

# Logging HOWTO

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**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\howto\[cpython-main] [Doc] [howto] logging.rst, line 9)

Unknown directive type "currentmodule".

```
.. currentmodule:: logging
```

## Basic Logging Tutorial

Logging is a means of tracking events that happen when some software runs. The software's developer adds logging calls to their code to indicate that certain events have occurred. An event is described by a descriptive message which can optionally contain variable data (i.e. data that is potentially different for each occurrence of the event). Events also have an importance which the developer ascribes to the event; the importance can also be called the *level* or *severity*.

### When to use logging

Logging provides a set of convenience functions for simple logging usage. These are `:func:`debug``, `:func:`info``, `:func:`warning``, `:func:`error`` and `:func:`critical``. To determine when to use logging, see the table below, which states, for each of a set of common tasks, the best tool to use for it.

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\howto\[cpython-main] [Doc] [howto] logging.rst, line 25); [backlink](#)

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**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\howto\[cpython-main] [Doc] [howto] logging.rst, line 25); [backlink](#)

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Task you want to perform	The best tool for the task
Display console output for ordinary usage of a command line script or program	<code>:func:`print`</code> <div><p><b>System Message: ERROR/3</b> (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\howto\[cpython-main] [Doc] [howto] logging.rst, line 34); <a href="#">backlink</a></p><p>Unknown interpreted text role "func".</p></div>

Task you want to perform	The best tool for the task
Report events that occur during normal operation of a program (e.g. for status monitoring or fault investigation)	<p><code>:func:logging.info` (or <code>:func:logging.debug` for very detailed output for diagnostic purposes)</code></code></p> <div> <p><b>System Message: ERROR/3</b>  (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\howto\[cpython-main] [Doc] [howto] logging.rst, line 38); <a href="#">backlink</a></p> <p>Unknown interpreted text role "func".</p> </div> <div> <p><b>System Message: ERROR/3</b>  (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\howto\[cpython-main] [Doc] [howto] logging.rst, line 38); <a href="#">backlink</a></p> <p>Unknown interpreted text role "func".</p> </div>
Issue a warning regarding a particular runtime event	<p><code>:func:warnings.warn` in library code if the issue is avoidable and the client application should be modified to eliminate the warning</code></p> <div> <p><b>System Message: ERROR/3</b>  (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\howto\[cpython-main] [Doc] [howto] logging.rst, line 43); <a href="#">backlink</a></p> <p>Unknown interpreted text role "func".</p> </div> <p><code>:func:logging.warning` if there is nothing the client application can do about the situation, but the event should still be noted</code></p> <div> <p><b>System Message: ERROR/3</b>  (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\howto\[cpython-main] [Doc] [howto] logging.rst, line 48); <a href="#">backlink</a></p> <p>Unknown interpreted text role "func".</p> </div>
Report an error regarding a particular runtime event	Raise an exception

Task you want to perform	The best tool for the task
Report suppression of an error without raising an exception (e.g. error handler in a long-running server process)	<p><code>:func:'logging.error'</code>, <code>:func:'logging.exception'</code> or <code>:func:'logging.critical'</code> as appropriate for the specific error and application domain</p> <div> <p><b>System Message: ERROR/3</b>  (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\howto\[cpython-main] [Doc] [howto] logging.rst, line 56); <a href="#">backlink</a></p> <p>Unknown interpreted text role "func".</p> </div> <div> <p><b>System Message: ERROR/3</b>  (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\howto\[cpython-main] [Doc] [howto] logging.rst, line 56); <a href="#">backlink</a></p> <p>Unknown interpreted text role "func".</p> </div> <div> <p><b>System Message: ERROR/3</b>  (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\howto\[cpython-main] [Doc] [howto] logging.rst, line 56); <a href="#">backlink</a></p> <p>Unknown interpreted text role "func".</p> </div>

The logging functions are named after the level or severity of the events they are used to track. The standard levels and their applicability are described below (in increasing order of severity):

<p><b>System Message: ERROR/3</b> (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\howto\[cpython-main] [Doc] [howto] logging.rst, line 66)</p> <p>Unknown directive type "tabularcolumns".</p> <pre>.. tabularcolumns::  l L </pre>
---

Level	When it's used
DEBUG	Detailed information, typically of interest only when diagnosing problems.
INFO	Confirmation that things are working as expected.
WARNING	An indication that something unexpected happened, or indicative of some problem in the near future (e.g. 'disk space low'). The software is still working as expected.
ERROR	Due to a more serious problem, the software has not been able to perform some function.
CRITICAL	A serious error, indicating that the program itself may be unable to continue running.

The default level is `WARNING`, which means that only events of this level and above will be tracked, unless the logging package is configured to do otherwise.

Events that are tracked can be handled in different ways. The simplest way of handling tracked events is to print them to the console. Another common way is to write them to a disk file.

## A simple example

A very simple example is:

```
import logging
logging.warning('Watch out!') # will print a message to the console
logging.info('I told you so') # will not print anything
```

If you type these lines into a script and run it, you'll see:

<p><b>System Message: WARNING/2</b> (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\howto\[cpython-main] [Doc] [howto] logging.rst, line 111)</p> <p>Cannot analyze code. No Pygments lexer found for "none".</p>
---

```
.. code-block:: none

WARNING:root:Watch out!
```

printed out on the console. The `INFO` message doesn't appear because the default level is `WARNING`. The printed message includes the indication of the level and the description of the event provided in the logging call, i.e. 'Watch out!'. Don't worry about the 'root' part for now: it will be explained later. The actual output can be formatted quite flexibly if you need that; formatting options will also be explained later.

## Logging to a file

A very common situation is that of recording logging events in a file, so let's look at that next. Be sure to try the following in a newly-started Python interpreter, and don't just continue from the session described above:

```
import logging
logging.basicConfig(filename='example.log', encoding='utf-8', level=logging.DEBUG)
logging.debug('This message should go to the log file')
logging.info('So should this')
logging.warning('And this, too')
logging.error('And non-ASCII stuff, too, like Å~resund and Malmö')
```

**System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\howto\[cpython-main] [Doc] [howto] logging.rst, line 137)**

Unknown directive type "versionchanged".

```
.. versionchanged:: 3.9
   The *encoding* argument was added. In earlier Python versions, or if not
   specified, the encoding used is the default value used by :func:`open`. While
   not shown in the above example, an *errors* argument can also now be passed,
   which determines how encoding errors are handled. For available values and
   the default, see the documentation for :func:`open`.
```

And now if we open the file and look at what we have, we should find the log messages:

**System Message: WARNING/2 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\howto\[cpython-main] [Doc] [howto] logging.rst, line 147)**

Cannot analyze code. No Pygments lexer found for "none".

```
.. code-block:: none

DEBUG:root:This message should go to the log file
INFO:root:So should this
WARNING:root:And this, too
ERROR:root:And non-ASCII stuff, too, like Å~resund and Malmö
```

This example also shows how you can set the logging level which acts as the threshold for tracking. In this case, because we set the threshold to `DEBUG`, all of the messages were printed.

