
pyfarm.core Documentation

Release 0.9.0

Oliver Palmer, Guido Winkelmann

January 08, 2015

1	pyfarm.core package	3
1.1	Submodules	3
1.2	Module contents	12
2	Indices and tables	13
	Python Module Index	15

This package contains some shared libraries and objects which other parts of PyFarm, such as `pyfarm.master` and `pyfarm.agent`, use directly.

Note: While this code could be used directly, it's primarily intended to be inside of other parts of PyFarm.

Contents

pyfarm.core package

1.1 Submodules

1.1.1 pyfarm.core.config module

Configuration Object

Basic module used for reading configuration data into PyFarm in various forms.

const **BOOLEAN_TRUE** set of values which will return a True boolean value from `read_env_bool()`

const **BOOLEAN_FALSE** set of values which will return a False boolean value from `read_env_bool()`

class `pyfarm.core.config.Configuration` (*name, version=None, cwd=None*)

Bases: `builtins.dict`

Main object responsible for finding, loading, and merging configuration data. By default this class does nothing until `load()` is called. Once this method is called `Configuration` class will populate itself with data loaded from the configuration files. The configuration files themselves can be loaded from multiple location depending on the system's setup. For example on Linux you might end up attempting to load these files for `pyfarm.agent` v1.2.3:

Override paths set by `DEFAULT_ENVIRONMENT_PATH_VARIABLE`. By default this path will not be set, this is only an example. * `/tmp/pyfarm/agent/1.2.3/agent.yml` *
 * `/tmp/pyfarm/agent/1.2/agent.yml` * `/tmp/pyfarm/agent/1/agent.yml` *
`/tmp/pyfarm/agent/agent.yml`

Paths relative to the current working directory or the directory provided to `cwd` when `Configuration` was instantiated. * `etc/pyfarm/agent/1.2.3/agent.yml` *
`etc/pyfarm/agent/1.2/agent.yml` * `etc/pyfarm/agent/1/agent.yml` *
`etc/pyfarm/agent/agent.yml`

User's home directory * `~/.pyfarm/agent/1.2.3/agent.yml` *
`~/.pyfarm/agent/1.2/agent.yml` * `~/.pyfarm/agent/1/agent.yml` *
`~/.pyfarm/agent/agent.yml`

System level paths * `/etc/pyfarm/agent/1.2.3/agent.yml` *
`/etc/pyfarm/agent/1.2/agent.yml` * `/etc/pyfarm/agent/1/agent.yml` *
`/etc/pyfarm/agent/agent.yml`

Finally, if we don't locate a configuration file in any of the above paths we'll use the file which was installed along side the source code.

`Configuration` will only attempt to load data from files which exist on the file system when `load()` is called. If multiple files exist the data will be loaded from each file with the successive data overwriting the value from the previously loaded configuration file. So if you have two files containing the same data:

```
• /etc/pyfarm/agent/agent.yml

  env:
    a: 0
    foo: 1
    bar: true

• etc/pyfarm/agent/1.2.3/agent.yml

  env:
    a: 1
    b: 1
    foo: 0
```

You'll end up with a single merged configuration. Please note that the only keys which will be merged in the configuration are the `env` key. Configuration files are meant to store simple data and while it can be used to store more complicate data it won't merge any other data structures.

```
env:
  a: 1
  b: 1
foo: 0
bar: true
```

Variables

- **DEFAULT_SYSTEM_ROOT** (*string*) – The system level directory that we should look for configuration files in. This path is platform dependent:

- **Linux** - `/etc/`

- **Mac** - `/Library/`

- **Windows** - `%ProgramData%`. An environment variable that varies depending on the Windows version. See Microsoft's docs: <https://www.microsoft.com/security/portal/mmpc/shared/variables.aspx>

The value built here will be copied onto the instance as `system_root`

- **DEFAULT_USER_ROOT** (*string*) – The user level directory that we should look for configuration files in. This path is platform dependent:

- **Linux/Mac** - `~` (home directory)

- **Windows** - `%APPDATA%`. An environment variable that varies depending on the Windows version. See Microsoft's docs: <https://www.microsoft.com/security/portal/mmpc/shared/variables.aspx>

The value built here will be copied onto the instance as `user_root`

- **DEFAULT_FILE_EXTENSION** (*string*) – The default file extension of the configuration files. This will default to `.yaml` and will be copied to `file_extension` when the class is instantiated.

