



History: “Go4 turns 16”

Review: Go4 features - as told at ROOT workshops

New V5.0: Go4 with/for ROOT THttpServer & JSROOT

Summary

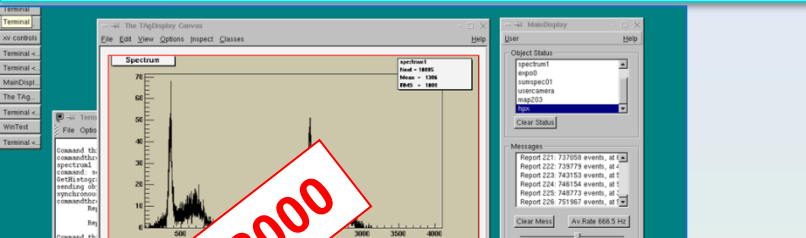




- **Development start: April 1999** - GSI hires 2 postdocs for **GSI Object Oriented Online Offline (Go4) project**
aim: successor of GOOSY (VMS), analysis of MBS DAQ data
- Go4 v.1.0 May 2002 - first complete version:
analysis framework, Qt-ROOT GUI, inter-task communication
- Go4 v.2.0 November 2002 - first public production release
- Go4 v.3.0 December 2005 - analysis server, GUI redesign
- Go4 v.4.0 February 2008 - Qt4
- **Go4 v.5.0 June 2015 :**
Qt5, ROOT6, THttpServer , JSROOT/jQuery UI GUI

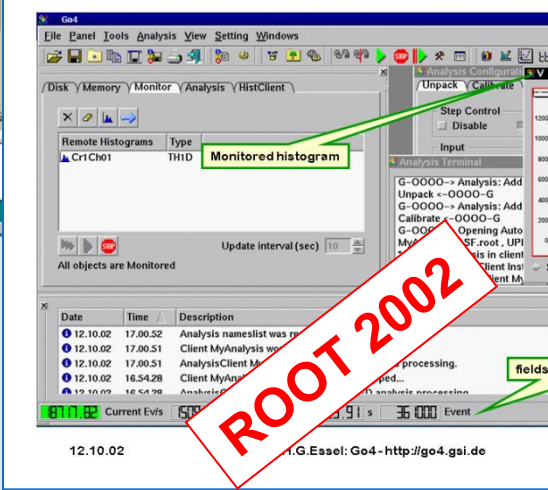
Go4 developers:

Jörn Adamczewski-Musch, Mohammad Al-Turany, Denis Bertini,
Hans.G.Essel, Marc Hemberger, Sergey Linev

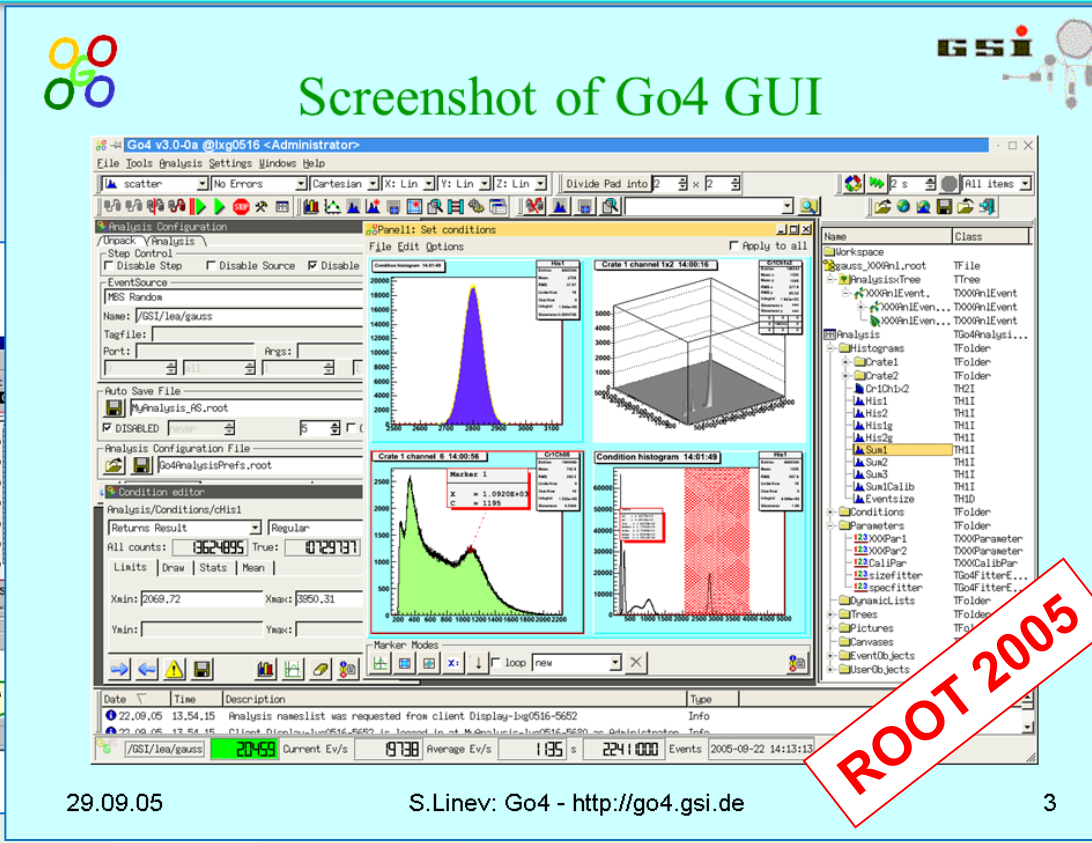


ROOT 2000

Analysis started and running



ROOT 2002



29.09.05

S.Linev: Go4 - <http://go4.gsi.de>

ROOT 2005

3

- ROOT object monitoring
 - interactive control and configuration
=> elaborate GUI required!
- decided for **Qt graphics library** (with *GUI designer tool*),
embed ROOT graphics with **QtROOT interface**