If you want to set the logging level from a command-line option such as:

**System Message: WARNING/2 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\howto\[cpython-main] [Doc] [howto] logging.rst, line 160)**

Cannot analyze code. No Pygments lexer found for "none".

```
.. code-block:: none

--log=INFO
```

and you have the value of the parameter passed for `--log` in some variable *loglevel*, you can use:

```
getattr(logging, loglevel.upper())
```

to get the value which you'll pass to `:func:`basicConfig`` via the *level* argument. You may want to error check any user input value, perhaps as in the following example:

**System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\howto\[cpython-main] [Doc] [howto] logging.rst, line 169); [backlink](#)**

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```
# assuming loglevel is bound to the string value obtained from the
# command line argument. Convert to upper case to allow the user to
# specify --log=DEBUG or --log=debug
numeric_level = getattr(logging, loglevel.upper(), None)
if not isinstance(numeric_level, int):
    raise ValueError('Invalid log level: %s' % loglevel)
logging.basicConfig(level=numeric_level, ...)
```

The call to `.func:basicConfig` should come *before* any calls to `.func:debug`, `.func:info` etc. As it's intended as a one-off simple configuration facility, only the first call will actually do anything: subsequent calls are effectively no-ops.

**System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\howto\cpython-main [Doc] [howto] logging.rst, line 181); [backlink](#)**

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**System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\howto\cpython-main [Doc] [howto] logging.rst, line 181); [backlink](#)**

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**System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\howto\cpython-main [Doc] [howto] logging.rst, line 181); [backlink](#)**

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If you run the above script several times, the messages from successive runs are appended to the file *example.log*. If you want each run to start afresh, not remembering the messages from earlier runs, you can specify the *filemode* argument, by changing the call in the above example to:

```
logging.basicConfig(filename='example.log', filemode='w', level=logging.DEBUG)
```

The output will be the same as before, but the log file is no longer appended to, so the messages from earlier runs are lost.

## Logging from multiple modules

If your program consists of multiple modules, here's an example of how you could organize logging in it:

```
# myapp.py
import logging
import mylib

def main():
    logging.basicConfig(filename='myapp.log', level=logging.INFO)
    logging.info('Started')
    mylib.do_something()
    logging.info('Finished')

if __name__ == '__main__':
    main()

# mylib.py
import logging

def do_something():
    logging.info('Doing something')
```

If you run *myapp.py*, you should see this in *myapp.log*:

**System Message: WARNING/2 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\howto\cpython-main [Doc] [howto] logging.rst, line 226)**

Cannot analyze code. No Pygments lexer found for "none".

```
.. code-block:: none
```

```
INFO:root:Started
INFO:root:Doing something
INFO:root:Finished
```

which is hopefully what you were expecting to see. You can generalize this to multiple modules, using the pattern in *mylib.py*. Note

that for this simple usage pattern, you won't know, by looking in the log file, *where* in your application your messages came from, apart from looking at the event description. If you want to track the location of your messages, you'll need to refer to the documentation beyond the tutorial level -- see [ref: logging-advanced-tutorial](#).

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\howto\[cpython-main] [Doc] [howto] logging.rst, line 232); [backlink](#)

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## Logging variable data

To log variable data, use a format string for the event description message and append the variable data as arguments. For example:

```
import logging
logging.warning('%s before you %s', 'Look', 'leap!')
```

will display:

**System Message: WARNING/2** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\howto\[cpython-main] [Doc] [howto] logging.rst, line 252)

Cannot analyze code. No Pygments lexer found for "none".

```
.. code-block:: none
```

```
WARNING:root:Look before you leap!
```

As you can see, merging of variable data into the event description message uses the old, %-style of string formatting. This is for backwards compatibility: the logging package pre-dates newer formatting options such as `meth: str.format` and `class: string.Template`. These newer formatting options *are* supported, but exploring them is outside the scope of this tutorial: see [ref: formatting-styles](#) for more information.

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\howto\[cpython-main] [Doc] [howto] logging.rst, line 256); [backlink](#)

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**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\howto\[cpython-main] [Doc] [howto] logging.rst, line 256); [backlink](#)

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**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\howto\[cpython-main] [Doc] [howto] logging.rst, line 256); [backlink](#)

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## Changing the format of displayed messages

To change the format which is used to display messages, you need to specify the format you want to use:

```
import logging
logging.basicConfig(format='%(levelname)s: %(message)s', level=logging.DEBUG)
logging.debug('This message should appear on the console')
logging.info('So should this')
logging.warning('And this, too')
```

which would print:

**System Message: WARNING/2** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\howto\[cpython-main] [Doc] [howto] logging.rst, line 278)

Cannot analyze code. No Pygments lexer found for "none".

```
.. code-block:: none
```

```
DEBUG:This message should appear on the console
```

```
INFO:So should this
```

```
WARNING:And this, too
```

Notice that the 'root' which appeared in earlier examples has disappeared. For a full set of things that can appear in format strings, you can refer to the documentation for [:ref: 'logrecord-attributes'](#), but for simple usage, you just need the *levelname* (severity), *message* (event description, including variable data) and perhaps to display when the event occurred. This is described in the next section.

**System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\howto\[cpython-main] [Doc] [howto] logging.rst, line 284); [backlink](#)**

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## Displaying the date/time in messages

To display the date and time of an event, you would place '%(asctime)s' in your format string:

```
import logging
logging.basicConfig(format='%(asctime)s %(message)s')
logging.warning('is when this event was logged.')
```

which should print something like this:

**System Message: WARNING/2 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\howto\[cpython-main] [Doc] [howto] logging.rst, line 304)**

Cannot analyze code. No Pygments lexer found for "none".

```
.. code-block:: none
```

```
2010-12-12 11:41:42,612 is when this event was logged.
```

The default format for date/time display (shown above) is like ISO8601 or [RFC 3339](#). If you need more control over the formatting of the date/time, provide a *datefmt* argument to `basicConfig`, as in this example:

```
import logging
logging.basicConfig(format='%(asctime)s %(message)s', datefmt='%m/%d/%Y %I:%M:%S %p')
logging.warning('is when this event was logged.')
```

which would display something like this:

**System Message: WARNING/2 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\howto\[cpython-main] [Doc] [howto] logging.rst, line 318)**

Cannot analyze code. No Pygments lexer found for "none".

```
.. code-block:: none
```

```
12/12/2010 11:46:36 AM is when this event was logged.
```

The format of the *datefmt* argument is the same as supported by [:func: 'time.strftime'](#).

**System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\howto\[cpython-main] [Doc] [howto] logging.rst, line 322); [backlink](#)**

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## Next Steps

That concludes the basic tutorial. It should be enough to get you up and running with logging. There's a lot more that the logging package offers, but to get the best out of it, you'll need to invest a little more of your time in reading the following sections. If you're ready for that, grab some of your favourite beverage and carry on.

If your logging needs are simple, then use the above examples to incorporate logging into your own scripts, and if you run into problems or don't understand something, please post a question on the [comp.lang.python](https://groups.google.com/forum/#!forum/comp.lang.python) Usenet group (available at <https://groups.google.com/forum/#!forum/comp.lang.python>) and you should receive help before too long.

Still here? You can carry on reading the next few sections, which provide a slightly more advanced/in-depth tutorial than the basic one above. After that, you can take a look at the [:ref: 'logging-cookbook'](#).

**System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\howto\[cpython-main] [Doc] [howto] logging.rst, line 341); [backlink](#)**

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## Advanced Logging Tutorial

The logging library takes a modular approach and offers several categories of components: loggers, handlers, filters, and formatters.

- Loggers expose the interface that application code directly uses.
- Handlers send the log records (created by loggers) to the appropriate destination.
- Filters provide a finer grained facility for determining which log records to output.
- Formatters specify the layout of log records in the final output.

Log event information is passed between loggers, handlers, filters and formatters in a `:class:`LogRecord`` instance.

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\howto\[cpython-main] [Doc] [howto] logging.rst, line 361); [backlink](#)

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Logging is performed by calling methods on instances of the `:class:`Logger`` class (hereafter called `:dfn`loggers``). Each instance has a name, and they are conceptually arranged in a namespace hierarchy using dots (periods) as separators. For example, a logger named 'scan' is the parent of loggers 'scan.text', 'scan.html' and 'scan.pdf'. Logger names can be anything you want, and indicate the area of an application in which a logged message originates.

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\howto\[cpython-main] [Doc] [howto] logging.rst, line 364); [backlink](#)

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**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\howto\[cpython-main] [Doc] [howto] logging.rst, line 364); [backlink](#)

Unknown interpreted text role "dfn".

A good convention to use when naming loggers is to use a module-level logger, in each module which uses logging, named as follows:

