Australian Government

Python for Instrument and Data

David Männicke

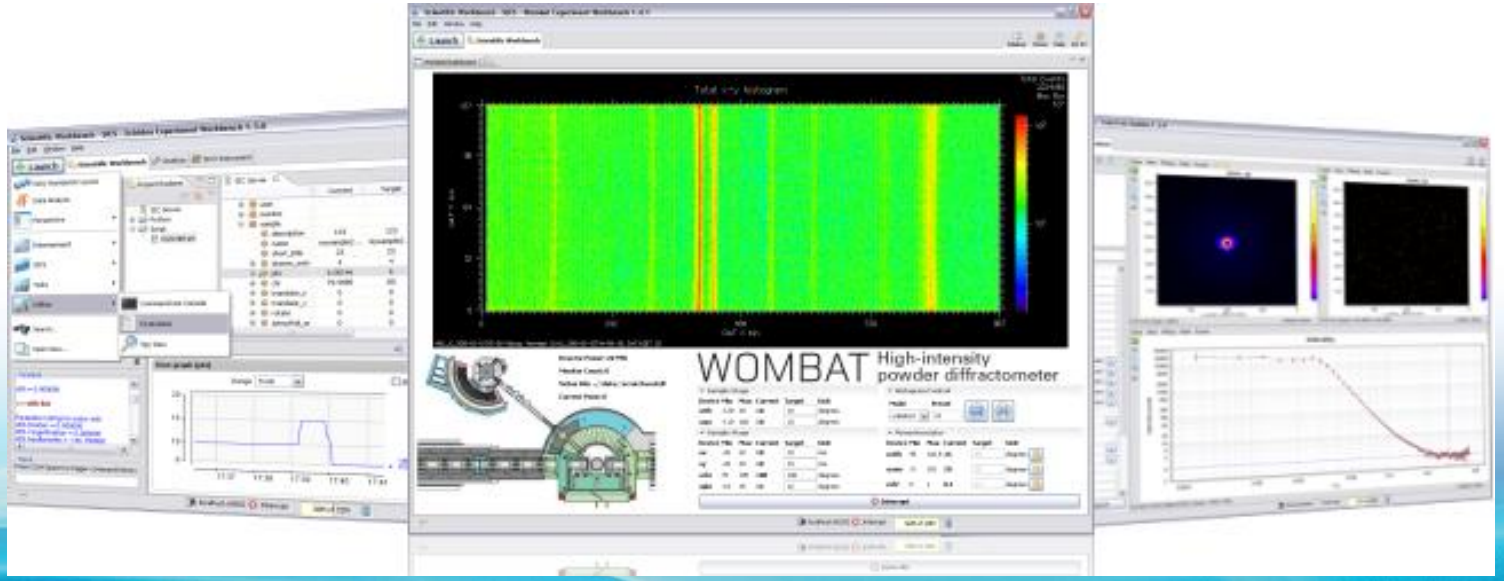
Australian Nuclear Science and Technology Organisation

Overview

- What is GumTree
- Data Management
- Python and GumTree
- Experiment Influence

GumTree

- Instrument Control and Data Acquisition
- Data Correction and Reduction
- Open Source Project
- Operating System independent



