

Wave

0.1

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Chapter 1

Class Index

1.1 Class List

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Chapter 2

File Index

2.1 File List

Here is a list of all documented files with brief descriptions:

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Chapter 3

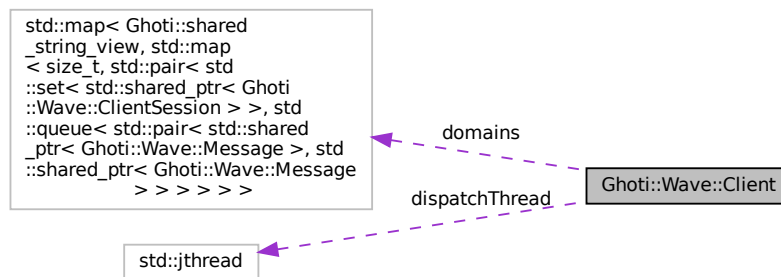
Class Documentation

3.1 Ghoti::Wave::Client Class Reference

Represents a client and all of its HTTP connections.

```
#include <client.hpp>
```

Collaboration diagram for Ghoti::Wave::Client:



Public Member Functions

- `Client ()`
The constructor.
- `~Client ()`
The destructor.
- `bool isRunning () const`
Indicates whether or not the client and its thread pools are currently active.
- `Client & start ()`
Instructs the client to start its thread pool and begin processing the requests in its queue.
- `Client & stop ()`
Instructs the client to gracefully shut down its thread pool.
- `void dispatchLoop (std::stop_token token)`
The dispatch loop used by the thread pool to process sending requests and receiving responses.
- `std::shared_ptr< Message > sendRequest (std::shared_ptr< Message > message)`
Enqueues a message to be sent to a client.

Private Attributes

- `Ghoti::Pool::Pool` [workers](#)
The thread pool worker queue.
- `std::map< Ghoti::shared_string_view, std::map< size_t, std::pair< std::set< std::shared_ptr< Ghoti::Wave::ClientSession`
`> >, std::queue< std::pair< std::shared_ptr< Message >, std::shared_ptr< Message > > > > >`
[domains](#)
Stores all connections and their request queues.
- `std::jthread` [dispatchThread](#)
The thread that runs the read/write processing queues.
- `bool` [running](#)
Whether or not the client is processing read/write actions from the sockets.

3.1.1 Detailed Description

Represents a client and all of its HTTP connections.

This class is currently only used for testing (so that the HTTP connection can be controlled explicitly), but that does not mean that it can't be used for more.

The [Client](#) object can establish connections to a server, receive message requests and forward them to the appropriate session, and report on the status of the connections.

This class exists primarily for testing the server, and as such offers fine-grained control of enabling and disabling features.

3.1.2 Member Function Documentation

3.1.2.1 dispatchLoop()

```
void Client::dispatchLoop (
    std::stop_token token )
```

The dispatch loop used by the thread pool to process sending requests and receiving responses.

Parameters

<i>token</i>	The jthread stop token, used to alert the thread that it should gracefully shut down.
--------------	---

3.1.2.2 isRunning()

```
bool Client::isRunning ( ) const
```

Indicates whether or not the client and its thread pools are currently active.

Returns

Whether or not the client and its thread pools are currently active.

3.1.2.3 sendRequest()

```
shared_ptr< Message > Client::sendRequest (
    std::shared_ptr< Message > message )
```

Enqueues a message to be sent to a client.

This returns a shared pointer to a [Message](#) which will contain the response when the request is completed.

Parameters

<i>message</i>	The request to be sent to a client.
----------------	-------------------------------------

Returns

A shared pointer to a [Message](#) the will eventually contain the response when the request is completed.

3.1.2.4 start()

```
Client& Ghoti::Wave::Client::start ( )
```

Instructs the client to start its thread pool and begin processing the requests in its queue.

Returns

The [Client](#) object.

3.1.2.5 stop()

```
Client & Client::stop ( )
```

Instructs the client to gracefully shut down its thread pool.

Returns

The [Client](#) object.

3.1.3 Member Data Documentation

3.1.3.1 domains

```
std::map<Ghoti::shared_string_view, std::map<size_t, std::pair<std::set<std::shared_ptr<Ghoti::Wave::ClientSession>, std::queue<std::pair<std::shared_ptr<Message>, std::shared_ptr<Message> > > > > > Ghoti::Wave::Client::domains [private]
```

Stores all connections and their request queues.

