

School on Data Acquisition & Analysis

Inter University Accelerator Centre,
New Delhi, INDIA

Subramaniam E T

Framework

- ROOT – a flexible data framework for analysis
- Visualization : Histograms, Scatter Plots, Isometric, Cubes
- Interactiveness : C++, CLING(CINT), PyROOT, JSROOT
- Correction, Transformation, Manipulation, Inevitable uncertainties, Correlation, Comparison to models
- Portability : Almost OS independant, + **Open Source**
- Can just use the libraries to improve stability

Installation for \geq Ubuntu 18.04LTS

- Download the source tar gunzipped file **root_v6.24.06.source.tar.gz**
- Untar with `tar -zxf ...`
- Move to the dir `chdir ..`
- `mkdir obj && cd obj`
- `cmake -Dgnuinstall=ON -DPython3_EXECUTABLE=python3 \`
- `-Dxrootd=off -DCMAKE_INSTALL_PREFIX=/opt/root ..`
- `make -j 8`
- `make install`

Introduction

- `echo $ROOTSYS`
- `source optroot/bin/thisroot.sh`
- `root-config --cflags / --ldflags`
- `root-config --libs / --glibs / --evelibs`
- `root-config --python-version`
- Globals
 - `gROOT`, `gStyle`, `gPad`, `gSystem`

Data Types

- (U)Short_t, (U)Int_t, (U)Long_t
- Float_t, Double_t
- TH1 I/F/D, TH2 I/F/D
- TF1, TF2
- TFile, TChain

Peep into ROOT

- **Function Plotter**

- TF1 s ("func", "sin(x)/x", 0., 10.)
- TF1 c ("func", "cos(x)/x", 0., 10.)
- s.SetLineColor (kRed);
- c.SetLineColor (kBlue);
- s.Draw ();
- c.Draw ("same");

- **MACROS**

- .x macroName
- .L macroName (+)
- macroName ()

Stand Alone Macro

```
#ifndef __CINT__  
void main ()  
{  
    TApplication theApp  
        ("App", &argc, argv, (void*)NULL, -1);  
    MyMacro (argc, argv);  
    TheApp.Run ();  
}  
#endif
```

MyMacro.C

```
TCanvas c ("MyCanvas", "IUAC", 200, 10, 1200, 800);
Trandom3 rng (23456789);
TH1D h ("MyHist", "IUAC", 1000, 0, 10);
kUPDATE = 1000;
for (i=0; i<10000; ++i) {
    value = rng.Gaus(5, 1);
    h.Fill(value);
    If (i && (i % kUPDATE)) {
        h.Draw();
        c.Modified();
        c.Update();
    }
}
```


Histogram Manipulations

TH1 I/F/D

- `TH1D*h1 = new TH1D ("Name", "Title", NumBins, minX, maxX)`
- Draw (options) "sukirome"
- Get / Set BinContent (bin (,val))
- Integral (fromX, uptoX)
- ShowPeaks (sigma, option, resolution)
- ShowBackground (numIter)
- SetTitle
- GetX / Y Axis
- SetTitle, SetRange, SetRangeUser