
PyQ Documentation

Release 3.8

Enlightenment Research, LLC.

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PyQ provides seamless integration of Python and Q code. It brings Python and Q interpreters in the same process and allows code written in either of the languages to operate on the same data. In PyQ, Python and Q objects live in the same memory space and share the same data.

Quickstart

First, make sure that PyQ is *installed* and *up-to-date*.

Start interactive session:

```
$ pyq
>>> from pyq import q
>>> from datetime import date
```

Create an empty table:

```
>>> q.trade = q('([date:();sym:();qty:()])')
```

Insert sample data:

```
>>> q.insert('trade', (date(2006,10,6), 'IBM', 200))
k('0')
>>> q.insert('trade', (date(2006,10,6), 'MSFT', 100))
k('1')
```

Display the result:

```
>>> q.trade.show()
date      sym  qty
-----
2006.10.06 IBM   200
2006.10.06 MSFT  100
```

Define a parameterized query:

```
>>> query = q('{[s;d]select from trade where sym=s,date=d}')
```

Run a query:

```
>>> query('IBM', date(2006,10,6))
k('+'date`sym`qty! (,2006.10.06; ,`IBM; ,200) ')
```

Pretty print the result:

```
>>> query('IBM', date(2006,10,6)).show()
date      sym  qty
-----
2006.10.06 IBM   200
```

Table of Contents

2.1 Installation

2.1.1 OS Support

PyQ has been tested and is supported on Linux and OS X 10.10 or later.

PyQ has support for Solaris, but has not been tested recently.

Windows is not supported yet.

2.1.2 Prerequisites

- [kdb+ 3.1](#) or later;
- Python 2.7, or 3.4 or later;
- GNU make, gcc or clang.

2.1.3 Using pip

Use following pip command to install PyQ into your environment.

```
pip -i https://pyq.enlnt.com install pyq
```

You can specify which version you would like to install:

```
pip -i https://pyq.enlnt.com install pyq==3.8
```

2.1.4 Using source code

1. Get the source code:

- You can clone the repository

```
git clone https://github.com/enlnt/pyq.git
```

- Download the [tar file](#) or [zip file](#) and extract it.

2. You can now install into your environment:

```
$ python setup.py install
```

2.2 Keeping PyQ up-to-date

You can upgrade PyQ to the latest version by running:

```
pip -i https://pyq.enlnt.com install pyq -U
```

2.3 PyQ

2.3.1 class pyq.K

2.4 IPython Magic

PyQ provides a Jupyter extension for accessing kdb+ from IPython.

In Jupyter notebook or the IPython Command Line Interface you can load PyQ's magic:

```
$ pyq -mIPython In [1]: %load_ext pyq.magic
```

Then you get access to two magics:

- Line magic:

```
In [2]: %q t:([a:til 3;b:10*til 3])

In [3]: %q show t
a b
----
0 0
1 10
2 20
```

- Cell magic:

```
In [4]: %%q
....: a: exec a from t where b=20
....: b: exec b from t where a=2
....: a+b
....:
Out[4]: ,22
```

You can pass following options to cell magic:

- l (dir|script)
pre-load database or script
- h host:port
execute on the given host
- o var
send output to a variable named var
- i var1, ..., varN

```

    input variables
-1
    redirect stdout
-2
    redirect stderr

```

2.5 kdb+ Command Line Interface

While in PyQ, you can drop to emulated kdb+ Command Line Interface (CLI). Here is how:

Start pyq:

```
$ pyq
>>> from pyq import q
```

Enter kdb+ CLI:

```
>>> q()
q)t:([a:til 5; b:10*til 5)
q)t
a b
----
0 0
1 10
2 20
3 30
4 40
```

Exit back to Python:

```
q) \
>>> print("Back to Python")
Back to Python
```

Or you can exit back to shell:

```
q) \
$
```

2.6 Version History

2.6.1 PyQ 3.8

Released on 2015-04-26.

