CFNetwork

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6.1 CFNetwork Namespace Reference

Classes

- class Connection
- class InvalidArgument
- class Socket
- class UnexpectedError

Enumerations

- enum ConnectionFlow { ConnectionFlow::Inbound, **Inbound**, ConnectionFlow::Outbound, **Outbound** }
- enum SocketFamily { SocketFamily::IPv4, **IPv4** = AF_INET, SocketFamily::IPv6, **IPv6** = AF_INET6 }
- enum SocketType { **TCP** = SOCK_STREAM, **UDP** = SOCK_DGRAM }

Functions

- struct sockaddr_storage parseAddress (const std::string &addr)

Variables

- const int MAX_BYTES = 8192

6.1.1 Detailed Description

`CFNetwork` is a collection of utilities that simplifies the process of developing an application that will make use of the network

6.1.2 Enumeration Type Documentation

6.1.2.1 enum CFNetwork::ConnectionFlow [strong]

The `ConnectionFlow` enum is responsible for communicating whether or not a given `Connection` is setup for outbound connectivity or was received inbound from a `Socket` object

Enumerator

Inbound Represents an inbound `Connection`

Outbound Represents an outbound `Connection`

6.1.2.2 enum CFNetwork::SocketFamily [strong]

The `SocketFamily` enum is responsible for communicating which address family that a `Socket` object is using

Enumerator

IPv4 Refers to the `AF_INET` socket family

IPv6 Refers to the `AF_INET6` socket family

6.1.2.3 enum CFNetwork::SocketType [strong]

The `SocketType` enum is responsible for communicating whether a given `Socket` object is using TCP or UDP as its transport.

6.1.3 Function Documentation

6.1.3.1 struct sockaddr_storage CFNetwork::parseAddress (const std::string & *addr*)

Dynamically parse a `std::string` into a `sockaddr_storage` structure that is capable of being used in socket operations

The `struct sockaddr_storage` can be reinterpret cast into any of the following structures (after checking the `ss_family` attribute):

- `struct sockaddr`
- `struct sockaddr_in`
- `struct sockaddr_in6`

Exceptions

<tt>InvalidArgument</tt>	on failure or when an unexpected address family is encountered

Returns

`struct sockaddr_storage` containing the relevant information

6.1.4 Variable Documentation

6.1.4.1 CFNetwork::MAX_BYTES = 8192

The maximum number of bytes that should be contained within all buffers in this namespace's classes

Chapter 7

Class Documentation

7.1 CFNetwork::Connection Class Reference

`#include <Connection.hpp>`

Public Member Functions

- Connection (const std::string &addr, int port)
- Connection (const std::string &laddr, const std::string &raddr, int port, int socket)
- ~Connection ()
- int getDescriptor () const
- SocketFamily getFamily () const
- ConnectionFlow getFlow () const
- const std::string & getListen () const
- int getPort () const
- const std::string & getRemote () const
- std::string read () const
- bool valid () const
- void write (std::string data, bool newline=true) const

Protected Attributes

- SocketFamily family = SocketFamily::IPv4
- ConnectionFlow flow = ConnectionFlow::Inbound
- std::string listen = ""
- int port = 0
- std::string remote = "0.0.0.0"
- int socket = -1

7.1.1 Detailed Description

An object-oriented encapsulation for network connections

The `Connection` object is responsible for communication between two network endpoints. The object can be setup by accepting an incoming connection on a `Socket` object, or by explicitly making an outgoing connection to a given address and port

The `Connection` object is not copyable or assignable since it contains resources that do not lend themselves well to duplication

7.1.2 Constructor & Destructor Documentation

7.1.2.1 CFNetwork::Connection::Connection (const std::string & *addr,* int *port*)

`Connection` Constructor (outbound)

Allows for constructing a `Connection` object to an outbound endpoint

Parameters

addr	The address of the remote endpoint
port	The port of the remote endpoint

7.1.2.2 CFNetwork::Connection::Connection (const std::string & *laddr,* const std::string & *raddr,* int *port,* int *socket*)

`Connection` Constructor (inbound)