- **DEFAULT_LOCAL_DIRECTORY_NAME** (*string*) – A directory local to the current process which we should search for configuration files in. This will default to `etc` and will be copied to `local_dir` when the class is instantiated.
- **DEFAULT_PARENT_APPLICATION_NAME** (*string*) – The base name of the parent application. This used used to build child directories and will default to `pyfarm`.
- **DEFAULT_ENVIRONMENT_PATH_VARIABLE** (*string*) – A environment variable to search for a configuration path in. The value defined here, which defaults to `PYFARM_CONFIG_ROOT`, will be read from the environment when `Configuration` is instantiated. This allows for an non-standard configuration location to be loaded first for testing forced-override of the configuration.
- **DEFAULT_TEMP_DIRECTORY_ROOT** – The directory which will store any temporary files.

Parameters

- **name** (*string*) – The name of the configuration itself, typically ‘master’ or ‘agent’. This may also be the name of a package such as ‘pyfarm.agent’. When the package name is provided we can usually automatically determine the version number.
- **version** (*string*) – The version the version of the program running.
- **cwd** (*string*) – The current working directory to construct the local path from. If not provided then we’ll use `os.getcwd()` to determine the current working directory.

`__expandvars` (*value*)

Performs variable expansion for `value`. This method is run when a string value is returned from `get()` or `__getitem__()`. The default behavior of this method is to recursively expand variables using sources in the following order:

- The environment, `os.environ`
- The environment (from the configuration), `env`
- Other values in the configuration
- `~` to the user’s home directory

For example, the following configuration:

```
foo: foo
bar: bar
foobar: $foo/$bar
path: ~/$foobar/$TEST
```

Would result in the following assuming `$TEST` is an environment variable set to `somevalue` and the current user’s name is `user`:

```
{
    "foo": "foo",
    "bar": "bar",
    "foobar": "foo/bar",
    "path": "/home/user/foo/bar/somevalue"
}
```

DEFAULT_ENVIRONMENT_PATH_VARIABLE = ‘PYFARM_CONFIG_ROOT’

DEFAULT_FILE_EXTENSION = ‘.yaml’

DEFAULT_LOCAL_DIRECTORY_NAME = ‘etc’

DEFAULT_PARENT_APPLICATION_NAME = 'pyfarm'

DEFAULT_SYSTEM_ROOT = '/etc'

DEFAULT_TEMP_DIRECTORY_ROOT = '/tmp/pyfarm'

DEFAULT_USER_ROOT = '/home/docs'

MAX_EXPANSION_RECURSION = 10

directories (*validate=True, unversioned_only=False*)

Returns a list of platform dependent directories which may contain configuration files.

Parameters

- **validate** (*bool*) – When `True` this method will only return directories which exist on disk.
- **unversioned_only** (*bool*) – When `True` this method will only return versionless directories instead of both versionless and versioned directories.

files (*validate=True, unversioned_only=False*)

Returns a list of configuration files.

Parameters

- **validate** (*bool*) – When `True` this method will only return files which exist on disk.

Note: This method calls `directories()` and will be passed the value that is provided to validate here.

- **unversioned_only** (*bool*) – See the keyword documentation for `unversioned_only` in `directories()`

get (*key, default=None*)

Overrides `dict.get()` to provide internal variable expansion through `_expandvars()`.

load (*environment=None*)

Loads data from the configuration files. Any data present in the `env` key in the configuration files will update `environment`

Parameters **environment** (*dict*) – A dictionary to load data in the `env` key from the configuration files into. This would typically be set to `os.environ` so the environment itself could be updated.

split_version (*sep='.'*)

Splits `self.version` into a tuple of individual versions. For example `1.2.3` would be split into `['1', '1.2', '1.2.3']`

`pyfarm.core.config.read_env(envvar, default=<object object at 0x7f6b6c401660>, warn_if_unset=False, eval_literal=False, raise_eval_exception=True, log_result=True, desc=None)`

Lookup and evaluate an environment variable.