Core Components

- **Data Management with CDMA**

  Dataset is a composition of information

- **Scripting**

  Task automation e.g. Data Acquisition and Reduction

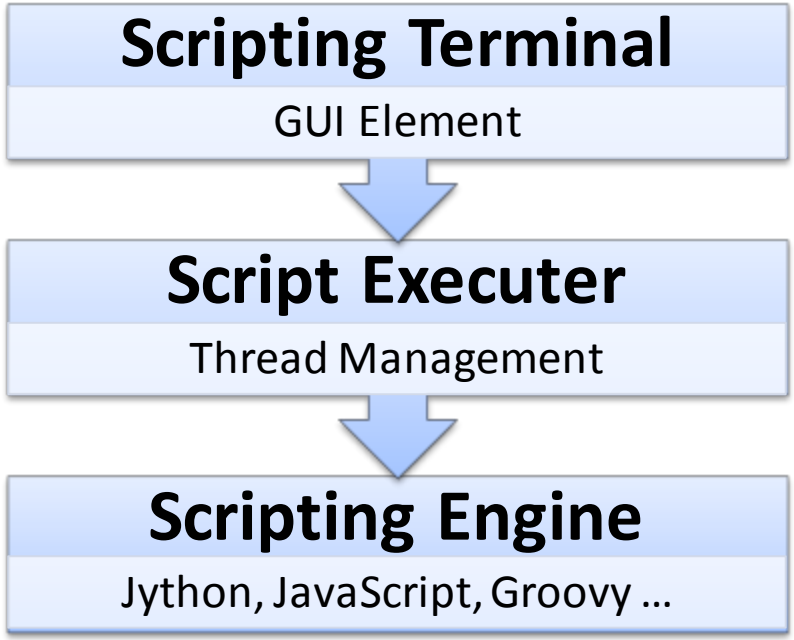
- **Visualization**

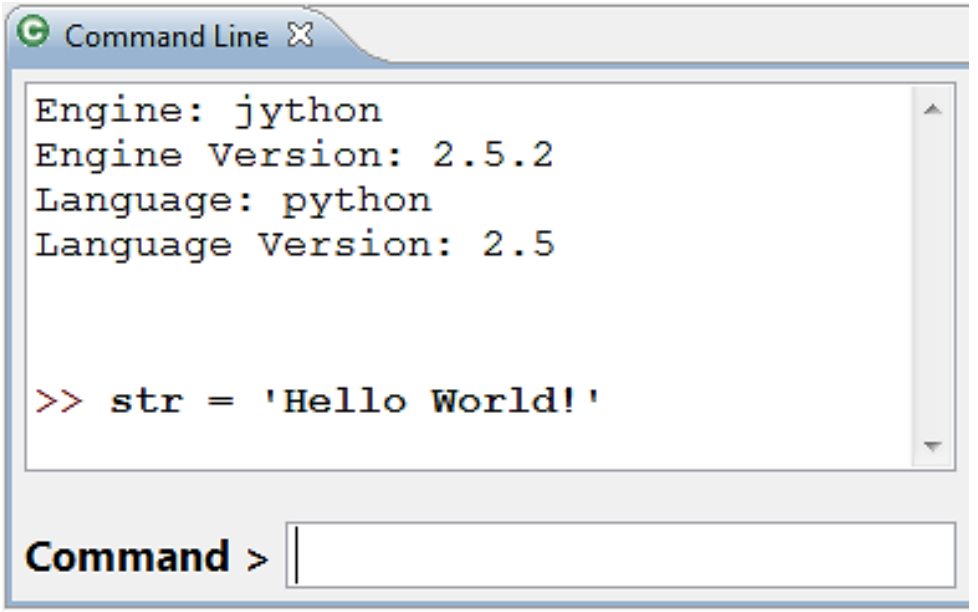
  1D, 2D and 3D Data Plots

- Workflow, Task management, Dashboard, …

Components can be shared across Organisations

Python in Gumtree





Scripts can be executed “on the fly”

CDMA in Python

- **Object Oriented Data Structure**

  Detector Data, Error Statistics, Metadata, etc.

- **Allows to slice and dice data**

  Metadata is appropriately forwarded

- **Fundamental Math Operations**

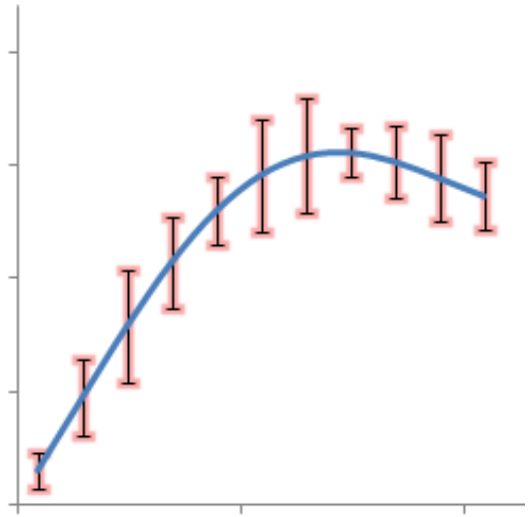
  Arithmetic, Trigonometric and Summation

