Receiving Unix Signals

Unix system event notifications normally interrupt an application, triggering their handler. When used with `asyncio`, signal handler callbacks are interleaved with the other coroutines and callbacks managed by the event loop. This results in fewer interrupted functions, and the resulting need to provide safe-guards for cleaning up incomplete operations.

Signal handlers must be regular callables, not coroutines.

```
# asyncio_signal.py

import asyncio
import functools
import os
import signal


def signal_handler(name):
    print('signal_handler({!r})'.format(name))
```

The signal handlers are registered using `add_signal_handler()`. The first argument is the signal and the second is the callback. Callbacks are passed no arguments, so if arguments are needed a function can be wrapped with `functools.partial()`.

```
event_loop = asyncio.get_event_loop()

event_loop.add_signal_handler(
    signal.SIGHUP,
    functools.partial(signal_handler, name='SIGHUP'),
)
event_loop.add_signal_handler(
    signal.SIGUSR1,
    functools.partial(signal_handler, name='SIGUSR1'),
)
event_loop.add_signal_handler(
    signal.SIGINT,
    functools.partial(signal_handler, name='SIGINT'),
)
```

This example program uses a coroutine to send signals to itself via `os.kill()`. After each signal is sent, the coroutine yields control to allow the handler to be run. In a normal application, there would be more places where application code yields back to the event loop and no artificial yield like this would be needed.

```
async def send_signals():
    pid = os.getpid()
    print('starting send_signals for {}'.format(pid))

    for name in ['SIGHUP', 'SIGHUP', 'SIGUSR1', 'SIGINT']:
        print('sending {}'.format(name))
        os.kill(pid, getattr(signal, name))
        # Yield control to allow the signal handler to run,
        # since the signal does not interrupt the program
        # flow otherwise.
        print('yielding control')
        await asyncio.sleep(0.01)
    return
```

The main program runs `send_signals()` until it has sent all of the signals.

```
try:
    event_loop.run_until_complete(send_signals())
finally:
    event_loop.close()
```

The output shows how the handlers are called when `send_signals()` yields control after sending a signal.

```
$ python3 asyncio_signal.py

starting send_signals for 21772
sending SIGHUP
yielding control
signal_handler('SIGHUP')
sending SIGHUP
yielding control
signal_handler('SIGHUP')
sending SIGUSR1
yielding control
signal_handler('SIGUSR1')
sending SIGINT
yielding control
signal_handler('SIGINT')
```

See also

- signal – Receive notification of asynchronous system events

Working with Subprocesses   Combining Coroutines with Threads and Processes

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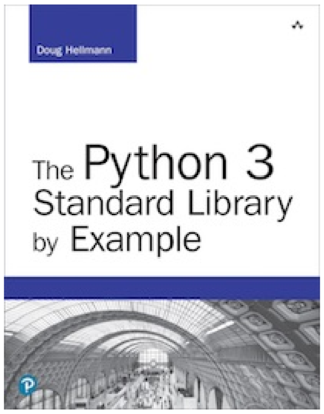
Navigation
Working with Subprocesses
Combining Coroutines with Threads and Processes



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The output from all the example programs from PyMOTW-3 has been generated with Python 3.7.1, unless otherwise noted. Some of the features described here may not be available in earlier versions of Python.

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This Site
Module Index
Index

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