conftools Documentation

Release 1.11.1

Polyconseil

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The getconf project provides simple configuration helpers for Python programs.

It provides a simple API to read from various configuration files and environment variables:

```
import getconf
config = getconf.ConfigGetter('myproj', ['/etc/myproj.conf'])
db_host = config.getstr('db.host', 'localhost')
db_port = config.getint('db.port', 5432)
```

Beyond this API, getconf aims at unifying configuration setup across development and production systems, respecting the standard procedures in each system:

- Allow userspace configuration on development systems
- Allow multiple different configurations for continuous integration systems
- Use standard configuration space in /etc on traditional production servers
- Handle environment-based configuration for cloud-based platforms

getconf is distributed under the two-clause BSD license, a copy of which is in the source.

getconf v1.11 onwards supports Python 3.5, 3.6, 3.7, 3.8, 3.9 and 3.10. v1.11.x are the last versions to support Python 3.5 & 3.6. v1.9.x are the last versions to support Python 2.7 and 3.4. v1.8.x are the last versions to support Python 3.3. v1.5.x are the last versions to support Python 2.6.

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Links

- Package on PyPI: http://pypi.python.org/pypi/getconf/
- Doc on ReadTheDocs: http://readthedocs.org/docs/getconf/
- Source on GitHub: http://github.com/Polyconseil/getconf/

4 Chapter 1. Links

Installation

Install the package from PyPI, using pip:

pip install getconf

Or from GitHub:

git clone git://github.com/Polyconseil/getconf

getconf has no external dependency beyond Python.

Introduction

Note: Please refer to the full doc for *reference* and *advanced usage*.

All configuration values are accessed through the getconf.ConfigGetter object:

The above line declares:

- Use the myproj namespace (explained later; this is mostly used for environment-based configuration, as a prefix for environment variables)
- Look, in turn, at /etc/myproj/settings.ini (for production) and ./local_settings.ini (for development); the latter overriding the former.

Once the getconf.ConfigGetter has been configured, it can be used to retrieve settings:

```
debug = config.getbool('debug', False)
db_host = config.getstr('db.host', 'localhost')
db_port = config.getint('db.port', 5432)
allowed_hosts = config.getlist('django.allowed_hosts', ['*'])
```

All settings have a type (default is text), and accept a default value. They use namespaces (think 'sections') for easier reading.

With the above setup, getconf will try to provide db.host by inspecting the following options in order (it stops at the first defined value):

- From the environment variable MYPROJ DB HOST, if defined
- From the host key in the [db] section of ./local_settings.ini
- From the host key in the [db] section of /etc/myproj/settings.ini
- From the default provided value, 'localhost'

Features

Env-based configuration files An extra configuration file/directory/glob can be provided through MYPROJ_CONFIG; it takes precedence over other files

Default options An extra dictionary can be provided as ConfigGetter(defaults=some_dict); it is used after configuration files and environment variables.

It should be a dict mapping a section name to a dict of key => value:

```
>>> config = ConfigGetter('myproj', defaults={'db': {'host': 'localhost'}})
>>> config.getstr('db.host')
'localhost'
```

Typed getters getconf can convert options into a few standard types:

```
config.getbool('db.enabled', False)
config.getint('db.port', 5432)
config.getlist('db.tables') # Expects a comma-separated list
config.getfloat('db.auto_vacuum_scale_factor', 0.2)
config.gettimedelta('account_activation.validity', '2d')
config.getpath('django.static_root', pathlib.Path(BASE_DIR / 'static'))
```

getconf can also convert options to user-defined standard-type-based types:

```
class Environment(str, enum.Enum):
    DEV = 'dev'
    PROD = 'prod'
config.getenum('environment', Environment.PROD)
```

10 Chapter 4. Features

Concepts

getconf relies on a few key concepts:

namespace Each ConfigGetter works within a specific namespace (its first argument).

Its goal is to avoid mistakes while reading the environment: with ConfigGetter(namespace='myproj'), only environment variables beginning with MYPROJ_will be read.

It is, however, possible to disable namespacing by using ConfigGetter(namespace=getconf. $NO_NAMESPACE$).

