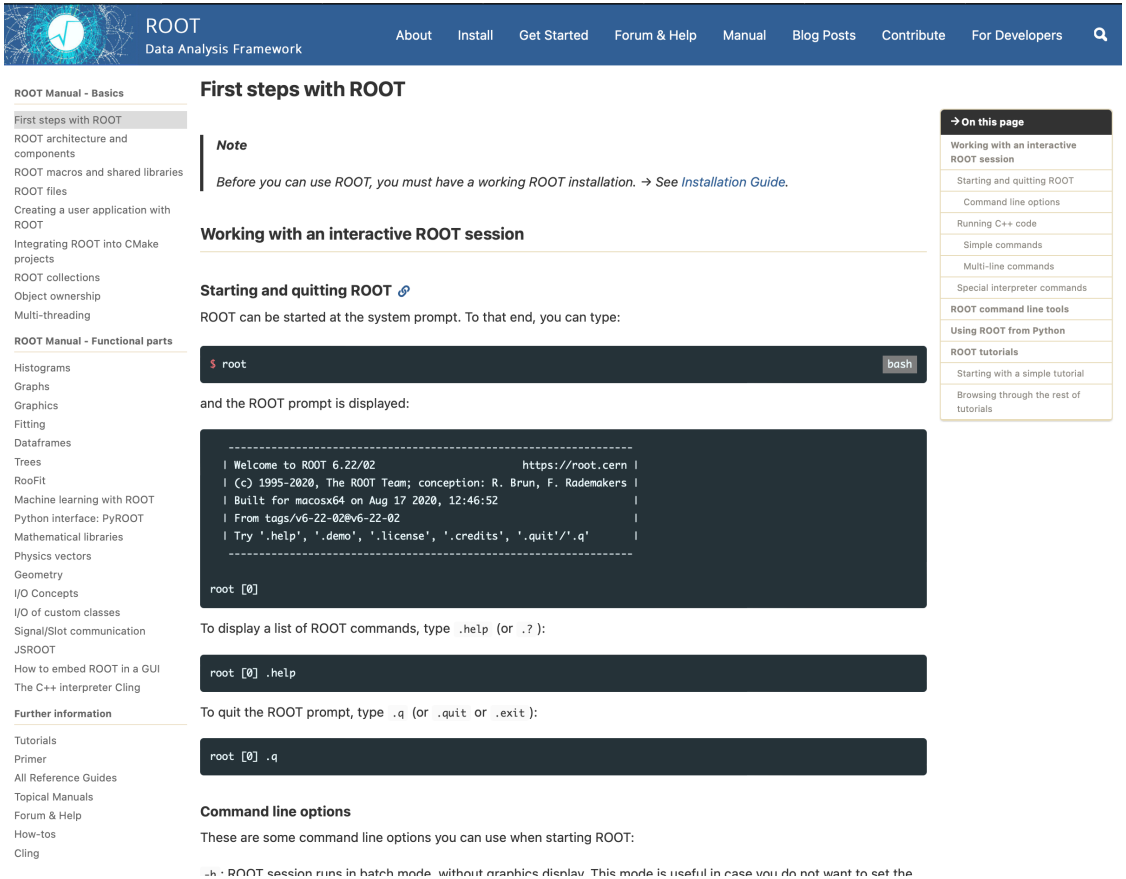
# Tutorials

The ROOT tutorials are part of the Reference Guide.
It is a collection of C++ macros, Python scripts and notebooks helping to learn ROOT by example.



# Manual

The ROOT Manual provides detailed information about the use and applications of ROOT.
The manual contains many, often interactive examples, so that you can immediately start interacting with ROOT.



ROOT
Data Analysis Framework

About | Install | Get Started | Forum & Help | Manual | Blog Posts | Contribute | For Developers

**ROOT Manual - Basics**

- First steps with ROOT
- ROOT architecture and components
- ROOT macros and shared libraries
- ROOT files
- Creating a user application with ROOT
- Integrating ROOT into CMake projects
- ROOT collections
- Object ownership
- Multi-threading

**ROOT Manual - Functional parts**

- Histograms
- Graphs
- Graphics
- Fitting
- Dataframes
- Trees
- RooFit
- Machine learning with ROOT
- Python interface: PyROOT
- Mathematical libraries
- Physics vectors
- Geometry
- I/O Concepts
- I/O of custom classes
- Signal/Slot communication
- JSROOT
- How to embed ROOT in a GUI
- The C++ interpreter Cling

**Further information**

- Tutorials
- Primer
- All Reference Guides
- Topical Manuals
- Forum & Help
- How-tos
- Cling

## First steps with ROOT

> ***Note***
>
> *Before you can use ROOT, you must have a working ROOT installation.* → See *Installation Guide*.

