

FCC Software meets

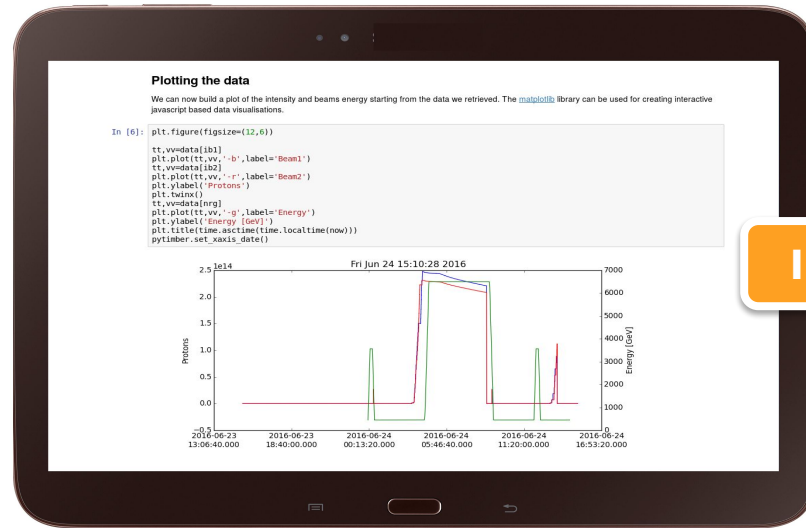


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Introduction to Notebooks

Jupyter Notebook: A web-based **interactive computing** interface and platform that combines **code, equations, text and visualisations**



In a Browser

Credit slide: [Eric Tejedor](#), [Danilo Piparo](#)

Introduction to Notebooks

Text

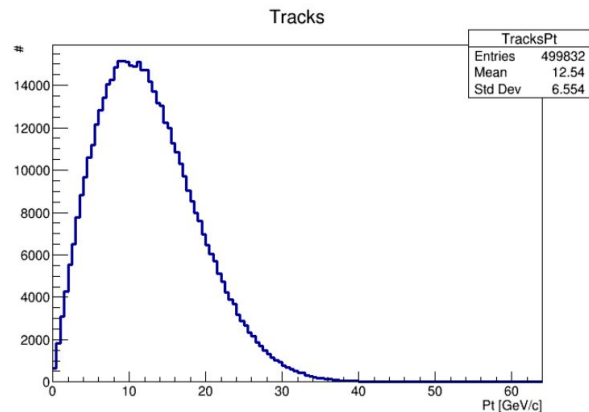
Code

Graphics

Access TTree in Python using PyROOT and fill a histogram

Loop over the TTree called "events" in a file located on the web. The tree is accessed with the dot operator. Same holds for the access to the branches: no need to set them up - they are just accessed by name, again with the dot operator.

```
In [1]: import ROOT
f = ROOT.TFile.Open("http://indico.cern.ch/event/395198/material/0/0.root");
h = ROOT.TH1F("TracksPt", "Tracks;Pt [GeV/c];#", 128, 0, 64)
for event in f.events:
    for track in event.tracks:
        h.Fill(track.Pt())
c = ROOT.TCanvas()
h.Draw()
c.Draw()
```



<http://jupyter.org/>

Credit slide: [Enric Tejedor](#), [Danilo Piparo](#)

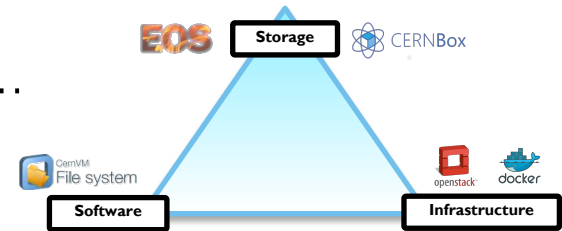
SWAN: Data analysis “as a service”

Interface: Jupyter Notebooks



Goals:

- Analysis **only with a web browser**
 - Platform independent ROOT-based data analysis
 - Calculations, input and results “**in the Cloud**”
- **Easy sharing** of scientific results: plots, data, code
 - Storage is crucial: mass & synchronised
- **Simplify teaching** of data processing and programming
- Integration with other **analysis ecosystems**: R, Python, ...