Sections The configuration options for a project often grow quite a lot; to restrict complexity, getconf splits values into sections, similar to Python's configparser module.

Section are handled differently depending on the actual configuration source:

- section.key is mapped to MYPROJ_SECTION_KEY for environment variables
- section.key is mapped to [section] key = in configuration files
- section.key is mapped to defaults ['section'] ['key'] in the defaults dict.

Default section Some settings are actually "globals" for a projet. This is handled by unset section names:

- key is mapped to MYPROJ_KEY for environment variables
- key is mapped to [DEFAULT] key = in configuration files
- key is mapped to defaults ['DEFAULT'] ['key'] in the defaults dict.

Contents:

6.1 Reference

6.1.1 The BaseConfigGetter class

class getconf.**BaseConfigGetter**(*config_finders, key_validator=None) This class works as the base for all ConfigGetters.

Parameters

- config_finders The list of finders the BaseConfigGetter will use to lookup keys. Finders are python objects providing the find(key) method that will be called in the order the config_finders were provided order until one of them finds the key. The find(key) method should either return a string or raise NotFound depending on whether the key was found or not.
- **key_validator** If provided, key_validator must be a callable that raises InvalidKey on invalid keys.

```
getstr(key[, default="])
```

Retrieve a key from available configuration sources.

Parameters

- **key** (str) The name of the field to use.
- default (str) The default value (string) for the field; optional

Note: The key param accepts two formats:

- 'foo.bar', mapped to section 'foo', key 'bar'
- 'foo', mapped to section '', key 'foo'

This looks, in order, at:

- <NAMESPACE>_<SECTION>_<KEY> if section is set, <NAMESPACE>_<KEY> otherwise
- The <key> entry of the <section> section of the file given in <NAMESPACE>_CONFIG
- The <key> entry of the <section> section of each file given in config_files
- The default value

```
getlist(key[, default=()])
```

Retrieve a key from available configuration sources, and parse it as a list.

Warning: The default value has the same syntax as expected values, e.g foo, bar, baz. It is **not** a list.

It splits the value on commas, and return stripped non-empty values:

```
>>> os.environ['A'] = 'foo'
>>> os.environ['B'] = 'foo,bar, baz,,'
>>> getter.getlist('a')
['foo']
>>> getter.getlist('b')
['foo', 'bar', 'baz']
```

```
getbool (key[, default=False])
```

Retrieve a key from available configuration sources, and parse it as a boolean.

The following values are considered as True: 'on', 'yes', 'true', '1'. Case variations of those values also count as True.

```
getint(key[, default=0])
```

Retrieve a key from available configuration sources, and parse it as an integer.

```
getfloat(key[, default=0.0])
```

Retrieve a key from available configuration sources, and parse it as a floating point number.

```
gettimedelta (key | , default='0d' |)
```

Retrieve a key from available configuration sources, and parse it as a datetime.timedelta object.

```
getpath(key[, default=Path('.')])
```

Retrieve a key from available configuration sources, and parse it as a pathlib.Path object.

```
getenum(key|, default, enum_class|)
```

Retrieve a key from available configuration sources, and parse it as an enum. Enum based object.

Note: The default param accepts either an enum. Enum based instance, an enum. Enum member value type or None.

Note: os.environ and INI configuration files shall only use enum member values, not member names, as a value.

6.1.2 The ConfigGetter class

files.

Parameters

- namespace (str) The namespace for all configuration entry lookups. If an environment variable of <NAMESPACE>_CONFIG is set, the file at that path will be loaded. Pass in the getconf.NO_NAMESPACE special value to load an empty namespace.
- **config_files** (list) List of ini-style configuration files to use. Each item may either be the path to a simple file, or to a directory (if the path ends with a '/') or a glob pattern (which will select all the files matching the pattern according to the rules used by the shell). Both strings and pathlib.Path objects are accepted. Each directory path will be replaced by the list of its directly contained files, in alphabetical order, excluding those whose name starts with a '.'. Provided configuration files are read in the order their name was provided, each overriding the next ones' values. <NAMESPACE>_CONFIG takes precedence over all config files contents.
- **defaults** (dict) Dictionary of defaults values that are fetch with the lowest priority. The value for 'section.key' will be looked up at defaults ['section'] ['key'].
- mandatory_section (bool) Boolean indicating weither requested keys should contain a section/a dot.

