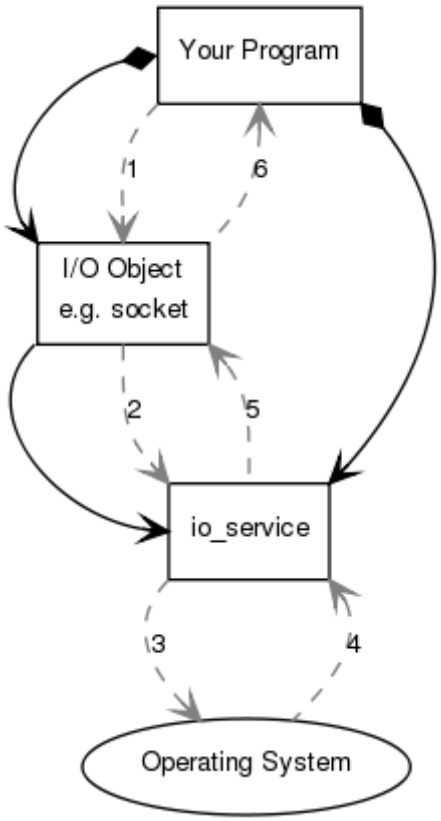
asio C++ library

Basic Asio Anatomy

Asio may be used to perform both synchronous and asynchronous operations on I/O objects such as sockets. Before using Asio it may be useful to get a conceptual picture of the various parts of Asio, your program, and how they work together.

As an introductory example, let's consider what happens when you perform a connect operation on a socket. We shall start by examining synchronous operations.



Your program will have at least one **io_service** object. The **io_service** represents **your program**'s link to the **operating system**'s I/O services.

```
asio::io_service io_service;
```

To perform I/O operations **your program** will need an **I/O object** such as a TCP socket:

```
asio::ip::tcp::socket socket(io_service);
```

When a synchronous connect operation is performed, the following sequence of events occurs:

1. **Your program** initiates the connect operation by calling the **I/O object**:

```
socket.connect(server_endpoint);
```

2. The **I/O object** forwards the request to the **io_service**.

3. The **io_service** calls on the **operating system** to perform the connect operation.

4. The **operating system** returns the result of the operation to the **io_service**.

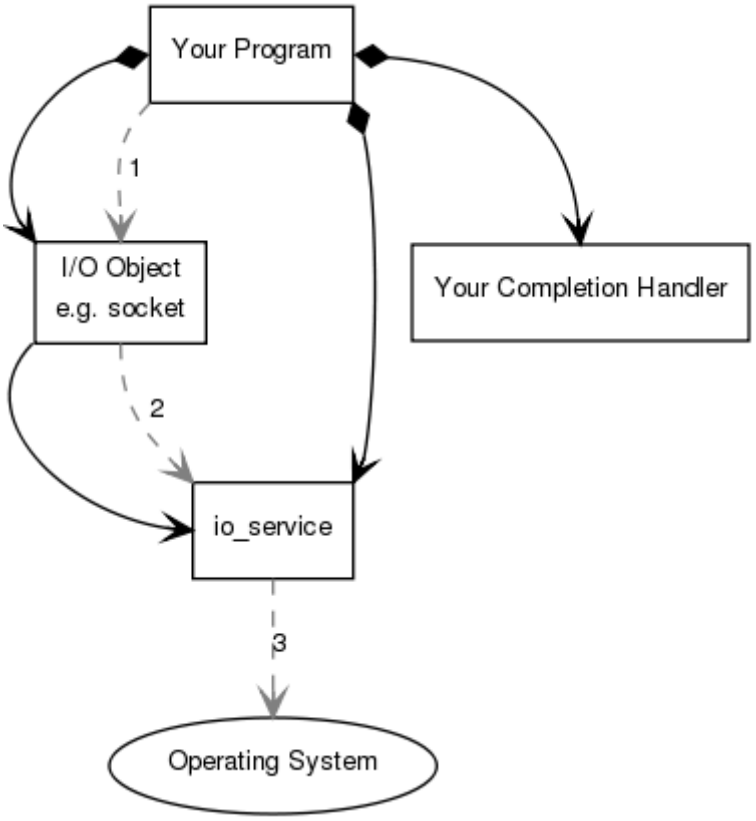
5. The **io_service** translates any error resulting from the operation into an `error_code`. An `error_code` may be compared with specific values, or tested as a boolean (where a `false` result means that no error occurred). The result is then forwarded back up to the **I/O object**.