- !256 - #670: Enable 32-bit CI
- !258 - #717 Expose sd0 and sd1 in python.
- !259 - #718 Added a test running “q test.p”.
- !261 - Use Python 3.4.3 in CI
- !272, !273 - #731 Added Python 3.5.0 test environment and other CI improvements.
- !263 - #718 More p) tests

- !264 - #709 Redirect stderr and stdout to notebook
- !271 - #729 Conversion of lists of long integers to q.
- !274 - #728 Don't corrupt existing QHOME while running tox.
- !275 - #733 Don't add second soabi for Python 3.5.
- !276 - #734: Added support for enums in memoryview.
- !277 - #736: Implemented format() for more scalar types.
- !278 - #737 Misleading error message from the list of floats conversion.
- !279, !280 - #738 CI improvements
- !281 - #611: Updated k.h as of 2016.02.18
- !286, !288, !289, !290 - #742 PyQ Documentation
- !287 - #745: Automatically generate version.py for PyQ during setup.

2.6.2 PyQ 3.7.2

Released on 2015-07-28.

- !270 - #726 Reuse dict converter for OrderedDict.
- !267 - #724 and #723 numpy <> q conversion fixes.
- !266 - #725 Use 001..002 to bracket ANSI escapes.
- !265 - #721 Made slicing work properly with associations (dictionaries) and keyed tables.
- !260 - #719 Backport python 3 bug fixes.
- CI Improvements (!257, !262, !269, !268).

2.6.3 PyQ 3.7.1

Released on 2015-02-12.

- !244 - #701 Fixed using q datetime (z) objects in format().
- !246 - Removed pytest-pyq code. pytest-pyq is now separate package.
- !247 - #709 IPython q-magic improvements
- !248 - #673 Implemented unicode to q symbol conversion in python 2.x.
- !249, !252 - #691 Improved test coverage
- !250, !251 - #695 Use Tox as test-runner
- !253 - #715 Fixed table size computation in getitem.
- !255 - #691 Remove redundant code in slice implementation

2.6.4 PyQ 3.7

Released on 2015-01-15.

- !222 - #581 Implements conversion of record arrays.
- !223 - #680 Fixed int32 conversion bug.
- !224 - #681 Fixed datetime bug - freed memory access.
- !225 - Added support for numpy.int8 conversion.
- !226 - #644 Fixed descriptor protocol.
- !227 - #663 Fixed nil repr (again).
- !228, !233, !237, !239 - #687 Updates to documentation in preparation to public release.
- !229 - #690 Use only major kx version in _k module name.
- !230 - #691 Added tests, fixed date/time list conversion.
- !232 - #693 Implement pyq.magic.
- !234 - #694 Use single source for python 2 and 3. (No 2to3.)
- !235 - #674 Added support for nested lists.
- !236 - #678 Fixed compiler warnings.
- !238 - #657 Make numpy optional.
- !240 - #674 Added support for nested tuples.
- !241 - #696 Implemented slicing of K objects.
- !242 - #699 int and float of non-scalar will raise TypeError.
- !243 - #697 Fixed a datetime bug.

2.6.5 PyQ 3.6.2

Released on 2014-12-23.

- !198 - #654 Restore python 3 compatibility
- !211 - #667 Added pyq.c into MANIFEST
- !213 - #669 Fixed a crash on Mac
- !214 - #590 Implemented numpy date (M8) to q conversion
- !215, !216 - #590 Implemented support for Y, M, W, and D date units
- !217, !218, !220, !221 - #666 Multiple CI improvements
- !219 - #676 Implemented numpy.timedelta64 to q conversion

2.6.6 PyQ 3.6.1

Released on 2014-11-06.

- !206 - #663 Fixed nil repr
- !207 - CI should use cached version of packages

- !208 - #665 Allow K objects to be written into ipython zmq.iostream
- !209 - Show python code coverage in CI
- !210 - #666: Extract C and Python coverage to print in the bottom of the CI run
- !212 - Bump version to 3.6.1b1

2.6.7 PyQ 3.6.0

Released on 2014-10-23.

- !189 - #647 Fix pyq.q() prompt
- !190 - CI should use Python 2.7.8
- !191 - #648 Boolean from empty symbol should be False
- !192 - #634: Moved time converter to C and removed unused converters
- !193 - #652 Added __long__ method to K type.
- !194 - #653 Allow K integer scalars to be used as indices
- !195, !197 - #651 Format for scalar types D, M, T, U, and V.
- !196 - #611 Updated k.h to 2014.09.11
- !199 - #656 Iteration over K scalars will now raise TypeError.
- !200 - #655 Added support for Python 3 in CI
- !202 - #571 Added support for uninstalling Q components
- !203 - #633 Improve test coverage
- !204 - #633 Added boundary and None checks in ja

2.6.8 PyQ 3.5.2

Released on 2014-07-03.