Allows for constructing a `Connection` object from an inbound client file descriptor that was accepted by a listening socket

Parameters

laddr	The address of the local listening socket
raddr	The address of the remote client
port	The port of the listening socket that received the client
socket	The file descriptor for the client

7.1.2.3 CFNetwork::Connection::~Connection ( )

`Connection` Destructor

Upon destruction of a `Connection` object, close its associated file descriptor (if still valid)

7.1.3 Member Function Documentation

7.1.3.1 int CFNetwork::Connection::getDescriptor ( ) const

Fetches the file descriptor of the `Connection` instance

The internal file descriptor can be used to perform more advanced actions that this class doesn't accommodate for

Returns

`int` representing a file descriptor

7.1.3.2 SocketFamily CFNetwork::Connection::getFamily ( ) const

Fetches the address family of the `Connection` instance

See also

SocketFamily for more information on socket families

Returns

`SocketFamily` value describing the address family

7.1.3.3 ConnectionFlow CFNetwork::Connection::getFlow ( ) const

Fetches the flow type of the `Connection` instance

See also

ConnectionFlow for more information on flow types

Returns

`ConnectionFlow` value describing the flow type

7.1.3.4 const std::string & CFNetwork::Connection::getListen ( ) const

Fetches the listening address of the `Connection` instance

This method will produce a `std::string` of an IPv4/IPv6 address only (no IP addresses will be reverse resolved into hostnames)

In the context of an outbound `Connection`, the resulting value will be an empty `std::string`

Returns

`std::string` containing the listening address

7.1.3.5 int CFNetwork::Connection::getPort ( ) const

Fetches the port of the `Connection` instance

If the `Connection` represents an inbound client, the port will be that of the originating `Socket` listening port. For outbound connections, the port will be the original value provided during construction

Returns

`int` representing the port

7.1.3.6 const std::string & CFNetwork::Connection::getRemote ( ) const

Fetches the remote address of the `Connection` instance

This method will produce a `std::string` of an IPv4/IPv6 address only (no IP addresses will be reverse resolved into hostnames)

Returns

`std::string` containing the remote peer's IP address

7.1.3.7 std::string CFNetwork::Connection::read ( ) const

Attempts to read data from the internal file descriptor

Performs a blocking read on the internal file descriptor up to `MAX_BYTES - 1`. If there were zero bytes read then the `Connection` will be invalidated due to being reset by the remote peer

Exceptions

<tt>InvalidArgument</tt>	if the `Connection` is invalid
<tt>UnexpectedError</tt>	if the `Connection` was reset by peer

Returns

`std::string` containing the data that was read

7.1.3.8 bool CFNetwork::Connection::valid ( ) const

Determines if the file descriptor is considered valid for read, write, or any other operations

A file descriptor is considered invalid if a call requesting its flags fails with the return value of `-1` or `errno` is set to `EBADF` (the provided argument is not an open file descriptor). If neither case is satisfied, the file descriptor is considered valid

See also

fcntl() For more information regarding this procedure's test

Returns

`true` if the file descriptor is valid, `false` otherwise

7.1.3.9 void CFNetwork::Connection::write (std::string *data,* bool *newline =* `true`) const

Attempts to write the provided data to the internal file descriptor

An optional newline character is inserted into the provided data by default, however this can be avoided using the appropriate parameter for this method.

Exceptions

<tt>InvalidArgument</tt>	if the internal file descriptor is considered invalid

Parameters

data	`std::string` containing the contents to write
newline	Whether or not a newline character should be included

7.1.4 Member Data Documentation

7.1.4.1 CFNetwork::Connection::family = SocketFamily::IPv4 [protected]

Used to describe the socket family type of a `Connection`

7.1.4.2 CFNetwork::Connection::flow = ConnectionFlow::Inbound [protected]

Used to describe the connection flow direction of a `Connection`

7.1.4.3 CFNetwork::Connection::listen = "" [protected]

Holds the listening address associated with an inbound `Connection`

7.1.4.4 CFNetwork::Connection::port = 0 [protected]

Holds the listening port for an inbound `Connection` or the outbound port for an outbound `Connection`