Parameters

- **envvar** (*string*) – The environment variable to lookup in `os.environ`
- **default** (*object*) – Alternate value to return if `envvar` is not present. If this is instead set to `NOTSET` then an exception will be raised if `envvar` is not found.
- **warn_if_unset** (*bool*) – If `True`, log a warning if the value being returned is the same as `default`
- **eval_literal** – if `True`, run `literal_eval()` on the value retrieved from the environment

- **raise_eval_exception** (*bool*) – If True and we failed to parse `envvar` with `literal_eval()` then raise a `EnvironmentKeyError`
- **log_result** (*bool*) – If True, log the query and result to INFO. If False, only log the query itself to DEBUG. This keyword mainly exists so environment variables such as `PYFARM_SECRET` or `PYFARM_DATABASE_URI` stay out of log files.
- **desc** (*string*) – Describes the purpose of the value being returned. This may also be read in at the time the documentation is built.

`pyfarm.core.config.read_env_bool(*args, **kwargs)`

Wrapper around `read_env()` which converts environment variables to boolean values. Please see the documentation for `read_env()` for additional information on exceptions and input arguments.

Raises

- **AssertionError** – raised if a default value is not provided
- **TypeError** – raised if the environment variable found was a string and could not be converted to a boolean.

`pyfarm.core.config.read_env_number(*args, **kwargs)`

Wrapper around `read_env()` which will read a numerical value from an environment variable. Please see the documentation for `read_env()` for additional information on exceptions and input arguments.

Raises **TypeError** raised if we either failed to convert the value from the environment variable or the value was not a float, integer, or long

`pyfarm.core.config.read_env_strict_number(*args, **kwargs)`

Strict version of `read_env_number()` which will only return an integer

Parameters **number_type** – the type of number(s) this function must return

Raises

- **AssertionError** – raised if the `number_type` keyword is not provided (required to check the type on output)
- **TypeError** – raised if the type of the result is not an instance of `number_type`

1.1.2 pyfarm.core.enums module

Enums

Provides enum values for certain aspect of PyFarm. See below for more detailed information.

Operating System

Describes an operating system type.

Table 1.1: OperatingSystem

Attribute	Description
LINUX	operating system on agent is a Linux variant
WINDOWS	operating system on agent is a Windows variant
MAC	operating system on agent is an Apple OS variant
BSD	operating system on agent is a BSD variant

Agent State

The last known state of the remote agent, used for making queue decisions and locking off resources.

Attribute	Description
OFFLINE	agent cannot be reached
ONLINE	agent is waiting for work
DISABLED	agent is online but cannot accept work
RUNNING	agent is currently processing work
ALLOC	special internal state used when the agent entry is being built

Work State

The state a job or task is currently in. These values apply more directly to tasks as job statuses are built from task status values.

Attribute	Description
PAUSED	this task cannot be assigned right now but can be once unpaused
RUNNING	work is currently being processed
DONE	work is finished (previous failures may be present)
FAILED	work as failed and cannot be continued