domains[domain][port] = {set{ClientSession}, queue{{request, response}}}

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

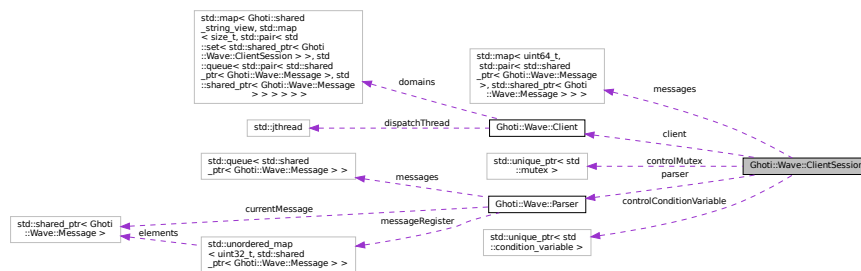
- include/wave/client.hpp
- src/client.cpp

3.2 Ghoti::Wave::ClientSession Class Reference

Represents a connection to a particular domain/port pair.

```
#include <clientSession.hpp>
```

Collaboration diagram for Ghoti::Wave::ClientSession:



Public Member Functions

- **ClientSession** (int hServer, Client *client)
The constructor.
- **~ClientSession** ()
The destructor.
- bool **hasReadDataWaiting** ()
Checks to see whether or not the session has data waiting to be read from the socket.
- bool **hasWriteDataWaiting** ()
Checks to see whether or not the session has data waiting to be written to the socket.
- bool **isFinished** ()
Indicates whether or not the session has completed all communications and may be terminated.
- void **read** ()
Performs a read from the session.
- void **write** ()
Performs a write to the session.
- void **enqueue** (std::shared_ptr< Message > request, std::shared_ptr< Message > response)
Add a request/response pair to the session's queue.

Public Attributes

- `std::unique_ptr< std::mutex > controlMutex`
Used to synchronize access to the session to make it thread safe.
- `std::unique_ptr< std::condition_variable > controlConditionVariable`
Used to synchronize access to the session to make it thread safe.

Private Attributes

- `int hServer`
The socket handle to the server.
- `size_t requestSequence`
The index number of the next request to be enqueued.
- `size_t writeSequence`
The index number of the current request being written.
- `size_t writeOffset`
A byte offset, used to track how many bytes of a message have been written, so that individual write attempts do not duplicate data.
- `size_t readSequence`
The index number of the current request being received.
- `bool working`
Tracks whether or not the session has work queued.
- `bool finished`
Tracks whether or not the session has completed all pending communications.
- `Parser parser`
The parser object used to parse the raw HTTP stream.
- `Client * client`
A pointer to the client object.
- `std::map< uint64_t, std::pair< std::shared_ptr< Message >, std::shared_ptr< Message > > > messages`
Tracks message/response pairs.

3.2.1 Detailed Description

Represents a connection to a particular domain/port pair.

3.2.2 Constructor & Destructor Documentation

3.2.2.1 ClientSession()

```
ClientSession::ClientSession (
    int hServer,
    Client * client )
```

The constructor.

The parent `Client` object will do the work of establishing the socket connection. Once the connection is established, then this class takes over the communication.

Parameters

<i>hServer</i>	The socket handle to the Server to which this session will communicate.
<i>client</i>	A pointer to the parent Client object.

3.2.3 Member Function Documentation

3.2.3.1 enqueue()

```
void ClientSession::enqueue (
    std::shared_ptr< Message > request,
    std::shared_ptr< Message > response )
```

Add a request/response pair to the session's queue.

The response object was created by the [Client](#), and we will write our results into it as the request is processed.

Parameters

<i>request</i>	The HTTP request Message .
<i>response</i>	The HTTP response Message .

3.2.3.2 hasReadDataWaiting()

```
bool ClientSession::hasReadDataWaiting ( )
```

Checks to see whether or not the session has data waiting to be read from the socket.

This is non-blocking mutex controlled. If the session is currently working, then this function will return false.

Returns

Whether or not the session has data waiting to be read from the socket.

3.2.3.3 hasWriteDataWaiting()

```
bool ClientSession::hasWriteDataWaiting ( )
```

Checks to see whether or not the session has data waiting to be written to the socket.

This is non-blocking mutex controlled. If the session is currently working, then this function will return false.

Returns

Whether or not the session has data waiting to be written to the socket.

3.2.3.4 isFinished()

```
bool ClientSession::isFinished ( )
```

Indicates whether or not the session has completed all communications and may be terminated.

Returns

`true` if all communications have completed, `false` otherwise.

3.2.3.5 read()

```
void ClientSession::read ( )
```

Performs a read from the session.

This function is intended to be called by the client session's dispatch thread.

3.2.3.6 write()

```
void ClientSession::write ( )
```

Performs a write to the session.

This function is intended to be called by the client session's dispatch thread.

3.2.4 Member Data Documentation

3.2.4.1 messages

```
std::map<uint64_t, std::pair<std::shared_ptr<Message>, std::shared_ptr<Message> > > Ghoti↵
::Wave::ClientSession::messages [private]
```

Tracks message/response pairs.

