
CERN

Python 2.x to Python 3.x software stack migration

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Introduction

Why?

End of support and updates for Python 2.x

- `Python 2.6.x` ended with *2.6.9* in 2013
- `Python 2.7.x` will end in 2020
- `No more 2.x`

Why?

- *NumPy*, *SciPy*, *matplotlib*, *Pandas*, *IPython*, *SymPy* and many others scientific Python libraries are all compatible with Python 3 and **support for some packages will be available only for python 3.x**
- Advanced string processing
- Other *fancy* features

New features

- Advanced unpacking
- Keyword only arguments
- Chained exceptions
- Everything is an iterator
- No more comparison of everything to everything
- Yield from
- Asyncio
- Standard library additions
- Many other[1]

[1] **http://goo.gl/cPNjgX**.

Impact

- *Long transition time*: Keep the retro-compatibility with previous python versions: 2.6.6 (default on `SLC6`), 2.7.5 (default of `Centos 7`)
- Maintain one package for all python version
- Avoid adding/removing (extra) dependencies

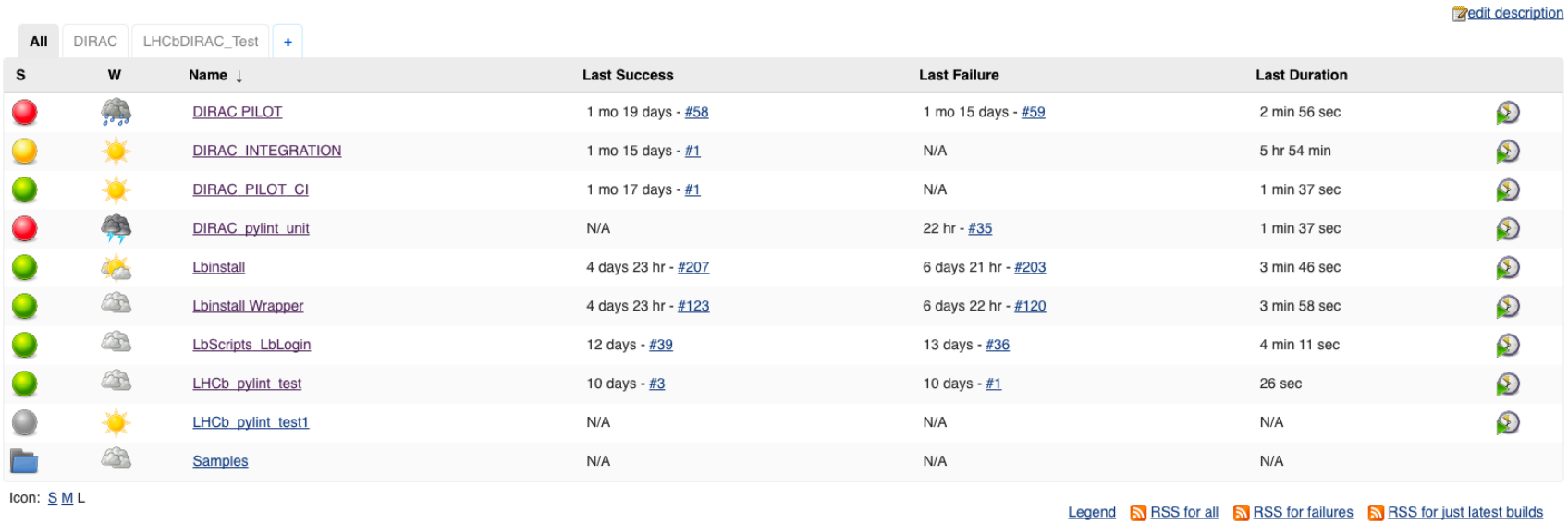
Infrastructure

Needs

- Strategy on how the migration should be done
- Testing environment for all the considered python version
- Analysis of cross-versions dependencies