Credit slide: [Enric Tejedor](#), [Danilo Piparo](#)

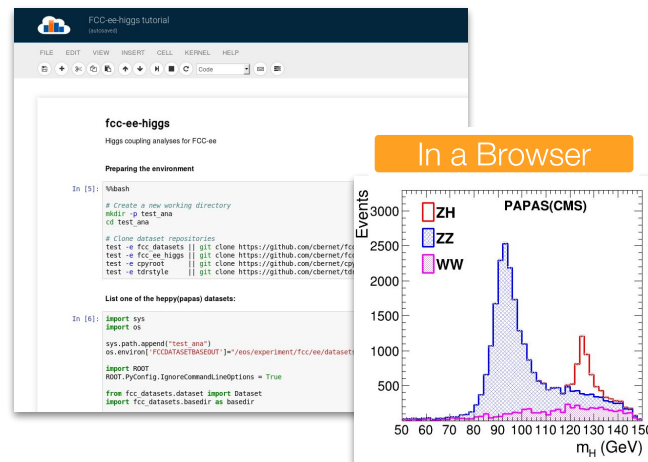
FCC Analysis in SWAN

Features:

- Analysis **only with a web browser**
- **Easy sharing** of scientific results: plots, data, code
- **Simplify teaching** of data processing and programming
- Integration with other **analysis ecosystems**: R, Python, ...



FCC Software environment



SWAN Configuration

FCCSW

FCC Specific dependencies

LCG Releases



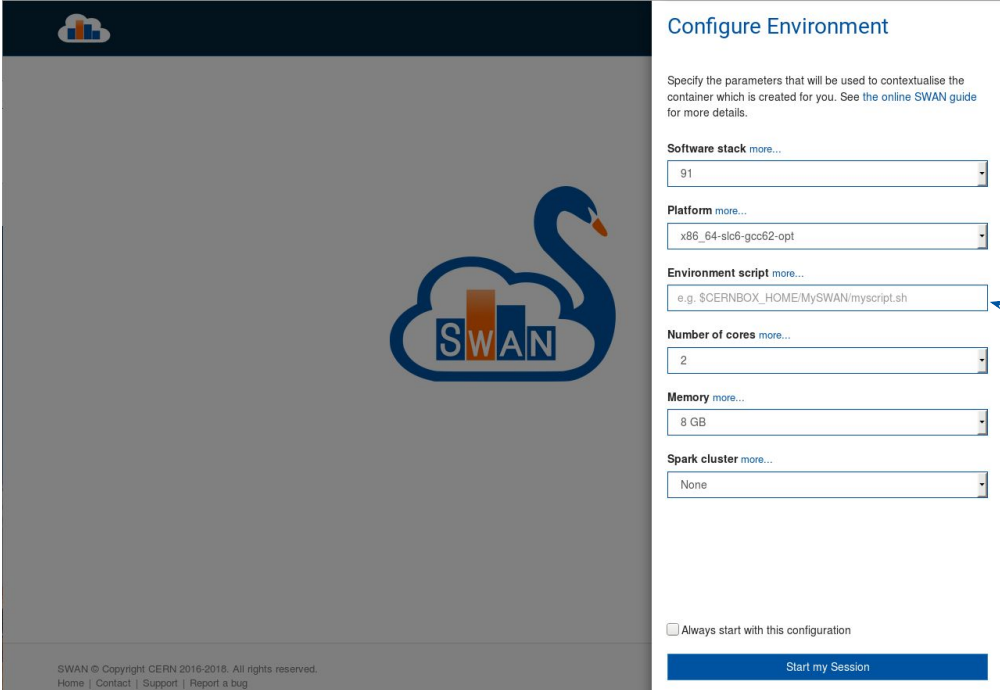
Let's try it

General use:

1. Go to swan.cern.ch
2. In **Software stack**, select the LCG Release
3. Start the session

FCC Specific environment:

1. Go to swan.cern.ch
2. Set **Environment script**
3. Start the session



New interface (beta version)

Configure Environment

Specify the parameters that will be used to contextualise the container which is created for you. See the [online SWAN guide](#) for more details.