- **Error Propagation**

  Poisson Statistics

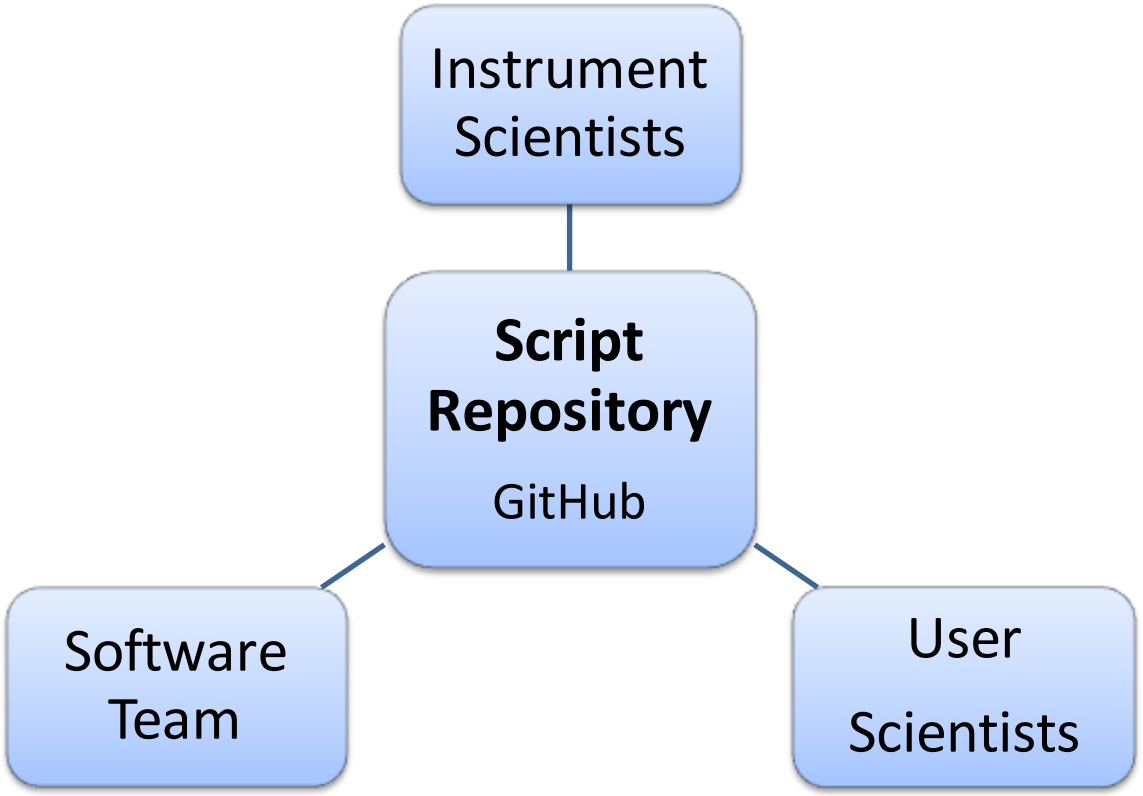
Correction and Reduction Scripts

- Statistical Analysis
- Background and Efficiency Corrections
- Geometry Corrections
- Horizontal/Vertical/Circular Integration
- …