```
logger = logging.getLogger(__name__)
```

This means that logger names track the package/module hierarchy, and it's intuitively obvious where events are logged just from the logger name.

The root of the hierarchy of loggers is called the root logger. That's the logger used by the functions `:func:`debug``, `:func:`info``, `:func:`warning``, `:func:`error`` and `:func:`critical``, which just call the same-named method of the root logger. The functions and the methods have the same signatures. The root logger's name is printed as 'root' in the logged output.

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\howto\[cpython-main] [Doc] [howto] logging.rst, line 379); [backlink](#)

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**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\howto\[cpython-main] [Doc] [howto] logging.rst, line 379); [backlink](#)

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**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\howto\[cpython-main] [Doc] [howto] logging.rst, line 379); [backlink](#)

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**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\howto\[cpython-main] [Doc] [howto] logging.rst, line 379); [backlink](#)

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**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\howto\[cpython-main] [Doc] [howto] logging.rst, line 379); [backlink](#)

Unknown interpreted text role "func".



It is, of course, possible to log messages to different destinations. Support is included in the package for writing log messages to files, HTTP GET/POST locations, email via SMTP, generic sockets, queues, or OS-specific logging mechanisms such as syslog or the Windows NT event log. Destinations are served by `:dfn:handler` classes. You can create your own log destination class if you have special requirements not met by any of the built-in handler classes.

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\howto\cpython-main [Doc] [howto] logging.rst, line 385); [backlink](#)

Unknown interpreted text role "dfn".

By default, no destination is set for any logging messages. You can specify a destination (such as console or file) by using `:func:basicConfig` as in the tutorial examples. If you call the functions `:func:debug`, `:func:info`, `:func:warning`, `:func:error` and `:func:critical`, they will check to see if no destination is set; and if one is not set, they will set a destination of the console (`sys.stderr`) and a default format for the displayed message before delegating to the root logger to do the actual message output.

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\howto\cpython-main [Doc] [howto] logging.rst, line 392); [backlink](#)

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**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\howto\cpython-main [Doc] [howto] logging.rst, line 392); [backlink](#)

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**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\howto\cpython-main [Doc] [howto] logging.rst, line 392); [backlink](#)

Unknown interpreted text role "func".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\howto\cpython-main [Doc] [howto] logging.rst, line 392); [backlink](#)

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**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\howto\cpython-main [Doc] [howto] logging.rst, line 392); [backlink](#)

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**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\howto\cpython-main [Doc] [howto] logging.rst, line 392); [backlink](#)

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The default format set by `:func:basicConfig` for messages is:

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\howto\cpython-main [Doc] [howto] logging.rst, line 400); [backlink](#)

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**System Message: WARNING/2** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\howto\cpython-main [Doc] [howto] logging.rst, line 402)

Cannot analyze code. No Pygments lexer found for "none".