Use Agent Address

Describes which address should be used to contact the agent

Attribute	Description
LOCAL	use the address which was provided by the agent
REMOTE	use the address which we received the request from
HOSTNAME	disregard both the local IP and the remote IP and use the hostname
PASSIVE	agent cannot be contacted but will still request work and process jobs

const PY_MAJOR the major Python version

const PY_MINOR the minor Python version

const PY_VERSION a tuple containing the major and minor Python versions

const PY3 True if running Python 3

const PY2 True if running Python 2

const PY26 True if running Python 2.6

const PY27 True if running Python 2.7

const NOTSET Instance of the object class, mainly used when None is actually a valid value

const STRING_TYPES A tuple of string types, provided for Python 3 backwards compatibility

const NUMERIC_TYPES A tuple of numeric types, provided for Python 3 backwards compatibility

const INTEGER_TYPES A tuple of integer types, provided for Python 3 backwards compatibility

const BOOLEAN_TRUE A set containing strings and other objects representing True under some conditions. Generally used by `pyfarm.core.utility.convert.bool()`

const BOOLEAN_FALSE A set containing strings and other objects representing False under some conditions. Generally used by `pyfarm.core.utility.convert.bool()`

const NONE A set containing strings and other objects which represent None under some conditions. Generally used by `pyfarm.core.utility.convert.none()`

const INTERACTIVE_INTERPRETER True when we're running inside an interactive interpreter such as a Python shell like IPython. This value will also be True if there's an active debugger.

const OS The current os type, the value will map to one of the values in `OperatingSystem`

const POSIX True if `OS` in `(OperatingSystem.LINUX, OperatingSystem.MAC)`

const WINDOWS True if `OS == OperatingSystem.WINDOWS`

const LINUX True if `OS == OperatingSystem.LINUX`

const MAC True if `OS == OperatingSystem.MAC`

`pyfarm.core.enums.Enum(classname, **kwargs)`

Produce an enum object using `namedtuple()`

```
>>> Foo = Enum("Foo", A=1, B=2)
>>> assert Foo.A == 1 and Foo.B == 2
>>> FooTemplate = Enum("Foo", A=int, instance=False)
>>> Foo = FooTemplate(A=1)
>>> assert Foo.A == 1
```

Parameters

- **classname** (*str*) – the name of the class to produce
- **to_dict** – a callable function to add to the named tuple for converting the internal values into a dictionary
- **instance** (*bool*) – by default calling `Enum()` will produce an instanced `namedtuple()` object, setting `instance` to `False` will instead produce the named tuple without instantiating it

`class pyfarm.core.enums.Values(*args, **kwargs)`

Bases: `pyfarm.core.enums.Values`

Stores values to be used in an enum. Each time this class is instantiated it will ensure that the input values are of the correct type and unique.

NUMERIC_TYPES = (`<class 'int'>`,)

check_uniqueness = `True`

`pyfarm.core.enums.cast_enum(enum, enum_type)`

Pulls the requested `enum_type` from `enum` and produce a new named tuple which contains only the requested data

```
>>> from pyfarm.core.enums import Enum, Values
>>> FooBase = Enum("Foo", A=Values(int=1, str="1"))
>>> Foo = cast_enum(FooBase, str)
>>> assert Foo.A == "1"
>>> Foo = cast_enum(FooBase, int)
>>> assert Foo.A == 1
>>> assert Foo._map == {"A": 1, 1: "A"}
```

Warning: This function does not perform any kind of caching. For the most efficient usage it should only be called once per process or module for a given enum and `enum_type` combination.

```
pyfarm.core.enums.operating_system (plat='linux')
```

Returns the operating system for the given platform. Please note that while you can call this function directly you're more likely better off using values in `pyfarm.core.enums` instead.

1.1.3 pyfarm.core.testutil module

```
class pyfarm.core.testutil.TestCase (methodName='runTest')
```

Bases: `unittest.case.TestCase`

```
ORIGINAL_ENVIRONMENT = {}
```

```
TEMPDIR_PREFIX = ''
```

```
add_cleanup_path (path)
```

```
classmethod mktempdir ()
```

```
classmethod remove (path)
```

```
setUp ()
```

```
classmethod setUpClass ()
```

```
tearDown ()
```

```
temp_directories = set()
```

```
pyfarm.core.testutil.requires_ci (func)
```

```
pyfarm.core.testutil.rm (path)
```

```
pyfarm.core.testutil.skip_on_ci (func)
```

