
Argvard Documentation

Release 0.1.0

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Sep 27, 2017

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Welcome to Argvard's documentation. If you are new to Argvard, start with [Installation](#) and read the [Tutorial](#) afterwards.

Installation

In order to get started you need Python 2.7, Python 3.3 or a higher Python 3 version. Argvard is tested on CPython and PyPy but using other interpreters should work just as well.

It is recommended that you install Argvard – or any other Python library – inside a virtual environment, created with [virtualenv](#). This allows you to isolate the projects you are working on from each other and the system.

Within a virtual environment you can install Argvard using [pip](#):

```
$ pip install argvard
```

This should take just a moment and then you are good to go.

Tutorial

This tutorial teaches you how to create command line applications using Argvard. We will explore the framework step-by-step using the example of a simple “Hello, World!” application, which we are going to over-engineer to explore the features provided by Argvard.

Creating a basic “Hello World!”-Application

The first step on our journey will be to create a simple “Hello World!” application. The first part of that application consists of importing what we need:

```
from argvard import Argvard
```

The *Argvard* object is central to every Argvard application and – for now – the only thing we are going to need. The next part of the application is creating such an object:

```
application = Argvard()
```

As you can see this is trivial as we do not have to pass it any arguments. As you can see from the name I gave it, for all intents and purposes it is the application. The next step is making that the application do something:

```
@application.main()
def main(context):
    print(u'Hello, World!')
```

The `application.main` decorator is used to register what in Argvard terms is called the `main` function. If you are familiar with other programming languages, you may be aware that a `main` function of some form can be found in many languages. In languages in which it exists it acts as an entry point and is automatically called when your application is started.

This case is similar, `main` is a function that will always be called by the `application` after any options have been parsed. The `main` function is supposed to do, whatever your application is supposed to do.

The last step is calling the application:

```
if __name__ == '__main__':
    application()
```

If you are not already familiar with the pattern, `__name__` is a special variable the interpreter sets to the name of the current module. If the module is being executed directly (and is not just imported), `__name__` will be set to `'__main__'`. This ensures that `application` is not called, unless the module is executed directly, which makes it possible to import the module without any side effects.

Once you have typed that into your editor, save it as `hello.py` and execute it with `python hello.py`. It should print “Hello, World!” and exit.

Continue with *Dealing with positional arguments*.

Dealing with positional arguments

Now that we have managed to greet the world, let us be more specific about whom we greet or at least let users be able to do that:

```
@application.main('name')
def main(context, name):
    print(u'Hello, %s!' % name)
```

Replace the main function defined in `hello.py` with the code above. This defines a signature for the main function. A signature defines which positional arguments something takes, in this case a main function.

This signature defines one required positional argument called `name`. Positional arguments are passed to the function under the names defined in the signature.

Now in order to run `hello.py` you have to call it like this:

```
$ python hello.py Daniel
Hello, Daniel!
```

Obviously you can replace “Daniel” with your own name.

Default arguments

This does introduce a problem though because if we call run `hello.py` as we did previously, we get this:


```
$ python hello.py
error: name is missing
usage: hello.py [-h|--help] <name>
```

If we want to have backwards compatibility, we need to make the name an optional positional argument:

```
@application.main('[name]')
def main(context, name=u'World'):
    print(u'Hello, %s!' % name)
```

Now we can run the application with a name:

```
$ python hello.py Daniel
Hello, Daniel!
```

or without it:

```
$ python hello.py
Hello, World!
```

Repetitions

Now that we have managed to greet one person or well everyone. Let us try to greet multiple people:

```
@application.main('[name... ]')
def main(context, name=None):
    if name is None:
        name = [u'World']
    if len(name) == 1:
        print(u'Hello, %s!' % name[0])
    elif len(name) == 2:
        print(u'Hello %s and %s!' % (name[0], name[1]))
    else:
        print(u'Hello %s and %s!' % (u', '.join(name[:-1]), name[-1]))
```

The function does quite a bit more than the previous ones, to achieve a nice formatting. Apart from that what has really changed is that we have added ... to the end of the argument in the signature.

Now we can greet any number of people:

```
$ python hello.py
Hello, World!
$ python hello.py Daniel
Hello, Daniel!
$ python hello.py Daniel Horst
Hello, Daniel and Horst!
$ python hello.py Daniel Horst Peter
Hello, Daniel, Horst and Peter!
```

See also:

Signatures

Continue with *Defining Options*.

Defining Options

So far we have concerned ourselves with whom we greet and not with how, let us change. How an application does things can usually be changed by using options, unfortunately there is not much you can change when saying hello to someone, so we are going to turn our application into something much more general, that is an application that greets people:

```
@application.option('--greeting greeting')
def greeting(context, greeting):
    context['greeting'] = greeting
```

This is quite similar to how main functions are defined. The difference is that the signature in case of an option, includes the name of an option.

Another thing we do is use the *context* object that we have ignored so far. This object is basically a dictionary that is passed around to capture the state of the application. You are supposed to use it to store information gathered in options.

Now we can use this information in the *context* in a main function:

```
@application.main(['name...'])
def main(context, name=None):
    if name is None:
        name = [u'World']
    greeting = context.get('greeting', u'Hello')
    if len(name) == 1:
        print(u'%s, %s!' % (greeting, name[0]))
    elif len(name) == 2:
        print(u'%s %s and %s!' % (greeting, name[0], name[1]))
    else:
        print(u'%s %s and %s!' % (greeting, u', '.join(name[:-1]), name[-1]))
```

Now we can use the `--greeting` option to change the way our application greets people:

```
$ python hello.py --greeting Hi
Hi, World!
```

Continue with *Defining Commands*.