```
.. code-block:: none
    severity:logger name:message
```

You can change this by passing a format string to `:func:basicConfig` with the `format` keyword argument. For all options regarding how a format string is constructed, see [ref:formatter-objects](#).

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-

main\Doc\howto\[cpython-main] [Doc] [howto] logging.rst, line 406); [backlink](#)

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**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\howto\[cpython-main] [Doc] [howto] logging.rst, line 406); [backlink](#)

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## Logging Flow

The flow of log event information in loggers and handlers is illustrated in the following diagram.



## Loggers

`class: 'Logger'` objects have a threefold job. First, they expose several methods to application code so that applications can log messages at runtime. Second, logger objects determine which log messages to act upon based upon severity (the default filtering facility) or filter objects. Third, logger objects pass along relevant log messages to all interested log handlers.

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\howto\[cpython-main] [Doc] [howto] logging.rst, line 421); [backlink](#)

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The most widely used methods on logger objects fall into two categories: configuration and message sending.

These are the most common configuration methods:

- `meth: 'Logger.setLevel'` specifies the lowest-severity log message a logger will handle, where debug is the lowest built-in severity level and critical is the highest built-in severity. For example, if the severity level is INFO, the logger will handle only INFO, WARNING, ERROR, and CRITICAL messages and will ignore DEBUG messages.

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\howto\[cpython-main] [Doc] [howto] logging.rst, line 432); [backlink](#)

Unknown interpreted text role "meth".

- `meth: 'Logger.addHandler'` and `meth: 'Logger.removeHandler'` add and remove handler objects from the logger object. Handlers are covered in more detail in [ref: handler-basic](#).

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\howto\[cpython-main] [Doc] [howto] logging.rst, line 438); [backlink](#)

Unknown interpreted text role "meth".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\howto\[cpython-main] [Doc] [howto] logging.rst, line 438); [backlink](#)

Unknown interpreted text role "meth".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\howto\[cpython-main] [Doc] [howto] logging.rst, line 438); [backlink](#)

Unknown interpreted text role "ref".

- `meth: 'Logger.addFilter'` and `meth: 'Logger.removeFilter'` add and remove filter objects from the logger object. Filters are covered in more detail in [ref: filter](#).

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\howto\[cpython-main] [Doc] [howto] logging.rst, line 442); [backlink](#)

Unknown interpreted text role "meth".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\howto\[cpython-main] [Doc] [howto]logging.rst, line 442);  
[backlink](#)

Unknown interpreted text role "meth".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\howto\[cpython-main] [Doc] [howto]logging.rst, line 442);  
[backlink](#)

Unknown interpreted text role "ref".

You don't need to always call these methods on every logger you create. See the last two paragraphs in this section.

With the logger object configured, the following methods create log messages:

- `meth:Logger.debug`, `meth:Logger.info`, `meth:Logger.warning`, `meth:Logger.error`, and `meth:Logger.critical` all create log records with a message and a level that corresponds to their respective method names. The message is actually a format string, which may contain the standard string substitution syntax of `%s`, `%d`, `%f`, and so on. The rest of their arguments is a list of objects that correspond with the substitution fields in the message. With regard to `**kwargs`, the logging methods care only about a keyword of `exc_info` and use it to determine whether to log exception information.

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\howto\[cpython-main] [Doc] [howto]logging.rst, line 451);  
[backlink](#)

Unknown interpreted text role "meth".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\howto\[cpython-main] [Doc] [howto]logging.rst, line 451);  
[backlink](#)

Unknown interpreted text role "meth".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\howto\[cpython-main] [Doc] [howto]logging.rst, line 451);  
[backlink](#)

Unknown interpreted text role "meth".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\howto\[cpython-main] [Doc] [howto]logging.rst, line 451);  
[backlink](#)

Unknown interpreted text role "meth".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\howto\[cpython-main] [Doc] [howto]logging.rst, line 451);  
[backlink](#)

Unknown interpreted text role "meth".

- `meth:Logger.exception` creates a log message similar to `meth:Logger.error`. The difference is that `meth:Logger.exception` dumps a stack trace along with it. Call this method only from an exception handler.

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\howto\[cpython-main] [Doc] [howto]logging.rst, line 461);  
[backlink](#)

Unknown interpreted text role "meth".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\howto\[cpython-main] [Doc] [howto]logging.rst, line 461);

[backlink](#)

Unknown interpreted text role "meth".

**System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\howto\[cpython-main] [Doc] [howto] logging.rst, line 461);**  
[backlink](#)

Unknown interpreted text role "meth".

- `meth: 'Logger.log'` takes a log level as an explicit argument. This is a little more verbose for logging messages than using the log level convenience methods listed above, but this is how to log at custom log levels.

**System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\howto\[cpython-main] [Doc] [howto] logging.rst, line 465);**  
[backlink](#)

Unknown interpreted text role "meth".

`func: 'getLogger'` returns a reference to a logger instance with the specified name if it is provided, or `root` if not. The names are period-separated hierarchical structures. Multiple calls to `func: 'getLogger'` with the same name will return a reference to the same logger object. Loggers that are further down in the hierarchical list are children of loggers higher up in the list. For example, given a logger with a name of `foo`, loggers with names of `foo.bar`, `foo.bar.baz`, and `foo.bam` are all descendants of `foo`.

**System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\howto\[cpython-main] [Doc] [howto] logging.rst, line 469);** [backlink](#)

Unknown interpreted text role "func".

**System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\howto\[cpython-main] [Doc] [howto] logging.rst, line 469);** [backlink](#)

Unknown interpreted text role "func".

Loggers have a concept of *effective level*. If a level is not explicitly set on a logger, the level of its parent is used instead as its effective level. If the parent has no explicit level set, its parent is examined, and so on - all ancestors are searched until an explicitly set level is found. The root logger always has an explicit level set (`WARNING` by default). When deciding whether to process an event, the effective level of the logger is used to determine whether the event is passed to the logger's handlers.

Child loggers propagate messages up to the handlers associated with their ancestor loggers. Because of this, it is unnecessary to define and configure handlers for all the loggers an application uses. It is sufficient to configure handlers for a top-level logger and create child loggers as needed. (You can, however, turn off propagation by setting the *propagate* attribute of a logger to `False`.)

## Handlers

`class: '~logging.Handler'` objects are responsible for dispatching the appropriate log messages (based on the log messages' severity) to the handler's specified destination. `class: 'Logger'` objects can add zero or more handler objects to themselves with an `meth: '~Logger.addHandler'` method. As an example scenario, an application may want to send all log messages to a log file, all log messages of error or higher to stdout, and all messages of critical to an email address. This scenario requires three individual handlers where each handler is responsible for sending messages of a specific severity to a specific location.

**System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\howto\[cpython-main] [Doc] [howto] logging.rst, line 498);** [backlink](#)

Unknown interpreted text role "class".

**System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\howto\[cpython-main] [Doc] [howto] logging.rst, line 498);** [backlink](#)

Unknown interpreted text role "class".

**System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\howto\[cpython-main] [Doc] [howto] logging.rst, line 498);** [backlink](#)

Unknown interpreted text role "meth".

The standard library includes quite a few handler types (see [ref`useful-handlers`](#)); the tutorials use mainly `class:`StreamHandler`` and `class:`FileHandler`` in its examples.

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\howto\[cpython-main] [Doc] [howto] logging.rst, line 508); [backlink](#)

Unknown interpreted text role "ref".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\howto\[cpython-main] [Doc] [howto] logging.rst, line 508); [backlink](#)

Unknown interpreted text role "class".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\howto\[cpython-main] [Doc] [howto] logging.rst, line 508); [backlink](#)

Unknown interpreted text role "class".

There are very few methods in a handler for application developers to concern themselves with. The only handler methods that seem relevant for application developers who are using the built-in handler objects (that is, not creating custom handlers) are the following configuration methods:

- The `meth:`~Handler.setLevel`` method, just as in logger objects, specifies the lowest severity that will be dispatched to the appropriate destination. Why are there two `func:`setLevel`` methods? The level set in the logger determines which severity of messages it will pass to its handlers. The level set in each handler determines which messages that handler will send on.

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\howto\[cpython-main] [Doc] [howto] logging.rst, line 517); [backlink](#)

Unknown interpreted text role "meth".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\howto\[cpython-main] [Doc] [howto] logging.rst, line 517); [backlink](#)

Unknown interpreted text role "func".

- `meth:`~Handler.setFormatter`` selects a Formatter object for this handler to use.

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\howto\[cpython-main] [Doc] [howto] logging.rst, line 523); [backlink](#)

Unknown interpreted text role "meth".

- `meth:`~Handler.addFilter`` and `meth:`~Handler.removeFilter`` respectively configure and deconfigure filter objects on handlers.

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\howto\[cpython-main] [Doc] [howto] logging.rst, line 526); [backlink](#)

Unknown interpreted text role "meth".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\howto\[cpython-main] [Doc] [howto] logging.rst, line 526); [backlink](#)

Unknown interpreted text role "meth".

Application code should not directly instantiate and use instances of `class:`Handler``. Instead, the `class:`Handler`` class is a base class that defines the interface that all handlers should have and establishes some default behavior that child classes can use (or override).

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-

main\Doc\howto\ [cpython-main] [Doc] [howto] logging.rst, line 529); [backlink](#)

Unknown interpreted text role "class".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\howto\ [cpython-main] [Doc] [howto] logging.rst, line 529); [backlink](#)

Unknown interpreted text role "class".

## Formatters

Formatter objects configure the final order, structure, and contents of the log message. Unlike the base `:class:`logging.Handler`` class, application code may instantiate formatter classes, although you could likely subclass the formatter if your application needs special behavior. The constructor takes three optional arguments -- a message format string, a date format string and a style indicator.

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\howto\ [cpython-main] [Doc] [howto] logging.rst, line 538); [backlink](#)

Unknown interpreted text role "class".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\howto\ [cpython-main] [Doc] [howto] logging.rst, line 545)

Unknown directive type "method".

```
.. method:: logging.Formatter.__init__(fmt=None, datefmt=None, style='%')
```

If there is no message format string, the default is to use the raw message. If there is no date format string, the default date format is:

**System Message: WARNING/2** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\howto\ [cpython-main] [Doc] [howto] logging.rst, line 550)

Cannot analyze code. No Pygments lexer found for "none".

```
.. code-block:: none

    %Y-%m-%d %H:%M:%S
```

with the milliseconds tacked on at the end. The `style` is one of `%`, `'` or `$`. If one of these is not specified, then `'` will be used.

If the `style` is `%`, the message format string uses `%( <dictionary key> )s` styled string substitution; the possible keys are documented in [ref`logrecord-attributes`](#). If the `style` is `'`, the message format string is assumed to be compatible with `:meth:`str.format`` (using keyword arguments), while if the `style` is `$` then the message format string should conform to what is expected by `:meth:`string.Template.substitute``.

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\howto\ [cpython-main] [Doc] [howto] logging.rst, line 557); [backlink](#)

Unknown interpreted text role "ref".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\howto\ [cpython-main] [Doc] [howto] logging.rst, line 557); [backlink](#)

Unknown interpreted text role "meth".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\howto\ [cpython-main] [Doc] [howto] logging.rst, line 557); [backlink](#)

Unknown interpreted text role "meth".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\howto\ [cpython-main] [Doc] [howto] logging.rst, line 564)

Unknown directive type "versionchanged".