Scientists can review, modify and create scripts

Script Synchronisation

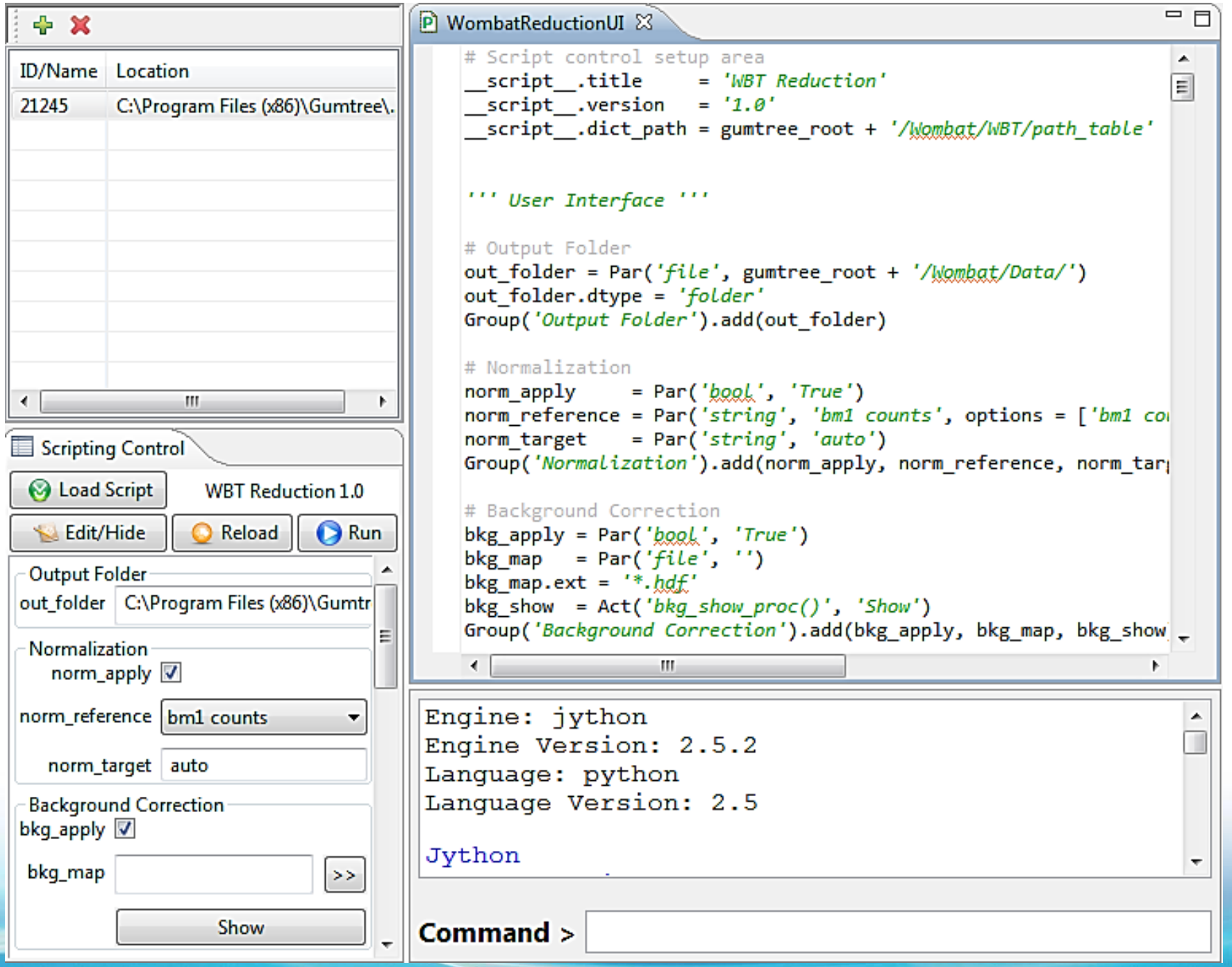


Central Repository enables Version Control and Sharing

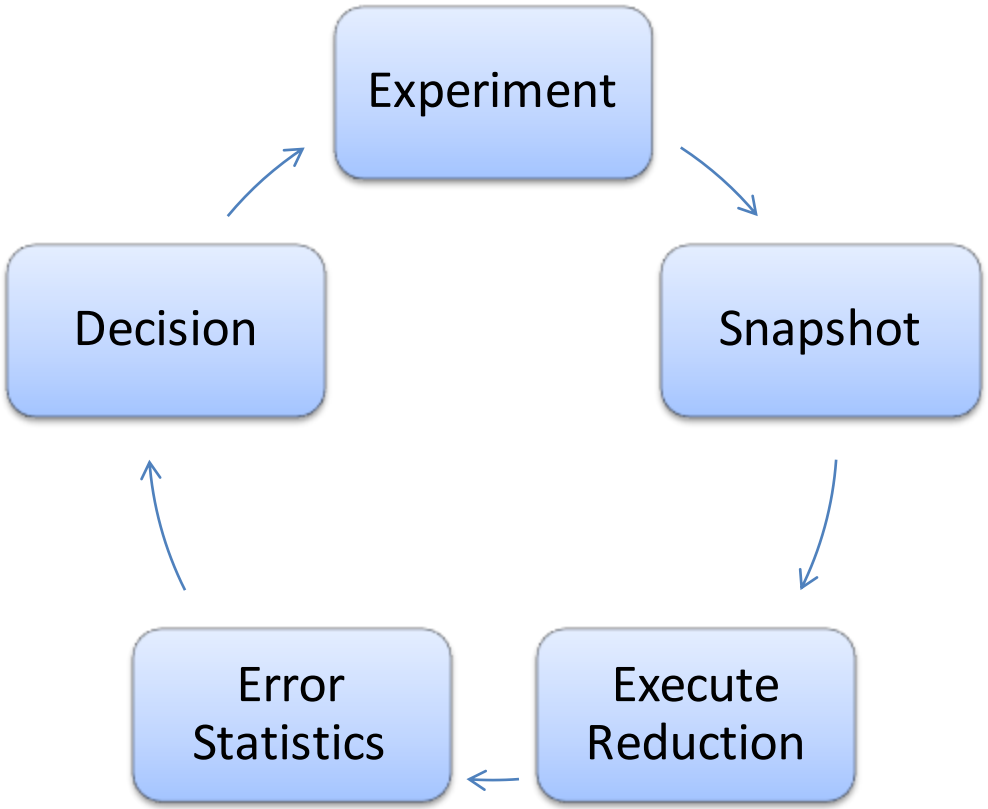
Generated GUI

- Simplifies interaction with Scripts
- Minimizes repetitive Tasks
- Better User Experience

Final users don’t need to know anything about Python


ID/Name
Location
21245
C:\Program Files (x86)\Gumtree\.
Scripting Control
Load Script
WBT Reduction 1.0
Edit/Hide
Reload
Run
Output Folder
out_folder
C:\Program Files (x86)\Gumtr
Normalization
norm_apply
norm_reference
bm1 counts
norm_target
auto
Background Correction
bkg_apply
bkg_map
>>
Show
WombatReductionUI
# Script control setup area
__script__.title = 'WBT Reduction'
__script__.version = '1.0'
__script__.dict_path = gumtree_root + '/Wombat/WBT/path_table'
''' User Interface '''
# Output Folder
out_folder = Par('file', gumtree_root + '/Wombat/Data/')
out_folder.dtype = 'folder'
Group('Output Folder').add(out_folder)
# Normalization
norm_apply = Par('bool', 'True')
norm_reference = Par('string', 'bm1 counts', options = ['bm1 co
norm_target = Par('string', 'auto')