Defining Commands

If you develop larger command line applications, like `pip` which you probably used to install Argvard, your application often does not perform a specific action like greeting someone but instead allows the user to perform multiple distinct actions.

In the case of `pip` such an action is installing or uninstalling something. These are fundamentally different actions, not just in what they operate on, how they operate but in what they do. We do not want to choose between these actions based on positional arguments or options, we need a different way to express these: commands.

A *Command* is very much like an argvard object. A command requires a main function that performs something and we can register options on a command.

Let us create a simple calculator as an example:

```
from argvard import Argvard, Command

application = Argvard()
```

```
@application.main()
def main(context):
    context.argvard(context.command_path + ['--help'])
```

The calculator, unless called with a command, has nothing useful to do. So within the main function we recursively call the application with the `-help` option, to provide the user with a help message that explains how the application should be used.

Now comes there interesting part, defining the commands:

```
add = Command()
@add.main('a b')
def add_main(context, a, b):
    print(int(a) + int(b))

sub = Command()
@sub.main('a b')
def sub_main(context, a, b):
    print(int(a) - int(b))
```

As you can see and as mentioned above, command objects are very similar to argvard objects in how they are used. We are not doing this in the tutorial but you could also add options to the `add` or `sub` commands. Now that the commands have been defined you have to register them with the application:

```
application.register_command('add', add)
application.register_command('sub', sub)
```

The string passed to `register_command()` is the name, which is used on the command line to call the command we are registering. In case you were wondering, you can also register commands with other commands.

Finally we call the application, just as we did in our previous “Hello World” application:

```
if __name__ == '__main__':
    application()
```

If you run the application the commands can be invoked as expected:

```
$ python calc.py add 1 1
2
$ python calc.py sub 1 1
0
```

Congratulations! You have now learned everything you need to know about Argvard, to create command line applications.

Signatures

Signatures are used to define positional arguments of an option, command or the application. A signature consists of zero or more *words* separated by spaces.

A *word* can be a *name*, – and if the signature does not describe the positional arguments of an option – a *repetition* or an *optional*.

A *name* is a python identifier, that an argument will be bound to.

A *repetition* is a name followed by `...`, it matches one or more arguments, all of which will be bound to the name.

An *optional* is a name or repetition followed by zero or more words enclosed in brackets.

For a short overview this is the grammar in EBNF:

```
signature = [ word { " " word } ]  
word = name | repetition | optional ;  
name = (* Any valid Python identifier *) ;  
repetition = name "...";  
optional = "[" (name | repetition) { word } "]" ;
```

API

`argvard.__version__`

The version as a string.

`argvard.__version_info__`

The version as a tuple, containing the major, minor, and bugfix version. You should this, if you need to implement any version checks.

Application Object

class `argvard.Argvard` (*defaults=None*)

The `argvard` object is the central object of the command line application.

Instances are callable with the command line arguments, `sys.argv` by default.

The object acts as a registry for options and commands and calls them as necessary.

Parameters **defaults** – A dictionary containing the initial values for the *context*.

main (*signature=''*)

A decorator that is used to register the main function with the given *signature*:

```
@app.main()
def main(context):
    # do something
    pass
```

The main function is called, after any options and if no command has been called.

option (*signature, overrideable=False*)

A decorator for registering an option with the given *signature*:

```
@app.option('--option')
def option(context):
    # do something
    pass
```

If the name in the signature has already been used to register an option, a `RuntimeError` is raised unless the registered option has been defined with *overrideable* set to *True*.

Parameters

- **signature** – The signature of the option as a string.
- **overrideable** – If *True* the registered option can be overridden.

register_command(*name*, *command*)

Registers the *command* with the given *name*.

If the *name* has already been used to register a command a `RuntimeError` will be raised.

Command Object

class `argvard.Command`(*defaults=None*)

A command - like an argvard object - is a registry of options and commands, that represents a distinct action.

Commands can be registered with any number of argvard objects, any number of times (under different names.)

Parameters defaults – A dictionary containing the initial values for the *context*, any values already contained in the context once the command is called will not be overridden with a default value.

main(*signature=''*)

A decorator that is used to register the main function with the given *signature*:

```
@app.main()
def main(context):
    # do something
    pass
```

The main function is called, after any options and if no command has been called.

option(*signature*, *overrideable=False*)

A decorator for registering an option with the given *signature*:

```
@app.option('--option')
def option(context):
    # do something
    pass
```

If the name in the signature has already been used to register an option, a `RuntimeError` is raised unless the registered option has been defined with *overrideable* set to *True*.

Parameters

- **signature** – The signature of the option as a string.
- **overrideable** – If *True* the registered option can be overridden.

register_command(*name*, *command*)

Registers the *command* with the given *name*.

If the *name* has already been used to register a command a `RuntimeError` will be raised.

Context Object

class `argvard.Context` (*argvard*, *application_name*)

The context object is a dictionary, passed to options and main functions, which they can use to store information.

It further provides information useful for introspection and debugging through attributes.

argvard

The current application.

command

The current command or *None*.

command_path

A list containing the name of the application and the names of all commands called so far.

caller

The current command or `argvard` object.

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