

# Rewriting ROOT's find\_python\_module

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ROOT  
Data Analysis Framework  
<https://root.cern>

# Remember this in CTest?

- ▶ ROOT was testing for python packages at test time
- ▶ Not finding a package would fail the test suite
  - Not great for e.g. stacks ([Andre's talk](#))
  - Why don't we disable like for C++ packages?
- ▶ Running the detection every time wastes resources
- ▶ → Could we detect presence/absence of Python packages at configure time?

```
1/9 Test #80: test-import-numba .....***Failed 0.06 sec
   Start 1111: tutorial-analysis-dataframe-df038_NumbaDeclare-py
Failed test dependencies: test-import-numba
2/9 Test #1111: tutorial-analysis-dataframe-df038_NumbaDeclare-py .....***Not Run 0.00 sec
3/9 Test #16: test-import-numpy ..... Passed 0.16 sec
4/9 Test #1103: test-import-numpy ..... Passed 0.16 sec
   Start 59: pyunittests-bindings-pyroot-pythonizations-pyroot-pyz-rdataframe-asnumpy
   Start 58: pyunittests-bindings-pyroot-pythonizations-pyroot-pyz-rdataframe-makenumpy
   Start 71: pyunittests-bindings-pyroot-pythonizations-pyroot-roofit-roodataset-numpy
   Start 68: pyunittests-bindings-pyroot-pythonizations-pyroot-roofit-roodatahist-numpy
5/9 Test #1154: tutorial-math-vecops-vo008_numpyInterface-py ..... Passed 1.49 sec
6/9 Test #68: pyunittests-bindings-pyroot-pythonizations-pyroot-roofit-roodatahist-numpy ... Passed 2.36 sec
7/9 Test #71: pyunittests-bindings-pyroot-pythonizations-pyroot-roofit-roodataset-numpy ... Passed 3.20 sec
8/9 Test #58: pyunittests-bindings-pyroot-pythonizations-pyroot-pyz-rdataframe-makenumpy ... Passed 22.66 sec
9/9 Test #59: pyunittests-bindings-pyroot-pythonizations-pyroot-pyz-rdataframe-asnumpy ..... Passed 31.98 sec

78% tests passed, 2 tests failed out of 9

Label Time Summary:
python_runtime_deps = 60.20 sec*proc (5 tests)
tutorial            = 1.49 sec*proc (2 tests)

Total Test time (real) = 32.46 sec

The following tests FAILED:
 80 - test-import-numba (Failed)
1111 - tutorial-analysis-dataframe-df038_NumbaDeclare-py (Not Run) python_runtime_deps tutorial
```



# More Motivation

- ▶ ROOT didn't complain about not finding numba, although it complained about sonnet. Why?
- ▶ ROOT seemed to be searching for other packages, but the result wasn't visible:

```
-- Could NOT find Python module sonnet  
-- Could NOT find Python module graph_nets
```

- ▶ Reasons:
  - `find_python_package` was defined both in ROOT and in llvm with the same name and the same output variables
  - If llvm searched for something, it would interfere with ROOT's search
  - Many package searches were silenced, because the search would be repeated numerous times



# Check at Configure Time

- ▶ ROOT's implementation is now `ROOT_FIND_PYTHON_PACKAGE` [#17477](#)
- ▶ ROOT checks once at configure time
- ▶ Cached across CMake runs
- ▶ Users can override:  
`$ cmake .`

```
ROOT_TEST_GRAPH_NETS    OFF
ROOT_TEST_NUMBA         OFF
ROOT_TEST_NUMPY         ON
ROOT_TEST_PANDAS        OFF
ROOT_TEST_SONNET        OFF
ROOT_TEST_XGBOOST       OFF
```

## 1st configure run:

```
[...]
-- Distributed RDataFrame enabled
-- RapidYAML not found, only compiling RooFit with nlohmann-json parser
-- Found Firefox browser executable
/Applications/firefox.app/Contents/MacOS/firefox
-- Found Python module numpy
-- Could NOT find Python module sonnet. Corresponding tests will be disabled.
-- Could NOT find Python module graph_nets. Corresponding tests will be disabled.
-- Could NOT find Python module numba. Corresponding tests will be disabled.
-- 573/908 C++ tutorials have been activated.
-- 195/258 python tutorials have been activated.
```

## 2nd run:

```
-- Found Firefox browser executable
/Applications/firefox.app/Contents/MacOS/firefox
-- 573/908 C++ tutorials have been activated.
```



- ▶ Tests now show as "disabled"

## Important take-away:

Test stay disabled until one of the following happens:

- ▶ Fresh configure (Remove CMakeCache)
- ▶ Toggle `ROOT_TEST_${package}`
  - `cmake -DROOT_TEST_NUMBA=On .`
  - `ccmake .`
- ▶ Remove `ROOT_TEST_${package}` from CMakeCache and reconfigure

```
1/6 Test #1108: tutorial-analysis-dataframe-df038_NumbaDeclare-py .....***Not Run (Disabled)
Start   58: pyunittests-bindings-pyroot-pythonizations-pyroot-pyz-rdataframe-asnumpy
Start   57: pyunittests-bindings-pyroot-pythonizations-pyroot-pyz-rdataframe-makenumpy
Start   70: pyunittests-bindings-pyroot-pythonizations-pyroot-roofit-roodataset-numpy
Start   67: pyunittests-bindings-pyroot-pythonizations-pyroot-roofit-roodatahist-numpy
Start  1149: tutorial-math-vecops-vo008_numpyInterface-py
2/6 Test #1149: tutorial-math-vecops-vo008_numpyInterface-py ..... Passed    1.54 sec
3/6 Test #67: pyunittests-bindings-pyroot-pythonizations-pyroot-roofit-roodatahist-numpy ... Passed    2.43 sec
4/6 Test #70: pyunittests-bindings-pyroot-pythonizations-pyroot-roofit-roodataset-numpy ... Passed    3.28 sec
5/6 Test #57: pyunittests-bindings-pyroot-pythonizations-pyroot-pyz-rdataframe-makenumpy ... Passed   23.66 sec
6/6 Test #58: pyunittests-bindings-pyroot-pythonizations-pyroot-pyz-rdataframe-asnumpy ..... Passed   32.05 sec

100% tests passed, 0 tests failed out of 5

Label Time Summary:
python          = 61.43 sec*proc (4 tests)
python_runtime_deps = 61.43 sec*proc (5 tests)
tutorial        =  1.54 sec*proc (2 tests)

Total Test time (real) = 32.36 sec

The following tests did not run:
 1108 - tutorial-analysis-dataframe-df038_NumbaDeclare-py (Disabled)
```

## CMakeCache.txt

```
ROOT_TEST_GRAPH_NETS OFF
ROOT_TEST_NUMBA OFF
ROOT_TEST_NUMPY ON
ROOT_TEST_PANDAS OFF
ROOT_TEST_SONNET OFF
ROOT_TEST_XGBOOST OFF
```

