Interacting with Domain Name Services

Applications use the network to communicate with servers for domain name service (DNS) operations like converting between hostnames and IP addresses. `asyncio` has convenience methods on the event loop to take care of those operations in the background, to avoid blocking during the queries.

Address Lookup by Name

Use the coroutine `getaddrinfo()` to convert a hostname and port number to an IP or IPv6 address. As with the version of the function in the socket module, the return value is a list of tuples containing five pieces of information.

1. The address family
2. The address type
3. The protocol
4. The canonical name for the server
5. A socket address tuple suitable for opening a connection to the server on the port originally specified

Queries can be filtered by protocol, as in this example, where only TCP responses are returned.

```
# asyncio_getaddrinfo.py

import asyncio
import logging
import socket
import sys


TARGETS = [
    ('pymotw.com', 'https'),
    ('doughellmann.com', 'https'),
    ('python.org', 'https'),
]


async def main(loop, targets):
    for target in targets:
        info = await loop.getaddrinfo(
            *target,
            proto=socket.IPPROTO_TCP,
        )

        for host in info:
            print('{:20}: {}'.format(target[0], host[4][0]))


event_loop = asyncio.get_event_loop()
try:
    event_loop.run_until_complete(main(event_loop, TARGETS))
finally:
    event_loop.close()
```

The example program converts a hostname and protocol name to IP address and port number.

```
$ python3 asyncio_getaddrinfo.py

pymotw.com          : 66.33.211.242
doughellmann.com    : 66.33.211.240
python.org          : 23.253.135.79
```

Name Lookup by Address

The coroutine `getnameinfo()` works in the reverse direction, converting an IP address to a hostname and a port number to a protocol name, where possible.

```
# asyncio_getnameinfo.py

import asyncio
import logging
import socket
import sys


TARGETS = [
    ('66.33.211.242', 443),
    ('104.130.43.121', 443),
]


async def main(loop, targets):
    for target in targets:
        info = await loop.getnameinfo(target)
        print('{:15}: {} {}'.format(target[0], *info))


event_loop = asyncio.get_event_loop()
try:
    event_loop.run_until_complete(main(event_loop, TARGETS))
finally:
    event_loop.close()
```

This example shows that the IP address for `pymotw.com` refers to a server at DreamHost, the hosting company where the site runs. The second IP address examined is for `python.org`, and it does not resolve back to a hostname.

```
$ python3 asyncio_getnameinfo.py

66.33.211.242  : n821.com https
104.130.43.121 : 104.130.43.121 https
```

See also

- The socket module discussion includes a more detailed examination of these operations.

Using SSL

Working with Subprocesses

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This page was last updated 2018-12-09.

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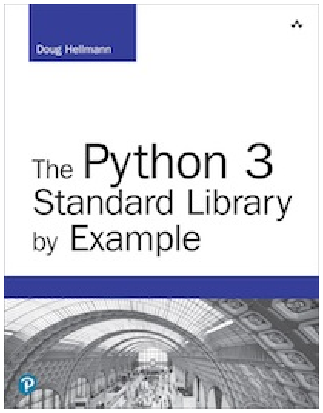

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The output from all the example programs from PyMOTW-3 has been generated with Python 3.7.1, unless otherwise noted. Some of the features described here may not be available in earlier versions of Python.

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