Group('Normalization').add(norm_apply, norm_reference, norm_tar
# Background Correction
bkg_apply = Par('bool', 'True')
bkg_map = Par('file', '')
bkg_map.ext = '*.hdf'
bkg_show = Act('bkg_show_proc()', 'Show')
Group('Background Correction').add(bkg_apply, bkg_map, bkg_show
Engine: jython
Engine Version: 2.5.2
Language: python
Language Version: 2.5
Jython
Command >

Beam-Time Optimisation



Improve usage of available time

Summary

- **Data Management**

  CDMA provides interface

- **Benefits of Scripting**

  Software Developers ↔ Scientists

- **Synchronisation is important**

  Usage of Script repository

- **Beam-Time Optimisation**

  Online Correction and Reduction

Summary

- **Data Management**

  CDMA provides interface

- **Benefits of Scripting**

  Software Developers ↔ Scientists

- **Synchronisation is important**

  Usage of Script repository

- **Beam-Time Optimisation**

  Online Correction and Reduction

Thank You

Credits

- **ANSTO (Australia)**

  Tony Lam, Norman Xiong, Nick Hauser

- **SOLEIL (France)**

  Majid Ounsy, Stephane Poirier, Clement Rodriguez, Katy Saintin, Alain Buteau

- **ESRF (France)**

  Andy Götz

- **DESY (Germany)**

  Eugen Wintersberger