Continuous integration and testing

- Dedicated `Jenkins` instance http://jenkins-lhcb-core-soft.web.cern.ch/



edit description

All | DIRAC | LHCbDIRAC_Test | +

S	W	Name ↓	Last Success	Last Failure	Last Duration	
		DIRAC PILOT	1 mo 19 days - #58	1 mo 15 days - #59	2 min 56 sec	
		DIRAC_INTEGRATION	1 mo 15 days - #1	N/A	5 hr 54 min	
		DIRAC_PILOT_CI	1 mo 17 days - #1	N/A	1 min 37 sec	
		DIRAC_pylint_unit	N/A	22 hr - #35	1 min 37 sec	
		Lbinstall	4 days 23 hr - #207	6 days 21 hr - #203	3 min 46 sec	
		Lbinstall Wrapper	4 days 23 hr - #123	6 days 22 hr - #120	3 min 58 sec	
		LbScripts_LbLogin	12 days - #39	13 days - #36	4 min 11 sec	
		LHCb_pylint_test	10 days - #3	10 days - #1	26 sec	
		LHCb_pylint_test1	N/A	N/A	N/A	
		Samples	N/A	N/A	N/A	

Icon: S M L

Legend | RSS for all | RSS for failures | RSS for just latest builds

Figure: LHCb Core Soft Jenkins

Continuous integration and testing

- Used for migration needs and for `Dirac` continuous integration
- Multi-python version: matrix of tests to see the failures on different versions
- `Openshift` cluster integration with CERN infrastructure (e.g `CVMFS`, `EOS`)

Dedicated virtual machines for testing

- Multiple python versions installed on the same host (*Centos 7*): `2.6.6`, `2.7.5`, `2.7.12` and `3.5.2`
- Dedicated `virtualenv` for each python version with version specific packages installed running on top of the corresponding python version
- `Docker` ready template usable on `Openshift`
- `Openstack` instance running and linked to `Jenkins` instance

Work in progress

Lessons learned

- `Openstack` qualify better than `Openshift` (@cern)
- DON'T use `2to3`, `autopep` in this order because first step will render the code almost `python 3` ready and the second step will impact all the files, making debugging impossible
- No magic solution to convert the code to python 3 and keep the compatibility with python 2
- Lint as much as possible and respect the coding rules and guidelines

Lbinstall

- First fully migrated tool
- Supports all the considered python versions
- Different dependencies based on which version is running (decided at installation phase)
- 78% of code coverage in unit testing and 0% pep8 errors

Lbinstall

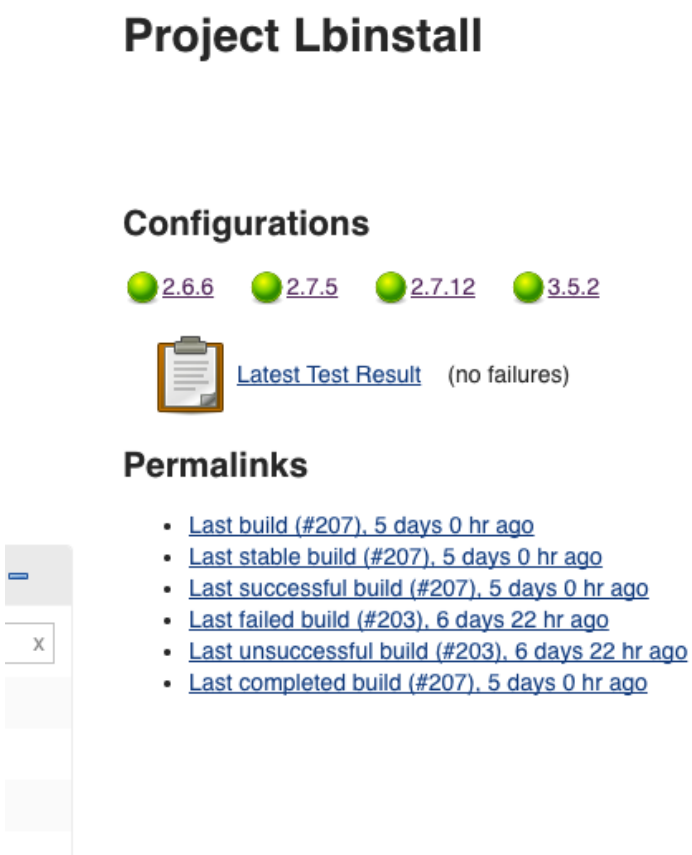


Figure: Lbinstall on Jenkis

Future work

- Started migrating LbScripts
- Multiple iterations: first LbLogin
- Possible change of building system: from CMT towards a PyPI installation architecture (with a local server)

Conclusion

- This is the right time to migrate to Python 3.
- Extra code to keep the retro compatibility should be easy to remove
- New code should be written in Python 3 directly
- Infrastructure is available for new projects

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