7.1.4.5 CFNetwork::Connection::remote = "0.0.0.0" [protected]

Holds the remote address of a `Connection`

7.1.4.6 CFNetwork::Connection::socket = -1 [protected]

Holds the file descriptor associated with a `Connection`

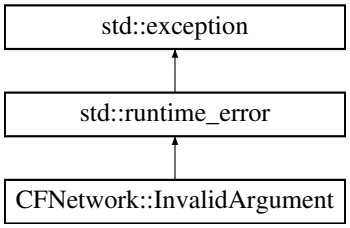
The documentation for this class was generated from the following files:

- Connection.hpp
- Connection.cpp

7.2 CFNetwork::InvalidArgument Class Reference

`#include <CFNetwork.hpp>`

Inheritance diagram for CFNetwork::InvalidArgument:



7.2.1 Detailed Description

The `InvalidArgument` exception can be thrown by methods in the `CFNetwork` namespace when an invalid argument is provided. This is a non-critical exception, and can safely be caught.

The documentation for this class was generated from the following file:

- CFNetwork.hpp

7.3 CFNetwork::Socket Class Reference

`#include <Socket.hpp>`

Public Member Functions

- Socket (const std::string &addr, int port)
- ~Socket ()
- std::shared_ptr< Connection > accept () const
- int getDescriptor () const
- SocketFamily getFamily () const
- const std::string & getHost () const
- int getPort () const
- bool valid () const

Protected Attributes

- SocketFamily family = SocketFamily::IPv4
- std::string host = "0.0.0.0"
- int port = 0
- int socket = -1

7.3.1 Detailed Description

An object-oriented encapsulation for sockets

The `Socket` object is responsible for preparations in order to ultimately accept connections on a given listening address and port number

The `Socket` object is not copyable or assignable since it contains resources that do not lend themselves well to duplication

7.3.2 Constructor & Destructor Documentation

7.3.2.1 CFNetwork::Socket::Socket (const std::string & *addr*, int *port*)

`Socket` Constructor

Constructs a `Socket` object given a listening address/port and begins listening for clients

Parameters

addr	`std::string` object containing the listen address
port	`int` containing the port number to listen on

7.3.2.2 CFNetwork::Socket::~Socket ( )

`Socket` Destructor

Upon destruction of a `Socket` object, close its associated file descriptor

7.3.3 Member Function Documentation

7.3.3.1 std::shared_ptr< Connection > CFNetwork::Socket::accept ( ) const

Accepts an incoming client and creates a `Connection` object for it

This method blocks execution until a client is accepted

Returns

`Connection` object representing the accepted client

7.3.3.2 int CFNetwork::Socket::getDescriptor ( ) const

Fetches the file descriptor of the `Socket` instance

The internal file descriptor can be used to perform more advanced actions that this class doesn't accommodate for

Returns

`int` representing a file descriptor

7.3.3.3 SocketFamily CFNetwork::Socket::getFamily ( ) const

Fetches the address family of the `Socket` instance

See also

SocketFamily for more information on socket families

Returns

`SocketFamily` value describing the address family

7.3.3.4 const std::string & CFNetwork::Socket::getHost ( ) const

Fetches the listening address of the associated `Socket`

This method can produce a `std::string` of either an IPv4 address or an IPv6 address. This method will not produce hostnames

Returns

`std::string` of the listening address

7.3.3.5 int CFNetwork::Socket::getPort ( ) const

Fetches the port of the `Socket` instance

The port should represent the value that the `Socket` was constructed with

Returns

`int` representing the port

7.3.3.6 bool CFNetwork::Socket::valid ( ) const

Determines if the file descriptor is considered valid for read, write, or any other operations

A file descriptor is considered invalid if a call requesting its flags fails with the return value of `-1` or `errno` is set to `EBADF` (the provided argument is not an open file descriptor). If neither case is satisfied, the file descriptor is considered valid