```
.. versionchanged:: 3.2
    Added the ``style`` parameter.
```

The following message format string will log the time in a human-readable format, the severity of the message, and the contents of the message, in that order:

```
'%(asctime)s - %(levelname)s - %(message)s'
```

Formatters use a user-configurable function to convert the creation time of a record to a tuple. By default, `func:time.localtime` is used; to change this for a particular formatter instance, set the `converter` attribute of the instance to a function with the same signature as `func:time.localtime` or `func:time.gmtime`. To change it for all formatters, for example if you want all logging times to be shown in GMT, set the `converter` attribute in the `Formatter` class (to `time.gmtime` for GMT display).

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\howto\[cpython-main] [Doc] [howto] logging.rst, line 573); [backlink](#)

Unknown interpreted text role "func".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\howto\[cpython-main] [Doc] [howto] logging.rst, line 573); [backlink](#)

Unknown interpreted text role "func".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\howto\[cpython-main] [Doc] [howto] logging.rst, line 573); [backlink](#)

Unknown interpreted text role "func".

## Configuring Logging

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\howto\[cpython-main] [Doc] [howto] logging.rst, line 585)

Unknown directive type "currentmodule".

```
.. currentmodule:: logging.config
```

Programmers can configure logging in three ways:

1. Creating loggers, handlers, and formatters explicitly using Python code that calls the configuration methods listed above.
2. Creating a logging config file and reading it using the `func:fileConfig` function.

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\howto\[cpython-main] [Doc] [howto] logging.rst, line 591); [backlink](#)

Unknown interpreted text role "func".

3. Creating a dictionary of configuration information and passing it to the `func:dictConfig` function.

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\howto\[cpython-main] [Doc] [howto] logging.rst, line 593); [backlink](#)

Unknown interpreted text role "func".

For the reference documentation on the last two options, see `ref:logging-config-api`. The following example configures a very simple logger, a console handler, and a simple formatter using Python code:

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\howto\[cpython-main] [Doc] [howto] logging.rst, line 596); [backlink](#)

Unknown interpreted text role "ref".

```
import logging

# create logger
logger = logging.getLogger('simple_example')
logger.setLevel(logging.DEBUG)
```



```
# create console handler and set level to debug
ch = logging.StreamHandler()
ch.setLevel(logging.DEBUG)

# create formatter
formatter = logging.Formatter('%(asctime)s - %(name)s - %(levelname)s - %(message)s')

# add formatter to ch
ch.setFormatter(formatter)

# add ch to logger
logger.addHandler(ch)

# 'application' code
logger.debug('debug message')
logger.info('info message')
logger.warning('warn message')
logger.error('error message')
logger.critical('critical message')
```

Running this module from the command line produces the following output:

```
$ python simple_logging_module.py
2005-03-19 15:10:26,618 - simple_example - DEBUG - debug message
2005-03-19 15:10:26,620 - simple_example - INFO - info message
2005-03-19 15:10:26,695 - simple_example - WARNING - warn message
2005-03-19 15:10:26,697 - simple_example - ERROR - error message
2005-03-19 15:10:26,773 - simple_example - CRITICAL - critical message
```

The following Python module creates a logger, handler, and formatter nearly identical to those in the example listed above, with the only difference being the names of the objects:

```
import logging
import logging.config

logging.config.fileConfig('logging.conf')

# create logger
logger = logging.getLogger('simpleExample')

# 'application' code
logger.debug('debug message')
logger.info('info message')
logger.warning('warn message')
logger.error('error message')
logger.critical('critical message')
```

Here is the logging.conf file:

```
[loggers]
keys=root,simpleExample

[handlers]
keys=consoleHandler

[formatters]
keys=simpleFormatter

[logger_root]
level=DEBUG
handlers=consoleHandler

[logger_simpleExample]
level=DEBUG
handlers=consoleHandler
qualname=simpleExample
propagate=0

[handler_consoleHandler]
class=StreamHandler
level=DEBUG
formatter=simpleFormatter
args=(sys.stdout,)

[formatter_simpleFormatter]
format=%(asctime)s - %(name)s - %(levelname)s - %(message)s
```

The output is nearly identical to that of the non-config-file-based example:

```
$ python simple_logging_config.py
```

```
2005-03-19 15:38:55,977 - simpleExample - DEBUG - debug message
2005-03-19 15:38:55,979 - simpleExample - INFO - info message
2005-03-19 15:38:56,054 - simpleExample - WARNING - warn message
2005-03-19 15:38:56,055 - simpleExample - ERROR - error message
2005-03-19 15:38:56,130 - simpleExample - CRITICAL - critical message
```

You can see that the config file approach has a few advantages over the Python code approach, mainly separation of configuration and code and the ability of noncoders to easily modify the logging properties.

### Warning

The `:func:'fileConfig'` function takes a default parameter, `disable_existing_loggers`, which defaults to `True` for reasons of backward compatibility. This may or may not be what you want, since it will cause any non-root loggers existing before the `:func:'fileConfig'` call to be disabled unless they (or an ancestor) are explicitly named in the configuration. Please refer to the reference documentation for more information, and specify `False` for this parameter if you wish.

**System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\howto\[cpython-main] [Doc] [howto] logging.rst, line 703); [backlink](#)**

Unknown interpreted text role "func".

**System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\howto\[cpython-main] [Doc] [howto] logging.rst, line 703); [backlink](#)**

Unknown interpreted text role "func".

The dictionary passed to `:func:'dictConfig'` can also specify a Boolean value with key `disable_existing_loggers`, which if not specified explicitly in the dictionary also defaults to being interpreted as `True`. This leads to the logger-disabling behaviour described above, which may not be what you want - in which case, provide the key explicitly with a value of `False`.

**System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\howto\[cpython-main] [Doc] [howto] logging.rst, line 711); [backlink](#)**

Unknown interpreted text role "func".

**System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\howto\[cpython-main] [Doc] [howto] logging.rst, line 719)**

Unknown directive type "currentmodule".

```
.. currentmodule:: logging
```

Note that the class names referenced in config files need to be either relative to the logging module, or absolute values which can be resolved using normal import mechanisms. Thus, you could use either `:class:'~logging.handlers.WatchedFileHandler'` (relative to the logging module) or `mypackage.mymodule.MyHandler` (for a class defined in package `mypackage` and module `mymodule`, where `mypackage` is available on the Python import path).

**System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\howto\[cpython-main] [Doc] [howto] logging.rst, line 721); [backlink](#)**

Unknown interpreted text role "class".

In Python 3.2, a new means of configuring logging has been introduced, using dictionaries to hold configuration information. This provides a superset of the functionality of the config-file-based approach outlined above, and is the recommended configuration method for new applications and deployments. Because a Python dictionary is used to hold configuration information, and since you can populate that dictionary using different means, you have more options for configuration. For example, you can use a configuration file in JSON format, or, if you have access to YAML processing functionality, a file in YAML format, to populate the configuration dictionary. Or, of course, you can construct the dictionary in Python code, receive it in pickled form over a socket, or use whatever approach makes sense for your application.

Here's an example of the same configuration as above, in YAML format for the new dictionary-based approach:

```

version: 1
formatters:
  simple:
    format: '%(asctime)s - %(name)s - %(levelname)s - %(message)s'
handlers:
  console:
    class: logging.StreamHandler
    level: DEBUG
    formatter: simple
    stream: ext://sys.stdout
loggers:
  simpleExample:
    level: DEBUG
    handlers: [console]
    propagate: no
root:
  level: DEBUG
  handlers: [console]

```

For more information about logging using a dictionary, see [:ref:`logging-config-api`](#).

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\howto\[cpython-main] [Doc] [howto] logging.rst, line 765); [backlink](#)

Unknown interpreted text role "ref".

## What happens if no configuration is provided

If no logging configuration is provided, it is possible to have a situation where a logging event needs to be output, but no handlers can be found to output the event. The behaviour of the logging package in these circumstances is dependent on the Python version.

For versions of Python prior to 3.2, the behaviour is as follows:

- If `logging.raiseExceptions` is `False` (production mode), the event is silently dropped.
- If `logging.raiseExceptions` is `True` (development mode), a message 'No handlers could be found for logger X.Y.Z' is printed once.

In Python 3.2 and later, the behaviour is as follows:

- The event is output using a 'handler of last resort', stored in `logging.lastResort`. This internal handler is not associated with any logger, and acts like a `:class:`~logging.StreamHandler`` which writes the event description message to the current value of `sys.stderr` (therefore respecting any redirections which may be in effect). No formatting is done on the message - just the bare event description message is printed. The handler's level is set to `WARNING`, so all events at this and greater severities will be output.

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\howto\[cpython-main] [Doc] [howto] logging.rst, line 786); [backlink](#)

Unknown interpreted text role "class".

To obtain the pre-3.2 behaviour, `logging.lastResort` can be set to `None`.

## Configuring Logging for a Library

When developing a library which uses logging, you should take care to document how the library uses logging - for example, the names of loggers used. Some consideration also needs to be given to its logging configuration. If the using application does not use logging, and library code makes logging calls, then (as described in the previous section) events of severity `WARNING` and greater will be printed to `sys.stderr`. This is regarded as the best default behaviour.

If for some reason you *don't* want these messages printed in the absence of any logging configuration, you can attach a do-nothing handler to the top-level logger for your library. This avoids the message being printed, since a handler will always be found for the library's events: it just doesn't produce any output. If the library user configures logging for application use, presumably that configuration will add some handlers, and if levels are suitably configured then logging calls made in library code will send output to those handlers, as normal.

A do-nothing handler is included in the logging package: `:class:`~logging.NullHandler`` (since Python 3.1). An instance of this handler could be added to the top-level logger of the logging namespace used by the library (*if* you want to prevent your library's logged events being output to `sys.stderr` in the absence of logging configuration). If all logging by a library *foo* is done using loggers with names matching 'foo.x', 'foo.x.y', etc. then the code:

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\howto\[cpython-main] [Doc] [howto] logging.rst, line 819); [backlink](#)

Unknown interpreted text role "class".

```
import logging
logging.getLogger('foo').addHandler(logging.NullHandler())
```

should have the desired effect. If an organisation produces a number of libraries, then the logger name specified can be 'orgname.foo' rather than just 'foo'.

#### Note

It is strongly advised that you *do not log to the root logger* in your library. Instead, use a logger with a unique and easily identifiable name, such as the `__name__` for your library's top-level package or module. Logging to the root logger will make it difficult or impossible for the application developer to configure the logging verbosity or handlers of your library as they wish.

#### Note

It is strongly advised that you *do not add any handlers other than* `:class:`~logging.NullHandler`` *to your library's loggers*. This is because the configuration of handlers is the prerogative of the application developer who uses your library. The application developer knows their target audience and what handlers are most appropriate for their application: if you add handlers 'under the hood', you might well interfere with their ability to carry out unit tests and deliver logs which suit their requirements.

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\howto\[cpython-main] [Doc] [howto] logging.rst, line 841); [backlink](#)

Unknown interpreted text role "class".

## Logging Levels

The numeric values of logging levels are given in the following table. These are primarily of interest if you want to define your own levels, and need them to have specific values relative to the predefined levels. If you define a level with the same numeric value, it overwrites the predefined value; the predefined name is lost.

Level	Numeric value
CRITICAL	50
ERROR	40
WARNING	30
INFO	20
DEBUG	10
NOTSET	0

Levels can also be associated with loggers, being set either by the developer or through loading a saved logging configuration. When a logging method is called on a logger, the logger compares its own level with the level associated with the method call. If the logger's level is higher than the method call's, no logging message is actually generated. This is the basic mechanism controlling the verbosity of logging output.

Logging messages are encoded as instances of the `:class:`~logging.LogRecord`` class. When a logger decides to actually log an event, a `:class:`~logging.LogRecord`` instance is created from the logging message.

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\howto\[cpython-main] [Doc] [howto] logging.rst, line 883); [backlink](#)

Unknown interpreted text role "class".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\howto\[cpython-main] [Doc] [howto] logging.rst, line 883); [backlink](#)

Unknown interpreted text role "class".

Logging messages are subjected to a dispatch mechanism through the use of `:dfn:`handlers``, which are instances of subclasses of the `:class:`Handler`` class. Handlers are responsible for ensuring that a logged message (in the form of a `:class:`LogRecord``) ends up in a particular location (or set of locations) which is useful for the target audience for that message (such as end users, support desk staff, system administrators, developers). Handlers are passed `:class:`LogRecord`` instances intended for particular destinations. Each

logger can have zero, one or more handlers associated with it (via the `meth:~Logger.addHandler` method of `class:Logger`). In addition to any handlers directly associated with a logger, *all handlers associated with all ancestors of the logger* are called to dispatch the message (unless the *propagate* flag for a logger is set to a false value, at which point the passing to ancestor handlers stops).

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\howto\cpython-main [Doc] [howto] logging.rst, line 887); [backlink](#)

Unknown interpreted text role "dfn".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\howto\cpython-main [Doc] [howto] logging.rst, line 887); [backlink](#)

Unknown interpreted text role "class".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\howto\cpython-main [Doc] [howto] logging.rst, line 887); [backlink](#)

Unknown interpreted text role "class".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\howto\cpython-main [Doc] [howto] logging.rst, line 887); [backlink](#)