6. The **I/O object** throws an exception of type `system_error` if the operation failed. If the code to initiate the operation had instead been written as:

```
asio::error_code ec;
socket.connect(server_endpoint, ec);
```

then the `error_code` variable `ec` would be set to the result of the operation, and no exception would be thrown.

When an asynchronous operation is used, a different sequence of events occurs.



1. **Your program** initiates the connect operation by calling the **I/O object**:

```
socket.async_connect(server_endpoint, your_completion_handler);
```

where `your_completion_handler` is a function or function object with the signature:

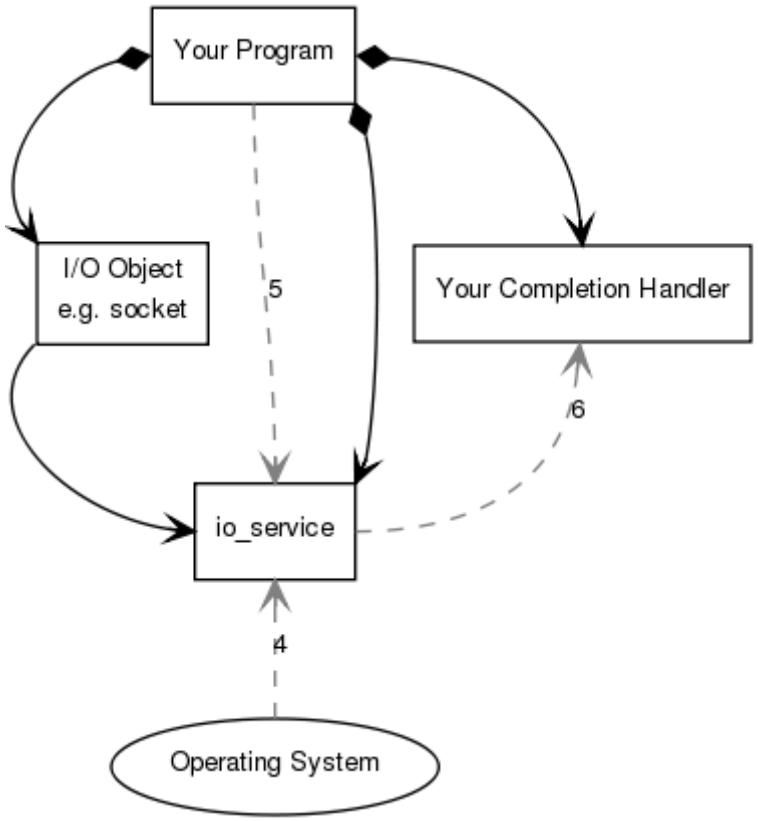
```
void your_completion_handler(const asio::error_code& ec);
```

The exact signature required depends on the asynchronous operation being performed. The reference documentation indicates the appropriate form for each operation.

2. The **I/O object** forwards the request to the **io_service**.

3. The **io_service** signals to the **operating system** that it should start an asynchronous connect.

Time passes. (In the synchronous case this wait would have been contained entirely within the duration of the connect operation.)



4. The **operating system** indicates that the connect operation has completed by placing the result on a queue, ready to be picked up by the **io_service**.

5. **Your program** must make a call to `io_service::run()` (or to one of the similar **io_service** member functions) in order for the result to be retrieved. A call to `io_service::run()` blocks while there are unfinished asynchronous operations, so you would typically call it as soon as you have started your first asynchronous operation.

6. While inside the call to `io_service::run()`, the **io_service** dequeues the result of the operation, translates it into an `error_code`, and then passes it to **your completion handler**.

This is a simplified picture of how Asio operates. You will want to delve further into the documentation if your needs are more advanced, such as extending Asio to perform other types of asynchronous operations.