Software stack [more...](#)
91

Platform [more...](#)
x86_64-slc6-gcc62-opt

Environment script [more...](#)
e.g. \$CERNBOX_HOME/MySWAN/myscript.sh

Number of cores [more...](#)
2

Memory [more...](#)
8 GB

Spark cluster [more...](#)
None

Always start with this configuration

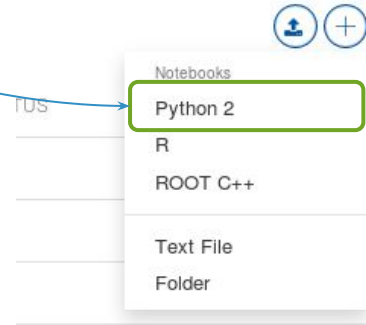
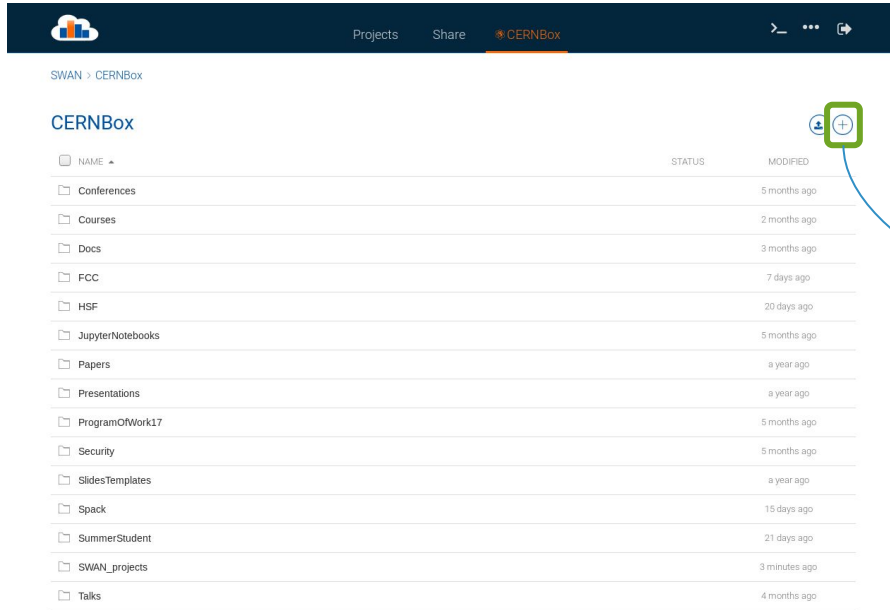
[Start my Session](#)