### Working with an interactive ROOT session

#### Starting and quitting ROOT

ROOT can be started at the system prompt. To that end, you can type:

```
$ root
```

and the ROOT prompt is displayed:

```
   ------------------------------------------------------------------
  | Welcome to ROOT 6.22/02                        https://root.cern |
  | (c) 1995-2020, The ROOT Team; conception: R. Brun, F. Rademakers |
  | Built for macosx64 on Aug 17 2020, 12:46:52                      |
  | From tags/v6-22-02@v6-22-02                                      |
  | Try '.help', '.demo', '.license', '.credits', '.quit'/'.q'       |
   ------------------------------------------------------------------

root [0]
```

To display a list of ROOT commands, type `.help` (or `.?`):

```
root [0] .help
```

To quit the ROOT prompt, type `.q` (or `.quit` or `.exit`):

```
root [0] .q
```

#### Command line options

These are some command line options you can use when starting ROOT:

`-b` : ROOT session runs in batch mode, without graphics display. This mode is useful in case you do not want to set the

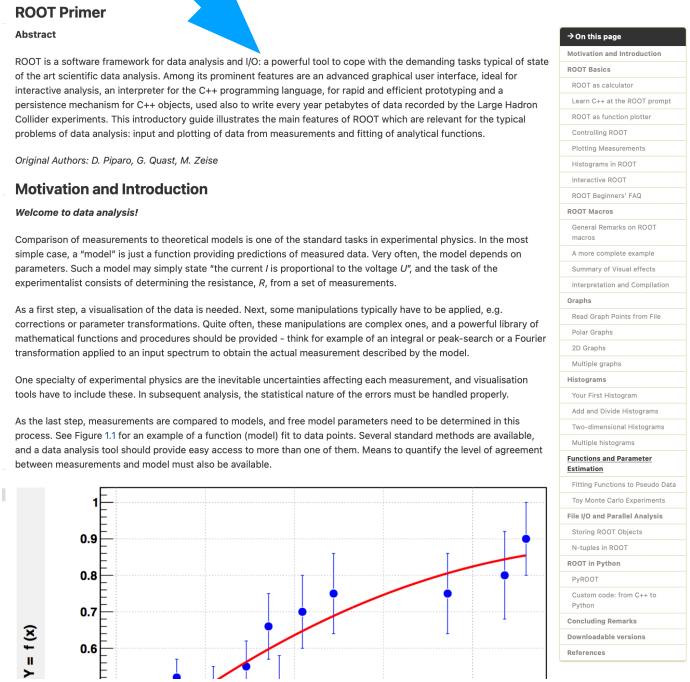
**On this page**

- Working with an interactive ROOT session
  - Starting and quitting ROOT
    - Command line options
    - Running C++ code
    - Simple commands
    - Multi-line commands
    - Special interpreter commands
- ROOT command line tools
- Using ROOT from Python
- ROOT tutorials
  - Starting with a simple tutorial
  - Browsing through the rest of tutorials

# Further information

Further source of documentation are available.
Among them:

- Topical Manuals
- Primer



ROOT Primer

Abstract

ROOT is a software framework for data analysis and I/O: a powerful tool to cope with the demanding tasks typical of state of the art scientific data analysis. Among its prominent features are an advanced graphical user interface, ideal for interactive analysis, an interpreter for the C++ programming language, for rapid and efficient prototyping and a persistence mechanism for C++ objects, used also to write every year petabytes of data recorded by the Large Hadron Collider experiments. This introductory guide illustrates the main features of ROOT which are relevant for the typical problems of data analysis: input and plotting of data from measurements and fitting of analytical functions.

*Original Authors: D. Piparo, G. Quast, M. Zeise*

Motivation and Introduction

***Welcome to data analysis!***

Comparison of measurements to theoretical models is one of the standard tasks in experimental physics. In the most simple case, a "model" is just a function providing predictions of measured data. Very often, the model depends on parameters. Such a model may simply state "the current *I* is proportional to the voltage *U*", and the task of the experimentalist consists of determining the resistance, *R*, from a set of measurements.