Warning: When running with an empty namespace (namespace=getconf. NO_NAMESPACE), the environment variables are looked up under <SECTION>_<KEY> instead of <NAMESPACE>_<SECTION>_<KEY>; use this setup with care, since getconf might load variables that weren't intended for this application.

Warning: Using dash in section or key would prevent from overriding values using environment variables. Dash are converted to underscore internally, but if you have the same variable using underscore, it would override both of them.

get_section (section_name)

Retrieve a dict-like proxy over a configuration section. This is intended to avoid polluting settings. py with a bunch of FOO = config.getstr('bar.foo'); BAR = config.getstr('bar.bar') commands.

Note: The returned object only supports the __getitem__ side of dicts (e.g. section_config['foo'] will work, 'foo' in section_config won't)

get_ini_template()

Return INI like commented content equivalent to the default values.

For example:

```
>>> getter.getlist('section.bar', default=['a', 'b'])
['a', 'b']
>>> getter.getbool('foo', default=True, doc="Set foo to True to enable the_

Truth")
True
>>> print(g.get_ini_template())
[DEFAULT]
; NAMESPACE_FOO - type=bool - Set foo to True to enable the Truth
```

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```
; foo = on
[section]
; NAMESPACE_SECTION_BAR - type=list
; bar = a, b
```

Note: This template is generated based on the *getxxxx* calls performed on the ConfigGetter. If some calls are optional, the corresponding options might not be present in the *get_ini_template* return value.

6.1.3 The provided finders

class getconf.finders.NamespacedEnvFinder(namespace)

Keys are lookuped in os.environ with the provided namespace. The key can follow two formats:

- 'foo.bar', mapped to section 'foo', key 'bar'
- 'foo', mapped to section '', key 'foo'

The finder will look at <NAMESPACE>_<SECTION>_<KEY> if section is set, <NAMESPACE>_<KEY> otherwise.

Keys are upper-cased and dash are converted to underscore before lookup as using dash in section or key would prevent from overriding values using environment variables.

If the special NO_NAMESPACE namespace is used, the finder will look at <SECTION>_<KEY> if section is set, <KEY> otherwise.

class getconf.finders.MultiINIFilesParserFinder(config_files)

Keys are lookuped in the provided config_files using Python's ConfigParser.

The key can follow two formats:

- 'foo.bar', mapped to section 'foo', key 'bar'
- 'foo', mapped to section 'DEFAULT', key 'foo'

The config_files argument can contain directories and glob that will be expanded while preserving the provided order:

- a directory some_dir is interpreted as the glob some_dir/*
- a glob is replaced by the matching files list ordered by name

Finally, the config parser (which interpolation switched off) will search the section.entry value in its files, with the last provided file having the strongest priority.

```
class getconf.finders.SectionDictFinder(data)
```

Keys are lookuped in the provided 1-level nested dictionary data.

The key can follow two formats:

- 'foo.bar', mapped to section 'foo', key 'bar'
- 'foo', mapped to section 'DEFAULT', key 'foo'

The finder will look at data[section][key].

```
class getconf.finders.ContentFileFinder(directory, encoding='utf-8')
```

Keys are lookuped in the provided directory as files.

If the directory contains a file named key, its content (decoded as encoding) will be returned.

Typically, this can be used to load configuration from Kubernetes' ConfigMaps and Secrets mounted on a volume.

6.1.4 ConfigGetter Example

With the following setup:

```
# test_config.py
import getconf
config = getconf.ConfigGetter('getconf', ['/etc/getconf/example.ini'])

print("Env: %s" % config.getstr('env', 'dev'))
print("DB: %s" % config.getstr('db.host', 'localhost'))
print("Debug: %s" % config.getbool('dev.debug', False))
```

```
# /etc/getconf/example.ini
[DEFAULT]
env = example

[db]
host = foo.example.net
```

```
# /etc/getconf/production.ini
[DEFAULT]
env = prod
[db]
host = prod.example.net
```

We get the following outputs:

```
# Default setup
$ python test_config.py
Env: example
DB: foo.example.net
Debug: False
# Override 'env'
$ GETCONF_ENV=alt python test_config.py
Env: alt
DB: foo.example.net
Debug: False
# Override 'dev.debug'
$ GETCONF_DEV_DEBUG=on python test_config.py
Env: example
DB: foo.example.net
Debug: True
# Read from an alternate configuration file
$ GETCONF_CONFIG=/etc/getconf/production.ini python test_config.py
Env: prod
DB: prod.example.net
Debug: False
```

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```
# Mix it up
$ GETCONF_DEV_DEBUG=on GETCONF_CONFIG=/etc/getconf/production python test_config.py
Env: prod
DB: prod.example.net
Debug: True
```

6.1.5 BaseConfigGetter example

We can easily create a config getter ignoring env varibles.

With the following setup:

```
# /etc/getconf/example.ini
[DEFAULT]
env = example
[db]
host = foo.example.net
```

We get:

```
# test_config.py
import getconf
import getconf.finders
config = getconf.BaseConfigGetter(
    getconf.finders.MultiINIFilesParserFinder(['/etc/getconf/*.ini']),
    getconf.finders.SectionDictFinder({'db': {'host': 'default.db.host', 'port': '1234
    →'}}),
)
config.getstr('env') == 'example'
config.getstr('db.host') == 'foo.example.net'
config.getstr('db.port') == '1234'
```

6.2 Advanced use

getconf supports some more complex setups; this document describes advanced options.

6.2.1 Recommended layout

Managing configuration can quickly turn into hell; here are a few guidelines:

- · Choose where default values are stored
- Define how complex system-wide setup may get
- Decide whether local, development configuration is needed
- · And whether user-local overrides are relevant

Use case	Example pro-	Defaults storage	System-	Path-	User-based
	gram		wide	based	
End-user	screen, bash	Within the code	Optional	No	Yes
binary					
Folder-based	git, hg,	Within the code	Optional	Yes	Yes (global set-
soft					tings)
System dae-	uwsgi,	Default file with pack-	Yes	No	No
mon		age			
Webapp	sentry,	Within the code	Yes	Yes (for	No
				dev)	

This would lead to:

- End-user binary: ConfigGetter('vim', ['/etc/vimrc', '~/.vimrc'])
- Folder-based (git): ConfigGetter('git', ['/etc/gitconfig', '~/.git/config', './. git/config'])
- System daemon: ConfigGetter('uwsgi', ['/usr/share/uwsgi/defaults.ini', '/etc/uwsgi/conf.d'])
- Webapp: ConfigGetter('sentry', ['/etc/sentry/conf.d/', './dev_settings.ini'], defaults=sentry_defaults)

6.2.2 Defaults

The default value may be provided in three different ways:

This is pretty handy when all configuration values are read once and stored in another object. However, if the ConfigGetter object is the reference "configuration-holder" object, repeating the default at each call is a sure way to get mismatches between various code sections.

Using a defaults directory The constructor for ConfigGetter takes an extra keyword argument, defaults, that is used after all provided configuration files:

With the above setup, config.getstr('logging.target') will be set to 'stderr' if no value is provided through the environment nor the configuration files.

In a package-owned configuration file For complex projects, the list of settings can get huge. In those cases, it may be useful to provide a default configuration file alongside the package, with each option documented.

This default configuration file can also be used as a default, reference file:

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With the above setup, the package-provided defaults.ini will be used as defaults.

Note: Don't forget to include the defaults.ini file in your package, with setup.py's include_package_data=True and MANIFEST.ini's include mymod/config/defaults.ini.

6.2.3 Configuration files in a folder

For complex production projects, a common pattern is to split configuration among several files – for instance, a standard file holds logging settings, a platform-dependent one provides standard system paths, an infrastructure-related one has all server host/port pairs, and a secured one contains the passwords.

In order to support this pattern, getconf's config_files list accepts folders as well; they are automatically detected on startup (using os.path.isdir).

With the following layout:

Just setup your getter with config = getconf.ConfigGetter('myproj', ['/etc/myproj/
', '~/.config/myproj.ini']); this is strictly equivalent to using config = getconf.
ConfigGetter('myproj', ['01_logging.ini', '02_passwords.ini', '~/.config/
myproj.ini']).