- !184, !186 - #639 taskset support. Use CPUS variable to assign CPU affinity.
- !187 - #641 color prompt
- !185 - #640 Restore minimal support for old buffer protocol

2.6.9 PyQ 3.5.1

Released on 2014-06-27.

- !177, !178 - #631 pyq is binary executable, not script and can be used in hasbang.
- !179 - #633 Added memoryview tests.
- !181 - #636 Moved extension module into pyq package.
- !182 - #633 Removed old buffer protocol support.
- !183 - #638 Calling q() with no arguments produces an emulation of q) prompt

2.6.10 PyQ 3.5.0

Released on 2014-06-20.

- !164 – #611 Updated k.h
- !165 – #614 Expose jv
- !166 – #580 Show with output=str will return string
- !167 – #627 Fixed p language
- !168 – Fix for pip, pycharm and OS X
- !169 – #629 python.py script was renamed to pyq
- !170 – #632 jv reference leak
- !171 – #633 C code review
- !172 – #634 k new
- !173 – #612 Generate C code coverage for CI
- !174, !175 – #633 test coverage
- !176 – #635 Disable strict aliasing

2.6.11 PyQ 3.4.5

Released on 2014-05-27.

- 614: Expose dj and ktj
- 620: Empty table should be falsy
- 622: Convert datetime to “p”, not “z”

2.6.12 PyQ 3.4.4

Released on 2014-05-23.

- python.q returns correct exit code

2.6.13 PyQ 3.4.3

Released on 2014-04-11.

- 617: Dict Conversion
- 619: Len Keyed Table

2.6.14 PyQ 3.4.2

Released on 2014-04-11.

- 589: Symbol array roundtripping
- 592: Properly register py.path.local
- 594: Support passing additional valuse to select/update/exec methods.

- 595: Implement pytest_pyq plugin
- 596: Implement python dict converter
- 601: Add support for ^ (fill) operator
- 602: Fix r-ops for non-commutative operations.
- 603: Fix unary + and implement unary ~
- 604: Make all q methods accessible from pyq as attributes
- 609: Updated k.h to the latest kx version
- NUC: Only true division is supported. Use “from __future__ import division” in python 2.x.

2.6.15 PyQ 3.4.1

Released on 2014-03-14.

- Add support for char arrays #588
- PyQ can now be properly installed with pip -r requirements.txt #572

2.6.16 PyQ 3.4

Released on 2014-03-07.

- Issues fixed: #582, #583, #584, #586
- Support dictionary/namespace access by .key
- Support ma.array(x) explicit conversion
- Add support for comparison of q scalars

2.6.17 PyQ 3.3

Released on 2014-02-05.

- Issues fixed: #574, #575, #576, #577, #578

2.6.18 PyQ 3.2

Released on 2013-12-24.

- Issues fixed: #556, #559, #560, #561, #562, #564, #565, #566, #569, #570, #573
- **NEW: wrapper for python.q to use it under PyCharm** Note: You will need to create symlink from python to python.py in order for this to work, ie: ln -s bin/python.py bin/python
- Support to use 32-bit Q under 64-bit OS X

2.6.19 PyQ 3.2.0 beta

- Convert int to KI if KXVER < 3, KJ otherwise
- In Python 2.x convert long to KJ for any KXVER

2.6.20 PyQ 3.1.0

Released on 2012-08-25.

- support Python 3.2
- release pyq-3.1.0 as a source archive

2.6.21 2012-08-10

- basic guid support

2.6.22 PyQ 3.0.1

Released on 2012-08-09.

- support both q 2.x and 3.x
- better setup.py
- release pyq-3.0.1 as a source archive

2.6.23 2009-10-23

- NUC: k3i
- K(None) => k("::")
- K(timedelta) => timespan

2.6.24 2009-01-02

- Use k(0, ..) instead of dot() and aN() to improve compatibility
- Default to python 2.6
- Improvements to q script.p
- NUC: extra info on q errors

2.6.25 2007-03-30

implemented K._ja

2.6.26 0.3

- Added support for arrays of strings

2.6.27 0.2

- Implemented iterator protocol.

2.7 PyQ General License

2.7.1 Copyright

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Indices and tables

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