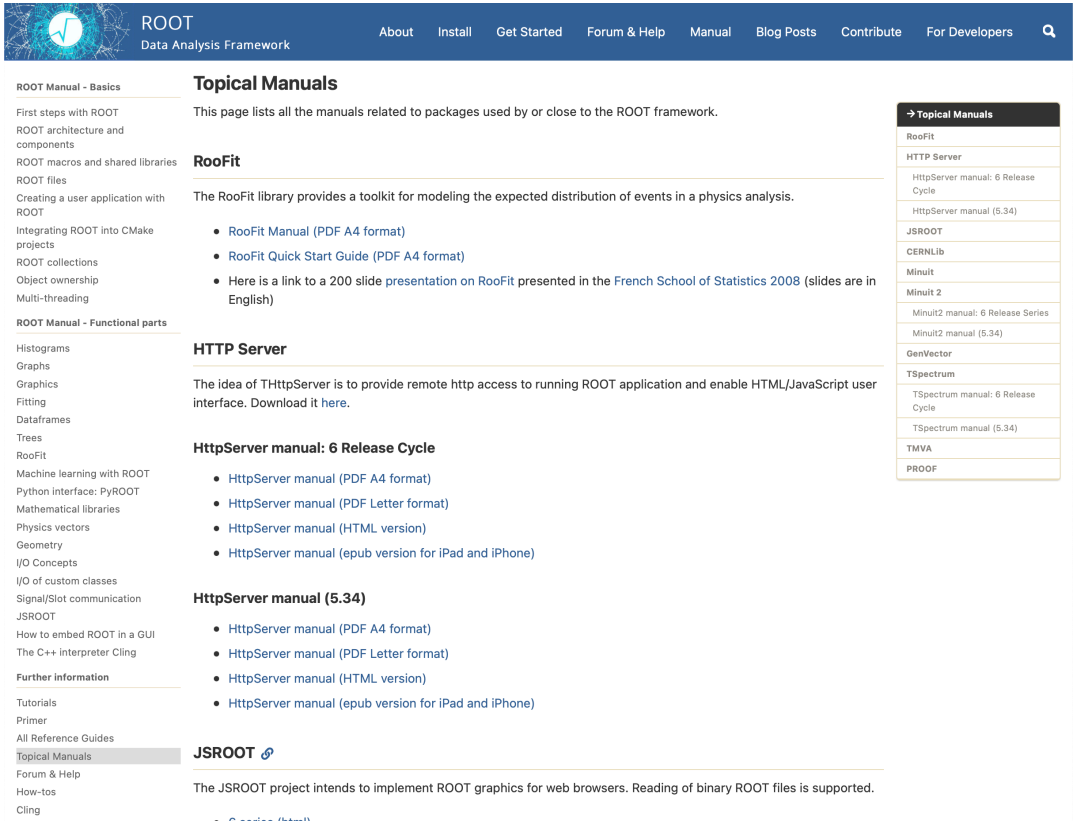
As a first step, a visualisation of the data is needed. Next, some manipulations typically have to be applied, e.g. corrections or parameter transformations. Quite often, these manipulations are complex ones, and a powerful library of mathematical functions and procedures should be provided - think for example of an integral or peak-search or a Fourier transformation applied to an input spectrum to obtain the actual measurement described by the model.

One specialty of experimental physics are the inevitable uncertainties affecting each measurement, and visualisation tools have to include these. In subsequent analysis, the statistical nature of the errors must be handled properly.

As the last step, measurements are compared to models, and free model parameters need to be determined in this process. See Figure 1.1 for an example of a function (model) fit to data points. Several standard methods are available, and a data analysis tool should provide easy access to more than one of them. Means to quantify the level of agreement between measurements and model must also be available.







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## Topical Manuals

This page lists all the manuals related to packages used by or close to the ROOT framework.

### RooFit

The RooFit library provides a toolkit for modeling the expected distribution of events in a physics analysis.

- RooFit Manual (PDF A4 format)
- RooFit Quick Start Guide (PDF A4 format)
- Here is a link to a 200 slide presentation on RooFit presented in the French School of Statistics 2008 (slides are in English)

### HTTP Server

The idea of THttpServer is to provide remote http access to running ROOT application and enable HTML/JavaScript user interface. Download it here.

#### HttpServer manual: 6 Release Cycle

- HttpServer manual (PDF A4 format)
- HttpServer manual (PDF Letter format)
- HttpServer manual (HTML version)
- HttpServer manual (epub version for iPad and iPhone)

#### HttpServer manual (5.34)

- HttpServer manual (PDF A4 format)
- HttpServer manual (PDF Letter format)
- HttpServer manual (HTML version)
- HttpServer manual (epub version for iPad and iPhone)

### JSROOT

The JSROOT project intends to implement ROOT graphics for web browsers. Reading of binary ROOT files is supported.

Topical Manuals
RooFit
HTTP Server
HttpServer manual: 6 Release Cycle
HttpServer manual (5.34)
JSROOT
CERNLib
Minuit
Minuit 2
Minuit2 manual: 6 Release Series
Minuit2 manual (5.34)
GenVector
TSpectrum
TSpectrum manual: 6 Release Cycle
TSpectrum manual (5.34)
TMVA
PROOF

# Live demonstration

Lets see how it looks like !