1.1.4 pyfarm.core.utility module

Utilities

General utility functions that are not specific to individual components of PyFarm.

```
class pyfarm.core.utility.ImmutableDict (iterable=None, **kwargs)
```

Bases: `builtins.dict`

A basic immutable dictionary that's built on top of Python's standard `dict` class. Once `__init__()` has been run the contents of the instance can no longer be modified

```
clear (*args, **kwargs)
```

```
pop (*args, **kwargs)
```

```
popitem (*args, **kwargs)
```

```
setdefault (*args, **kwargs)
```

```
update (*args, **kwargs)
```

```
class pyfarm.core.utility.PyFarmJSONEncoder (skipkeys=False,          ensure_ascii=True,
                                              check_circular=True,      allow_nan=True,
                                              sort_keys=False,   indent=None,   separa-
                                              tors=None, default=None)
```

Bases: `json.encoder.JSONEncoder`

```
encode (o)
```

```
class pyfarm.core.utility.convert
```

```
Bases: builtins.object
```

Namespace containing various static methods for converting data.

Some static methods are named the same as builtin types. The name indicates the expected result but the static method may not behave the same as the equivalently named Python object. Read the documentation for each static method to learn the differences, expected input and output.

```
static bool (value)
```

Converts `value` into a boolean object. This function mainly exists so human-readable booleans such as 'yes' or 'y' can be handled in a single location. Internally it does *not* use `bool()` and instead checks `value` against `pyfarm.core.enums.BOOLEAN_TRUE` and `pyfarm.core.enums.BOOLEAN_FALSE`.

Parameters `value` – The value to attempt to convert to a boolean. If this value is a string it will be run through `.lower().strip()` first.

Raises `ValueError` Raised if we can't convert `value` to a true boolean object

```
static bytetomb (value)
```

Convert bytes to megabytes

```
>>> convert.bytetomb(10485760)
10.0
```

```
static list (value, sep=',', strip=True, filter_empty=True)
```

Converts `value` into a list object by splitting on `sep`.

Parameters

- **value** (*str*) – The string we should convert into a list
- **sep** (*str*) – The string that we should split `value` by.
- **strip** (*bool*) – If `True`, strip extra whitespace from the results so 'foo, bar' becomes ['foo', 'bar']
- **filter_empty** (*bool*) – If `True`, any result that evaluates to `False` will be removed so 'foo,' would become ['foo']

```
static mbtomb (value)
```

Convert megabytes to gigabytes

```
>>> convert.mbtomb(2048)
2.0
```

```
static none (value)
```

Converts `value` into `None`. This function mainly exists so human-readable values such as 'None' or 'null' can be handled in a single location. Internally this checks `value` against `pyfarm.core.enums.NONE`

Parameters `value` – The value to attempt to convert to `None`. If this value is a string it will be run through `.lower().strip()` first.

Raises `ValueError` Raised if we can't convert `value` to `None`

```
static ston (value, types=(<class 'int'>, <class 'float'>, <class 'complex'>))
```

Converts a string to an integer or fails with a useful error message

Parameters `value` (*string*) – The value to convert to an integer

Raises

- `ValueError` – Raised if `value` could not be converted using `literal_eval()`

- **TypeError** – Raised if `value` was not converted to a float, integer, or long

1.2 Module contents

1.2.1 PyFarm Core

Core library used by other components of PyFarm.

Indices and tables

- *genindex*
- *modindex*
- *search*

p

`pyfarm.core`, [12](#)
`pyfarm.core.config`, [3](#)
`pyfarm.core.enums`, [7](#)
`pyfarm.core.testutil`, [10](#)
`pyfarm.core.utility`, [10](#)

Symbols

`_expandvars()` (pyfarm.core.config.Configuration method), 5

A

`add_cleanup_path()` (pyfarm.core.testutil.TestCase method), 10

B

`bool()` (pyfarm.core.utility.convert static method), 11
`bytetomb()` (pyfarm.core.utility.convert static method), 11