Note: Remember: ConfigGetter parses configuration files in order this means that files provided at the beginning of the list are overridden by the next ones.

This aligns with the natural alphabetical handling of files: when using a folder, we want definitions from 99_overrides to override those in 00_base.

6.2.4 Precedence

When reading configuration from multiple sources, it can be complex to determine which source overrides which. getconf's precedence rules should be natural and easy to understand:

- Environment variables **ALWAYS** override other sources
- Configuration files are parsed in the order they are declared (last declaration wins)
- global defaults (in ConfigGetter(defaults={})) come before calling-defaults (in config. getstr('x.y', default='blah')), which come last.

Two special cases need to be handled:

• The environment-provided configuration file (<NAMESPACE>_CONFIG) has precedence over configuration files declared in ConfigGetter (config_files=[])

• When a configuration file is actually a directory (even if provided through <NAMESPACE>_CONFIG), its directly contained files are inserted in **ALPHABETICAL ORDER**, so that 99_foo actually overrides 10_base.

Example

Note: This example is an extremely complex layout, for illustration purposes. Understanding it might hurt your head. Please prefer simpler layouts!

With the following layout:

And the following environment variables:

```
MYPROJ_CONFIG=/etc/myproj.local
MYPROJ_DB_HOST=localhost
```

And this ConfigGetter setup:

Then:

- config.getstr('db.host') is read from MYPROJ_DB_HOST=localhost
- config.getstr('db.name', 'foo') looks, in turn:
 - At /etc/myproj.local/20_passwords.ini's [db] name =
 - At/etc/myproj.local/15_logging.ini's [db] name =
 - $At/etc/myproj/20_passwords.ini's$ [db] name =
 - At /etc/myproj/10_logging.ini's [db] name =
 - At/etc/myproj.conf's [db] name =
 - Defaults to foo
- config.getstr('db.port', '1234') looks, in turn:
 - At/etc/myproj.local/20 passwords.ini's [db] port =
 - At/etc/myproj.local/15_logging.ini's [db] port =
 - At /etc/myproj/20_passwords.ini's [db] port =
 - At /etc/myproj/10_logging.ini's [db] port =

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- At/etc/myproj.conf's [db] port =
- Defaults to defaults ['db'] ['port'] = '5432'

6.3 Goals

get conf aims to solve a specific problem: provide a simple way to load settings in a platform-typical manner.

6.3.1 The problem

Daemons and centralized applications need to fetch some platform-specific configuration to run:

- Mode of operation (debug vs. production vs. packaging)
- Address of remote services (databases, other servers, ...)
- · Credentials

Beyond those required settings, an application needs to configure its behavior (timeouts, retries, languages, ...).

Various solutions exist:

- · Command line flags
- Environment variables
- Files in /etc

6.3.2 The approach

getconf has been designed to provide the following features:

Readability:

- All options can be defined in a single file
- The provided values are typechecked (int, float,...)
- All settings can have a default

Development:

- If I checkout the code and execute my program's entry point, it should be able to start
- If my local setup is slightly different from the default (non-standard DB port, ...), I just have to put a simple local_settings.ini file in the current directory

Continuous integration: The continuous integration server just needs to set a few well-defined environment variables to point the program to the test databases, servers, . . .

Production:

- In a could-like setup, I can use facilities provided by my platform to set the appropriate environment variables
- In a simpler, dedicated server setup, the application can also be configured with files in /etc

Customization:

• While providing sane defaults via the ConfigGetter class, you can easily define and use your own logic by providing the finders you want to use in the order you want by using/subclassing BaseConfigGetter.