Unknown interpreted text role "class".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\howto\cpython-main [Doc] [howto] logging.rst, line 887); [backlink](#)

Unknown interpreted text role "meth".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\howto\cpython-main [Doc] [howto] logging.rst, line 887); [backlink](#)

Unknown interpreted text role "class".

Just as for loggers, handlers can have levels associated with them. A handler's level acts as a filter in the same way as a logger's level does. If a handler decides to actually dispatch an event, the `meth:~Handler.emit` method is used to send the message to its destination. Most user-defined subclasses of `class:Handler` will need to override this `meth:~Handler.emit`.

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\howto\cpython-main [Doc] [howto] logging.rst, line 901); [backlink](#)

Unknown interpreted text role "meth".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\howto\cpython-main [Doc] [howto] logging.rst, line 901); [backlink](#)

Unknown interpreted text role "class".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\howto\cpython-main [Doc] [howto] logging.rst, line 901); [backlink](#)

Unknown interpreted text role "meth".

## Custom Levels

Defining your own levels is possible, but should not be necessary, as the existing levels have been chosen on the basis of practical experience. However, if you are convinced that you need custom levels, great care should be exercised when doing this, and it is possibly *a very bad idea to define custom levels if you are developing a library*. That's because if multiple library authors all define their own custom levels, there is a chance that the logging output from such multiple libraries used together will be difficult for the using developer to control and/or interpret, because a given numeric value might mean different things for different libraries.

## Useful Handlers

In addition to the base `class:Handler` class, many useful subclasses are provided:

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\howto\[cpython-main] [Doc] [howto] logging.rst, line 927); [backlink](#)

Unknown interpreted text role "class".

1. `:class:`StreamHandler`` instances send messages to streams (file-like objects).

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\howto\[cpython-main] [Doc] [howto] logging.rst, line 930); [backlink](#)

Unknown interpreted text role "class".

2. `:class:`FileHandler`` instances send messages to disk files.

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\howto\[cpython-main] [Doc] [howto] logging.rst, line 933); [backlink](#)

Unknown interpreted text role "class".

3. `:class:`~handlers.BaseRotatingHandler`` is the base class for handlers that rotate log files at a certain point. It is not meant to be instantiated directly. Instead, use `:class:`~handlers.RotatingFileHandler`` or `:class:`~handlers.TimedRotatingFileHandler``.

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\howto\[cpython-main] [Doc] [howto] logging.rst, line 935); [backlink](#)

Unknown interpreted text role "class".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\howto\[cpython-main] [Doc] [howto] logging.rst, line 935); [backlink](#)

Unknown interpreted text role "class".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\howto\[cpython-main] [Doc] [howto] logging.rst, line 935); [backlink](#)

Unknown interpreted text role "class".

4. `:class:`~handlers.RotatingFileHandler`` instances send messages to disk files, with support for maximum log file sizes and log file rotation.

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\howto\[cpython-main] [Doc] [howto] logging.rst, line 940); [backlink](#)

Unknown interpreted text role "class".

5. `:class:`~handlers.TimedRotatingFileHandler`` instances send messages to disk files, rotating the log file at certain timed intervals.

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\howto\[cpython-main] [Doc] [howto] logging.rst, line 943); [backlink](#)

Unknown interpreted text role "class".

6. `:class:`~handlers.SocketHandler`` instances send messages to TCP/IP sockets. Since 3.4, Unix domain sockets are also supported.

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\howto\[cpython-main] [Doc] [howto] logging.rst, line 946);

[backlink](#)

Unknown interpreted text role "class".

7. `:class:`~handlers.DatagramHandler`` instances send messages to UDP sockets. Since 3.4, Unix domain sockets are also supported.

**System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\howto\[cpython-main] [Doc] [howto] logging.rst, line 949);**  
[backlink](#)

Unknown interpreted text role "class".

8. `:class:`~handlers.SMTPHandler`` instances send messages to a designated email address.

**System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\howto\[cpython-main] [Doc] [howto] logging.rst, line 952);**  
[backlink](#)

Unknown interpreted text role "class".

9. `:class:`~handlers.SysLogHandler`` instances send messages to a Unix syslog daemon, possibly on a remote machine.

**System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\howto\[cpython-main] [Doc] [howto] logging.rst, line 955);**  
[backlink](#)

Unknown interpreted text role "class".

10. `:class:`~handlers.NTEventLogHandler`` instances send messages to a Windows NT/2000/XP event log.

**System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\howto\[cpython-main] [Doc] [howto] logging.rst, line 958);**  
[backlink](#)

Unknown interpreted text role "class".

11. `:class:`~handlers.MemoryHandler`` instances send messages to a buffer in memory, which is flushed whenever specific criteria are met.

**System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\howto\[cpython-main] [Doc] [howto] logging.rst, line 961);**  
[backlink](#)

Unknown interpreted text role "class".

12. `:class:`~handlers.HTTPHandler`` instances send messages to an HTTP server using either `GET` or `POST` semantics.

**System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\howto\[cpython-main] [Doc] [howto] logging.rst, line 964);**  
[backlink](#)

Unknown interpreted text role "class".

13. `:class:`~handlers.WatchedFileHandler`` instances watch the file they are logging to. If the file changes, it is closed and reopened using the file name. This handler is only useful on Unix-like systems; Windows does not support the underlying mechanism used.

**System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\howto\[cpython-main] [Doc] [howto] logging.rst, line 967);**  
[backlink](#)

Unknown interpreted text role "class".

14. `:class:`~handlers.QueueHandler`` instances send messages to a queue, such as those implemented in the `:mod:`queue`` or `:mod:`multiprocessing`` modules.



**System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\howto\[cpython-main] [Doc] [howto] logging.rst, line 972);**  
[backlink](#)

Unknown interpreted text role "class".

**System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\howto\[cpython-main] [Doc] [howto] logging.rst, line 972);**  
[backlink](#)

Unknown interpreted text role "mod".

**System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\howto\[cpython-main] [Doc] [howto] logging.rst, line 972);**  
[backlink](#)

Unknown interpreted text role "mod".

15. `:class:`NullHandler`` instances do nothing with error messages. They are used by library developers who want to use logging but want to avoid the 'No handlers could be found for logger XXX' message which can be displayed if the library user has not configured logging. See [:ref:`library-config`](#) for more information.

**System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\howto\[cpython-main] [Doc] [howto] logging.rst, line 975);**  
[backlink](#)

Unknown interpreted text role "class".

**System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\howto\[cpython-main] [Doc] [howto] logging.rst, line 975);**  
[backlink](#)

Unknown interpreted text role "ref".

**System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\howto\[cpython-main] [Doc] [howto] logging.rst, line 981)**

Unknown directive type "versionadded".