C

`cast_enum()` (in module pyfarm.core.enums), 9
`check_uniqueness` (pyfarm.core.enums.Values attribute), 9
`clear()` (pyfarm.core.utility.ImmutableDict method), 10
`Configuration` (class in pyfarm.core.config), 3
`convert` (class in pyfarm.core.utility), 10

D

`DEFAULT_ENVIRONMENT_PATH_VARIABLE` (pyfarm.core.config.Configuration attribute), 5
`DEFAULT_FILE_EXTENSION` (pyfarm.core.config.Configuration attribute), 5
`DEFAULT_LOCAL_DIRECTORY_NAME` (pyfarm.core.config.Configuration attribute), 5
`DEFAULT_PARENT_APPLICATION_NAME` (pyfarm.core.config.Configuration attribute), 5
`DEFAULT_SYSTEM_ROOT` (pyfarm.core.config.Configuration attribute), 6
`DEFAULT_TEMP_DIRECTORY_ROOT` (pyfarm.core.config.Configuration attribute), 6
`DEFAULT_USER_ROOT` (pyfarm.core.config.Configuration attribute), 6

`directories()` (pyfarm.core.config.Configuration method), 6

E

`encode()` (pyfarm.core.utility.PyFarmJSONEncoder method), 10
`Enum()` (in module pyfarm.core.enums), 9
environment variable
 PYFARM_DATABASE_URI, 7
 PYFARM_SECRET, 7

F

`files()` (pyfarm.core.config.Configuration method), 6

G

`get()` (pyfarm.core.config.Configuration method), 6

I

`ImmutableDict` (class in pyfarm.core.utility), 10

L

`list()` (pyfarm.core.utility.convert static method), 11
`load()` (pyfarm.core.config.Configuration method), 6

M

`MAX_EXPANSION_RECURSION` (pyfarm.core.config.Configuration attribute), 6
`mbtomb()` (pyfarm.core.utility.convert static method), 11
`mktempdir()` (pyfarm.core.testutil.TestCase class method), 10

N

`none()` (pyfarm.core.utility.convert static method), 11
`NUMERIC_TYPES` (pyfarm.core.enums.Values attribute), 9

O

`operating_system()` (in module pyfarm.core.enums), 9

ORIGINAL_ENVIRONMENT (pyfarm.core.testutil.TestCase attribute), 10

P

pop() (pyfarm.core.utility.ImmutableDict method), 10
popitem() (pyfarm.core.utility.ImmutableDict method), 10
pyfarm.core (module), 12
pyfarm.core.config (module), 3
pyfarm.core.enums (module), 7
pyfarm.core.testutil (module), 10
pyfarm.core.utility (module), 10
PYFARM_DATABASE_URI, 7
PYFARM_SECRET, 7
PyFarmJSONEncoder (class in pyfarm.core.utility), 10

R

read_env() (in module pyfarm.core.config), 6
read_env_bool() (in module pyfarm.core.config), 7
read_env_number() (in module pyfarm.core.config), 7
read_env_strict_number() (in module pyfarm.core.config), 7
remove() (pyfarm.core.testutil.TestCase class method), 10
requires_ci() (in module pyfarm.core.testutil), 10
rm() (in module pyfarm.core.testutil), 10

S

setdefault() (pyfarm.core.utility.ImmutableDict method), 10
setUp() (pyfarm.core.testutil.TestCase method), 10
setUpClass() (pyfarm.core.testutil.TestCase class method), 10
skip_on_ci() (in module pyfarm.core.testutil), 10
split_version() (pyfarm.core.config.Configuration method), 6
ston() (pyfarm.core.utility.convert static method), 11

T

tearDown() (pyfarm.core.testutil.TestCase method), 10
temp_directories (pyfarm.core.testutil.TestCase attribute), 10
TEMPDIR_PREFIX (pyfarm.core.testutil.TestCase attribute), 10
TestCase (class in pyfarm.core.testutil), 10

U

update() (pyfarm.core.utility.ImmutableDict method), 10

V

Values (class in pyfarm.core.enums), 9