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```
/cvmfs/fcc.cern.ch/testing/sw/views/stable-swan/x86_64-slc6-gcc62-opt/setup.sh
```

New Python Notebook

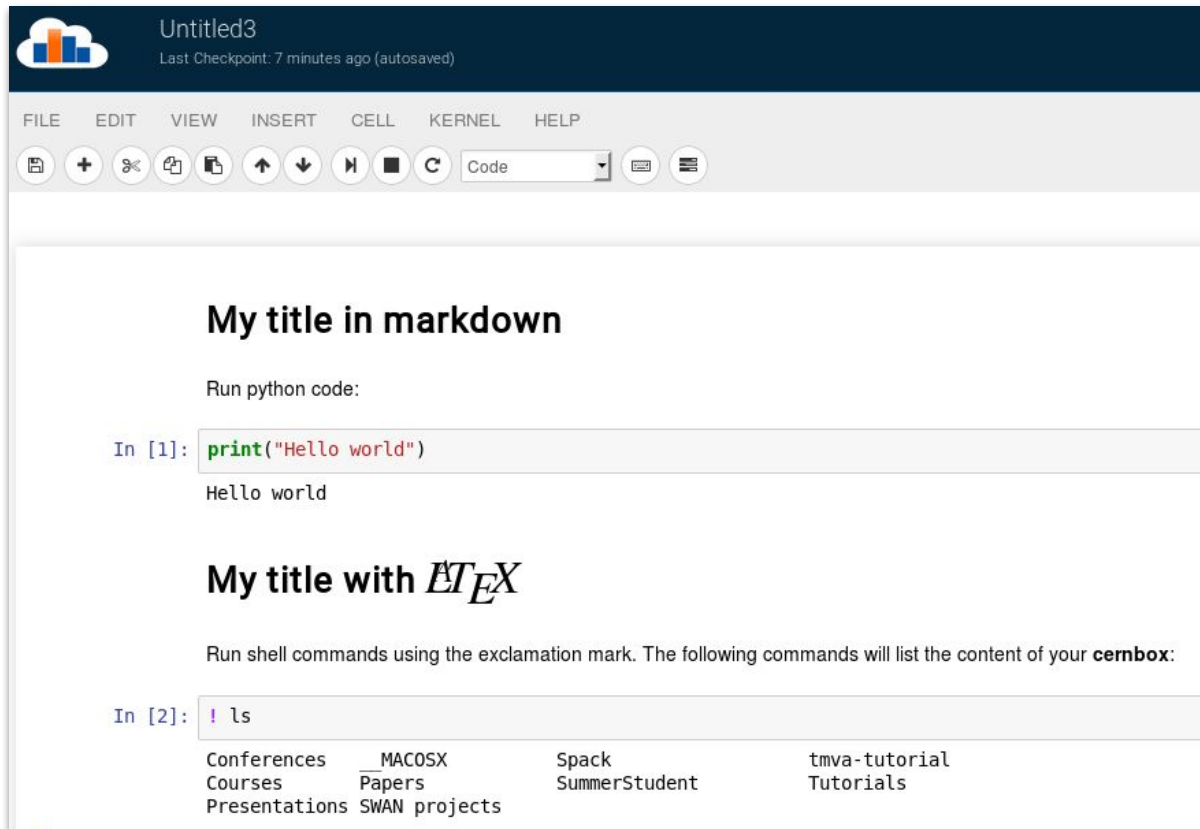
New interface (beta version)



Different types of notebooks available

Access to your Cernbox user space

Start coding



The screenshot shows a Jupyter Notebook window titled "Untitled3" with a dark blue header. Below the header is a menu bar with options: FILE, EDIT, VIEW, INSERT, CELL, KERNEL, HELP. A toolbar contains icons for file operations, navigation, and execution. The main content area displays two markdown cells. The first cell has a bold heading "My title in markdown", followed by the text "Run python code:". Below this is a code input field with "In [1]: print('Hello world')", and the output "Hello world". The second cell has a bold heading "My title with *LaTeX*", followed by the text "Run shell commands using the exclamation mark. The following commands will list the content of your **cmbox**:". Below this is a code input field with "In [2]: ! ls", and the output of the command: "Conferences", "Courses", "Presentations", "_MACOSX", "Papers", "SWAN projects", "Spack", "SummerStudent", "tmva-tutorial", and "Tutorials".

New interface (beta version)

Demo

- *FCC Tutorial*
 - [FCC: Getting started with the production and analysis of fast-simulated events](#)

- Tutorial in Swan - [Download it from my Cernbox](#)
 - Clone it to your space
 - Open a new Swan (using the FCC environment) session and open it

Incoming Swan versions:

- Easier sharing
- Easier experiment setups

Resources

- SWAN Web: <http://swan.web.cern.ch/>
- SWAN Galleries: <http://swan.web.cern.ch/content/basic-examples>
- [Jupyter notebooks and Swan episodes](#), included in the ROOT Cern Training Basic Course