Go4 V5 with ROOT http server and client

optionally use [generic ROOT THttpServer](#) in Go4 analysis process

(please see [THttpServer presentation by S. Linev](#))

- any web browser may display and control Go4 objects
- JavaScript ROOT GUI extended by [Go4 specific GUI \(jQuery UI\)](#)
- [Go4 Qt GUI](#) can communicate with [Go4 analysis via http server](#) with (almost) full functionality
- [Faster start-up](#) of http server connection than Go4 taskhandler, less resource consumption!
- [Go4 Qt GUI](#) can also display objects from [any ROOT THttpServer](#)
-> better performance than browser with JavaScript ROOT display



any web browser!

Go4 specific elements

JSROOT environment

The screenshot shows the Go4 V5 web GUI interface. On the left is the JSROOT environment sidebar with a tree view of the analysis structure. The main area contains several panels:

- Analysis Client:** Shows the status of various histograms (e.g., Histogram Cr1Ch01, Cr2Ch02, etc.) and their loading progress.
- Return Result:** Displays summary statistics: All counts: 16430389, True: 12941538, 78.76%. It also includes input fields for XMin (100), XMax (2000), YMin, and YMax.
- Step Control:** Includes checkboxes for 'Enable Step', 'Source', and 'Store', and a dropdown for 'Event Source' (MBS Random).
- Auto Save File:** Shows the save path: Go4AnalysisASF.root.
- Plots:**
 - Events processing rate:** A line plot showing the rate over time.
 - Condition histogram:** A histogram showing the distribution of a condition.
 - Event size [b]:** A histogram showing the distribution of event sizes.
 - Crate 1 channel 1x2:** A 2D histogram showing the distribution of data in a specific channel.
 - 3D Plot:** A 3D visualization of the data distribution.
- Parameters:** A table for 'XXXXParameter' and 'TXXXXParameter' with columns for Name, Type, Value, and Comments.
- Status Bar:** Displays real-time statistics: 169032.3 Ev/s, 166389.2 Ev/s, 11.0 s, 1835700 Ev.





Analysis configuration editor

- enable/disable „analysis steps“
- select event input (MBS online, MBS file, ROOT TTree, user plug-in)
- select event stores (ROOT TTree)
- specify histogram/object store (ROOT TFile)
- specify default setup (ROOT TFile)





Analysis configuration editor (Qt4)



Step selection



Analysis Configuration

Raw xxx / Profile xoo

Step Control

Enable Step Source Store

Event source

MBS Stream Server

Name: depc418

Port: dflt Tmout: 1 s Retr: never

0 all 1

Event store

Go4FileStore (1 tree/step) (*.root)

Name: /data/test/unpack5.root

99 32 kB 5 1000 Overwrite

Auto Save File

Go4AnalysisASF.root

Enabled 500 s 5 Overwrite

Analysis Configuration File

Go4AnalysisPrefs.root

Submit Submit+Start Close

Event input

Event output

Object persistency

Load/save config

Apply and Refresh





Unpack Analysis

Step Control

Enable Step Source Store

Event Source

MBS Stream Server

Name: more...

Port: Tmout (s): Retr (s):

First: Last: Step:

Event store

Go4FileStore (*.root)

Name:

Auto Save File

Enabled Overwrite

Analysis Configuration File

Submit Submit+ Start Close





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Condition display and editor

TGo4Condition: checks if value x / point (x,y) is inside a 1D/2D region

- condition types: window, polygon (TCutG), ellipse, circle, box
- manipulate condition limits and operation modes
- draw condition together with corresponding TH1/TH2



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Parameter editor

TGo4Parameter: user subclass (plug-in) keeps parameter variables

- change values of fundamental ROOT data type members
- support C arrays of those (1D,2D,3D)
- show data member comments/explanations





```
#include "TGo4Parameter.h"
#include "TArrayI.h"

class TXXXParameter : public TGo4Parameter {
public:
    TXXXParameter(const char* name = 0);
    virtual ~TXXXParameter() {}

    Float_t frP1; // Offset for calibration
    Float_t frP2; // Factor for Calibration
    Bool_t fbHisto; // Enable Histogramming
    TArrayI fArr; // example of usage of TArray in the parameter
    Int_t fArr2[3][4]; // example of 2d array usage
    Int_t fArr3[3][4][5]; // example of 3d array usage (works only
with browser)

    ClassDef(TXXXParameter, 2)
};
```




Summary

Go4 “turns 16”: has continuously being improved together with ROOT

Go4 is still alive and in action (~50 various users):

- **atomic/nuclear/plasma physics analysis**
- **detector tests monitoring**
- **frontend electronics characterization**

New Go4 version 5 introduces THttpServer and jQuery UI GUI:

- **Go4 analysis can be controlled by any (?) web browser**
- **Go4 Qt GUI can visualize Go4 analysis and any THttpServer**

Custom GUI elements can be added to JSROOT default GUI

(take Go4 configuration/condition/parameter editors as example)

Go4 v5.0 is available under GPL at <http://go4.gsi.de>