6.3.3 Other options

While designing getconf, we looked at other options:

Define everything in files

- This makes it difficult to override a single setting (where should the file be?)
- Not compatible with env-based cloud platforms
- dev and prod often have very different configurations, but flat files don't provide a simple switch to set those defaults

Define everything in the environment Requires a prod-like setup for starting local servers, with files listing the environment variables

Load a single file, which includes others

- · Quickly turns into a maze of "local includes dev includes base"
- Hard to see where a setting is defined

6.4 Development

Clone the repository and install the development dependencies in a virtualenv:

```
pip install -r requirements_dev.txt
```

To run tests:

nosetests

To make a release:

fullrelease

6.5 ChangeLog

6.5.1 1.11.1 (2022-01-21)

Bugfix:

- Fix support for simple enum. Enum objects (not inheriting str) in getenum getter.
- Delay default value validation in getenum getter.

Note:

- Switch test runner to pytest
- Add official support of Python 3.10
- Python 3.5 and 3.6 support will be dropped in the next minor version.

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6.5.2 1.11.0 (2022-01-17)

New:

• Add support for enum. Enum based objects through the new getenum getter.

6.5.3 1.10.0 (2020-11-04)

New:

- Add support of pathlib.Path objects, both in loading the config and through the new getpath getter.
- Add mandatory_section option to ConfigGetter to enforce the use of a section in requested keys (and its underlying option key_validator on BaseConfigGetter to validate keys format)

Removed:

- Drop support of Python 2.7 which reached EOL in January 2020
- Drop support of Python 3.4 which reached EOL in 2019

6.5.4 1.9.0 (2019-02-01)

Removed:

• Drop support of Python 3.3 which reached EOL in September 2017

Deprecated:

• Use of list of non-strings as getconf.getlist() default value is deprecated

6.5.5 1.8.0 (2018-01-30)

New:

• Add BaseConfigGetter and the notion of "finders" to ease customization.

Note:

• Python 2.7 and 3.3 support will be dropped in next minor version.

6.5.6 1.7.1 (2017-10-20)

Bugfix:

• Allows to override a configuration containing a dash.

6.5.7 1.7.0 (2017-02-23)

New:

• Allow using an empty namespace (ConfigGetter (namespace=getconf.NO_NAMESPACE) to load unprefixed environment variables.

6.5.8 1.6.0 (2017-02-03)

New:

• Remove support for string interpolation in .ini file If this undocumented getconf feature is still needed by some users, we might consider restoring it in a future release.

6.5.9 1.5.2 (2017-01-23)

New:

• Add a new gettimedelta function to parse simple durations expressed as strings (10 days as '10d', 3 hours as '3h', etc.)

6.5.10 1.5.1 (2016-12-15)

New:

• Display the key of the value that triggers an error to help resolve.

6.5.11 1.5.0 (2016-05-11)

New:

- Better AssertionError messages when default values have the wrong type.
- Add ConfigGetter.get_ini_template() method

6.5.12 1.4.1 (2015-08-28)

New:

· Improve error reporting when raising on wrongly typed defaults

6.5.13 1.4.0 (2015-08-27)

New:

- Enforce type checking on every getconf.getXXX() call
- Add getconf.getstr() method
- Enable using None as default value for every function
- Better support for Python 3.3, 3.4 and wheel distribution

Deprecated:

- Use of strings as default values for getconf.getlist()
- Use of getconf.get() in favor of getconf.getstr()

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6.5.14 1.3.0 (2015-04-14)

New:

- Add getfloat() method
- Allow globs in config_files
- <PROJECT>_CONFIG env var will now have the same behaviour than *config_files* items

6.5.15 1.2.1 (2014-10-24)

Bugfix:

• Fix version number

6.5.16 1.2.0 (2014-10-20)

New:

• Add support for directory-based configuration and providing defaults through a dict

Removed:

• Remove support for ConfigGetter (namespace, file1, file2, file3) syntax (deprecated in 1.1.0), use ConfigGetter (namespace, [file1, file2, file3]) instead

6.5.17 1.1.0 (2014-08-18)

New:

• New initialization syntax

Deprecated

• Using argument list for config file paths when initializing ConfigGetter is now deprecated, you need to use a list (use ConfigGetter(namespace, ['settings_1.ini', 'settings_2.ini']) instead of ConfigGetter(namespace, 'settings_1.ini', 'settings_2.ini'))

6.5.18 1.0.1 (2014-04-13)

Bugfix:

• Fix packaging (missing requirements files)

6.5.19 1.0.0 (2014-04-12)

New:

· First version

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