See also

fcntl() For more information regarding this procedure's test

Returns

`true` if the file descriptor is valid, `false` otherwise

7.3.4 Member Data Documentation

7.3.4.1 CFNetwork::Socket::family = SocketFamily::IPv4 [protected]

Used to describe the socket family type of a Socket

7.3.4.2 CFNetwork::Socket::host = "0.0.0.0" [protected]

Holds the listening address associated with a Socket

7.3.4.3 CFNetwork::Socket::port = 0 [protected]

Holds the listening port associated with a Socket

7.3.4.4 CFNetwork::Socket::socket = -1 [protected]

Holds the file descriptor associated with a Socket

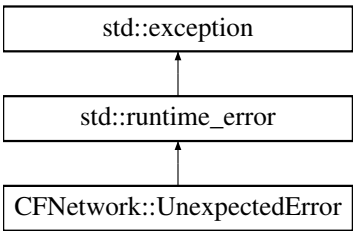
The documentation for this class was generated from the following files:

- Socket.hpp
- Socket.cpp

7.4 CFNetwork::UnexpectedError Class Reference

`#include <CFNetwork.hpp>`

Inheritance diagram for CFNetwork::UnexpectedError:



7.4.1 Detailed Description

The UnexpectedError exception can be thrown by methods in the CFNetwork namespace when an unexpected error is encountered. This is a non-critical exception, and can safely be caught

The documentation for this class was generated from the following file:

- CFNetwork.hpp

Chapter 8

File Documentation

8.1 CFNetwork.cpp File Reference

```
#include <cstring>
#include <netdb.h>
#include <string>
#include <sys/socket.h>
#include "CFNetwork.hpp"
```

Namespaces

- CFNetwork

Functions

- struct sockaddr_storage CFNetwork::parseAddress (const std::string &addr)

8.1.1 Detailed Description

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Implementation source for the `CFNetwork` helper functions

8.2 CFNetwork.hpp File Reference

```
#include <stdexcept>
#include <string>
#include <sys/socket.h>
```

Classes

- class CFNetwork::InvalidArgument
- class CFNetwork::UnexpectedError

Namespaces

- CFNetwork

Enumerations

- enum CFNetwork::ConnectionFlow { CFNetwork::ConnectionFlow::Inbound, **Inbound**, CFNetwork::ConnectionFlow::Outbound, **Outbound** }
- enum CFNetwork::SocketFamily { CFNetwork::SocketFamily::IPv4, **IPv4** = AF_INET, CFNetwork::SocketFamily::IPv6, **IPv6** = AF_INET6 }
- enum CFNetwork::SocketType { **TCP** = SOCK_STREAM, **UDP** = SOCK_DGRAM }

Functions

- struct sockaddr_storage CFNetwork::parseAddress (const std::string &addr)

Variables

- const int CFNetwork::MAX_BYTES = 8192

8.2.1 Detailed Description

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Forward declaration of the `CFNetwork` namespace and related items

8.3 Connection.cpp File Reference

```
#include <arpa/inet.h>
#include <cstring>
#include <netinet/in.h>
#include <string>
#include <sys/errno.h>
#include <sys/fcntl.h>
#include <sys/socket.h>
#include <unistd.h>
#include "CFNetwork.hpp"
#include "Connection.hpp"
```

Namespaces

- CFNetwork

8.3.1 Detailed Description

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Implementation source for the `Connection` object

8.4 Connection.hpp File Reference

```
#include <string>
#include "CFNetwork.hpp"
```

Classes

- class CFNetwork::Connection

Namespaces

- CFNetwork

8.4.1 Detailed Description

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Implementation reference for the `Connection` object

8.5 Socket.cpp File Reference

```
#include <arpa/inet.h>
#include <memory>
#include <netinet/in.h>
#include <string>
#include <sys/errno.h>
#include <sys/fcntl.h>
#include <sys/socket.h>
#include <unistd.h>
#include "CFNetwork.hpp"
#include "Connection.hpp"
#include "Socket.hpp"
```

Namespaces

- CFNetwork

8.5.1 Detailed Description

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Implementation source for the `Socket` object

8.6 Socket.hpp File Reference

```
#include <memory>
#include <string>
#include "CFNetwork.hpp"
```

Classes

- class CFNetwork::Socket

Namespaces

- CFNetwork

8.6.1 Detailed Description

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Implementation reference for the `Socket` object

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