```
.. versionadded:: 3.1
   The :class:`NullHandler` class.
```

**System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\howto\[cpython-main] [Doc] [howto] logging.rst, line 984)**

Unknown directive type "versionadded".

```
.. versionadded:: 3.2
   The :class:`~handlers.QueueHandler` class.
```

The `:class:`NullHandler``, `:class:`StreamHandler`` and `:class:`FileHandler`` classes are defined in the core logging package. The other handlers are defined in a sub-module, `:mod:`logging.handlers``. (There is also another sub-module, `:mod:`logging.config``, for configuration functionality.)

**System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\howto\[cpython-main] [Doc] [howto] logging.rst, line 987);** [backlink](#)

Unknown interpreted text role "class".

**System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\howto\[cpython-main] [Doc] [howto] logging.rst, line 987);** [backlink](#)

Unknown interpreted text role "class".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\howto\[cpython-main] [Doc] [howto] logging.rst, line 987); [backlink](#)

Unknown interpreted text role "class".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\howto\[cpython-main] [Doc] [howto] logging.rst, line 987); [backlink](#)

Unknown interpreted text role "mod".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\howto\[cpython-main] [Doc] [howto] logging.rst, line 987); [backlink](#)

Unknown interpreted text role "mod".

Logged messages are formatted for presentation through instances of the `:class:`Formatter`` class. They are initialized with a format string suitable for use with the `%` operator and a dictionary.

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\howto\[cpython-main] [Doc] [howto] logging.rst, line 992); [backlink](#)

Unknown interpreted text role "class".

For formatting multiple messages in a batch, instances of `:class:`~handlers.BufferingFormatter`` can be used. In addition to the format string (which is applied to each message in the batch), there is provision for header and trailer format strings.

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\howto\[cpython-main] [Doc] [howto] logging.rst, line 996); [backlink](#)

Unknown interpreted text role "class".

When filtering based on logger level and/or handler level is not enough, instances of `:class:`Filter`` can be added to both `:class:`Logger`` and `:class:`Handler`` instances (through their `:meth:`~Handler.addFilter`` method). Before deciding to process a message further, both loggers and handlers consult all their filters for permission. If any filter returns a false value, the message is not processed further.

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\howto\[cpython-main] [Doc] [howto] logging.rst, line 1001); [backlink](#)

Unknown interpreted text role "class".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\howto\[cpython-main] [Doc] [howto] logging.rst, line 1001); [backlink](#)

Unknown interpreted text role "class".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\howto\[cpython-main] [Doc] [howto] logging.rst, line 1001); [backlink](#)

Unknown interpreted text role "class".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\howto\[cpython-main] [Doc] [howto] logging.rst, line 1001); [backlink](#)

Unknown interpreted text role "meth".

The basic `:class:`Filter`` functionality allows filtering by specific logger name. If this feature is used, messages sent to the named logger and its children are allowed through the filter, and all others dropped.

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\howto\[cpython-main] [Doc] [howto] logging.rst, line 1008); [backlink](#)

Unknown interpreted text role "class".

## Exceptions raised during logging

The logging package is designed to swallow exceptions which occur while logging in production. This is so that errors which occur while handling logging events - such as logging misconfiguration, network or other similar errors - do not cause the application using logging to terminate prematurely.

`:class:'SystemExit'` and `:class:'KeyboardInterrupt'` exceptions are never swallowed. Other exceptions which occur during the `:meth:'~Handler.emit'` method of a `:class:'Handler'` subclass are passed to its `:meth:'~Handler.handleError'` method.

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\howto\[cpython-main] [Doc] [howto] logging.rst, line 1023); [backlink](#)

Unknown interpreted text role "class".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\howto\[cpython-main] [Doc] [howto] logging.rst, line 1023); [backlink](#)

Unknown interpreted text role "class".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\howto\[cpython-main] [Doc] [howto] logging.rst, line 1023); [backlink](#)

Unknown interpreted text role "meth".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\howto\[cpython-main] [Doc] [howto] logging.rst, line 1023); [backlink](#)

Unknown interpreted text role "class".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\howto\[cpython-main] [Doc] [howto] logging.rst, line 1023); [backlink](#)

Unknown interpreted text role "meth".

The default implementation of `:meth:'~Handler.handleError'` in `:class:'Handler'` checks to see if a module-level variable, `:data:'raiseExceptions'`, is set. If set, a traceback is printed to `:data:'sys.stderr'`. If not set, the exception is swallowed.

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\howto\[cpython-main] [Doc] [howto] logging.rst, line 1028); [backlink](#)

Unknown interpreted text role "meth".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\howto\[cpython-main] [Doc] [howto] logging.rst, line 1028); [backlink](#)

Unknown interpreted text role "class".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\howto\[cpython-main] [Doc] [howto] logging.rst, line 1028); [backlink](#)

Unknown interpreted text role "data".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\howto\[cpython-main] [Doc] [howto] logging.rst, line 1028); [backlink](#)

Unknown interpreted text role "data".

### Note

The default value of `:data:'raiseExceptions'` is `True`. This is because during development, you typically want to be notified of any exceptions that occur. It's advised that you set `:data:'raiseExceptions'` to `False` for production usage.

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\howto\[cpython-main] [Doc] [howto] logging.rst, line 1033); [backlink](#)

Unknown interpreted text role "data".

**System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\howto\[cpython-main] [Doc] [howto] logging.rst, line 1033); [backlink](#)**

Unknown interpreted text role "data".

**System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\howto\[cpython-main] [Doc] [howto] logging.rst, line 1038)**

Unknown directive type "currentmodule".

```
.. currentmodule:: logging
```

## Using arbitrary objects as messages

In the preceding sections and examples, it has been assumed that the message passed when logging the event is a string. However, this is not the only possibility. You can pass an arbitrary object as a message, and its `meth:~object.__str__` method will be called when the logging system needs to convert it to a string representation. In fact, if you want to, you can avoid computing a string representation altogether - for example, the `:class:~handlers.SocketHandler` emits an event by pickling it and sending it over the wire.

**System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\howto\[cpython-main] [Doc] [howto] logging.rst, line 1045); [backlink](#)**

Unknown interpreted text role "meth".

**System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\howto\[cpython-main] [Doc] [howto] logging.rst, line 1045); [backlink](#)**

Unknown interpreted text role "class".

## Optimization

Formatting of message arguments is deferred until it cannot be avoided. However, computing the arguments passed to the logging method can also be expensive, and you may want to avoid doing it if the logger will just throw away your event. To decide what to do, you can call the `meth:~Logger.isEnabledFor` method which takes a level argument and returns true if the event would be created by the Logger for that level of call. You can write code like this:

**System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\howto\[cpython-main] [Doc] [howto] logging.rst, line 1058); [backlink](#)**

Unknown interpreted text role "meth".

```
if logger.isEnabledFor(logging.DEBUG):
    logger.debug('Message with %s, %s', expensive_func1(),
                expensive_func2())
```

so that if the logger's threshold is set above `DEBUG`, the calls to `:func:~expensive_func1` and `:func:~expensive_func2` are never made.

**System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\howto\[cpython-main] [Doc] [howto] logging.rst, line 1070); [backlink](#)**

Unknown interpreted text role "func".

**System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\howto\[cpython-main] [Doc] [howto] logging.rst, line 1070); [backlink](#)**

Unknown interpreted text role "func".

### Note

In some cases, `meth:~Logger.isEnabledFor` can itself be more expensive than you'd like (e.g. for deeply nested

loggers where an explicit level is only set high up in the logger hierarchy). In such cases (or if you want to avoid calling a method in tight loops), you can cache the result of a call to `meth:~Logger.isEnabledFor` in a local or instance variable, and use that instead of calling the method each time. Such a cached value would only need to be recomputed when the logging configuration changes dynamically while the application is running (which is not all that common).

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\howto\[cpython-main] [Doc] [howto]logging.rst, line 1073); [backlink](#)

Unknown interpreted text role "meth".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\howto\[cpython-main] [Doc] [howto]logging.rst, line 1073); [backlink](#)

Unknown interpreted text role "meth".

There are other optimizations which can be made for specific applications which need more precise control over what logging information is collected. Here's a list of things you can do to avoid processing during logging which you don't need:

What you don't want to collect	How to avoid collecting it
Information about where calls were made from	<p>Set <code>logging._srcfile</code> to <code>None</code>. This avoids calling <code>func:sys._getframe</code>, which may help to speed up your code in environments like PyPy (which can't speed up code that uses <code>func:sys._getframe</code>).</p> <div><p><b>System Message: ERROR/3</b> (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\howto\[cpython-main] [Doc] [howto]logging.rst, line 1091); <a href="#">backlink</a></p><p>Unknown interpreted text role "func".</p></div> <div><p><b>System Message: ERROR/3</b> (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\howto\[cpython-main] [Doc] [howto]logging.rst, line 1091); <a href="#">backlink</a></p><p>Unknown interpreted text role "func".</p></div>
Threading information.	Set <code>logging.logThreads</code> to <code>False</code> .
Current process ID ( <code>func:os.getpid</code> )	<div><p><b>System Message: ERROR/3</b> (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\howto\[cpython-main] [Doc] [howto]logging.rst, line 1099); <a href="#">backlink</a></p><p>Unknown interpreted text role "func".</p></div> <p>Set <code>logging.logProcesses</code> to <code>False</code>.</p>
Current process name when using multiprocessing to manage multiple processes.	Set <code>logging.logMultiprocessing</code> to <code>False</code> .

Also note that the core logging module only includes the basic handlers. If you don't import `mod:logging.handlers` and `mod:logging.config`, they won't take up any memory.

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\howto\[cpython-main] [Doc] [howto]logging.rst, line 1104); [backlink](#)

Unknown interpreted text role "mod".

**System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\howto\[cpython-main] [Doc] [howto] logging.rst, line 1104); [backlink](#)**

Unknown interpreted text role "mod".

**System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\howto\[cpython-main] [Doc] [howto] logging.rst, line 1108)**

Unknown directive type "seealso".

```
.. seealso::
```

```
Module :mod:`logging`  
    API reference for the logging module.
```

```
Module :mod:`logging.config`  
    Configuration API for the logging module.
```

```
Module :mod:`logging.handlers`  
    Useful handlers included with the logging module.
```

```
:ref:`A logging cookbook <logging-cookbook>`
```