`messages[request sequence #] = <request, response>`

3.2.4.2 readSequence

```
size_t Ghoti::Wave::ClientSession::readSequence [private]
```

The index number of the current request being received.

A session may send many requests before a single response is completely received. This variable tracks the response order so that it can be paired to the correct request.

3.2.4.3 requestSequence

```
size_t Ghoti::Wave::ClientSession::requestSequence [private]
```

The index number of the next request to be enqueued.

A session may have multiple messages enqueued before the connection has been established. This variable ensures that messages are handled in the order requested.

3.2.4.4 writeSequence

```
size_t Ghoti::Wave::ClientSession::writeSequence [private]
```

The index number of the current request being written.

A session must send requests in the order that they were enqueued. This variable tracks which message will be sent next.

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

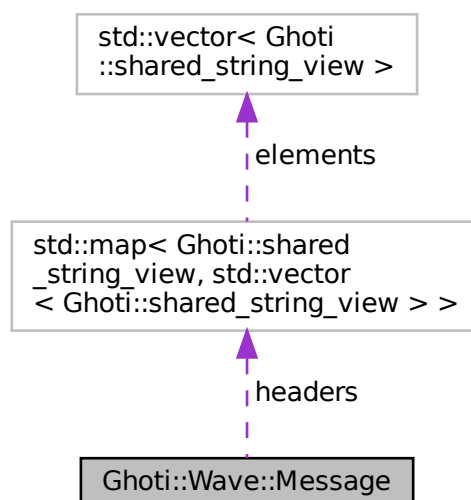
- [include/wave/clientSession.hpp](#)
- [src/clientSession.cpp](#)

3.3 Ghoti::Wave::Message Class Reference

Represents a HTTP message.

```
#include <message.hpp>
```

Collaboration diagram for Ghoti::Wave::Message:



Public Types

- enum [Type](#) { [REQUEST](#) , [RESPONSE](#) }
Indicates whether the message is a request or a response.

Public Member Functions

- [Message](#) ([Type](#) type)
The constructor.
- void [adoptContents](#) ([Message](#) &source)
Move the contents of `source` into the `this` object, except for the promise and future attributes.
- const [Ghoti::shared_string_view](#) & [getRenderedHeader1](#) ()
Get the HTTP/1.1 rendered header as a string.
- bool [hasError](#) () const
Indicates that the message has an error.
- [Message](#) & [setStatusCode](#) (size_t statusCode)
Set the status code of the message.
- size_t [getStatusCode](#) () const
Get the status code of the message.
- [Message](#) & [setErrorMessage](#) (const [Ghoti::shared_string_view](#) &message)
Set an error message description.
- [Message](#) & [setMessage](#) (const [Ghoti::shared_string_view](#) &message)
Set a status message.
- const [Ghoti::shared_string_view](#) & [getMessage](#) () const
Get the status message.
- [Message](#) & [setMethod](#) (const [Ghoti::shared_string_view](#) &method)
Set the HTTP method of the message.
- const [Ghoti::shared_string_view](#) & [getMethod](#) () const
Get the HTTP method of the message.
- [Message](#) & [setTarget](#) (const [Ghoti::shared_string_view](#) &target)
Set the URL target of the message.
- const [Ghoti::shared_string_view](#) & [getTarget](#) () const
Get the URL target of the message.
- [Message](#) & [setVersion](#) (const [Ghoti::shared_string_view](#) &version)
Set the HTTP version of the message.
- const [Ghoti::shared_string_view](#) & [getVersion](#) () const
Get the HTTP version of the message.
- void [addFieldValue](#) (const [Ghoti::shared_string_view](#) &name, const [Ghoti::shared_string_view](#) &value)
Add a header key/value pair.
- const std::map< [Ghoti::shared_string_view](#), std::vector< [Ghoti::shared_string_view](#) > > & [getFields](#) () const
Get the map of all header field key/value pairs.
- [Type](#) [getType](#) () const
Get the `Message::Type` of the message.
- [Message](#) & [setMessageBody](#) (const [Ghoti::shared_string_view](#) &body)
Set the content body of the message.
- const [Ghoti::shared_string_view](#) & [getMessageBody](#) () const
Get the content body of the message.
- size_t [getContentLength](#) () const
Get the content length of the message body.
- [Message](#) & [setPort](#) (size_t port)

- Set the port to which the message is targeted.
 - `size_t getPort () const`
 Get the port to which the message is targeted.
- `Message & setDomain (const Ghoti::shared_string_view &domain)`
 Set the domain to which the message is targeted.
- `const Ghoti::shared_string_view & getDomain () const`
 Get the domain to which the message is targeted.
- `void setReady (bool isError)`
 Notify the associated promise/future that the message is completed.
- `std::future< bool > & getReadyFuture ()`
 Get the future which will indicate when the message has been fully processed.
- `Message & setId (uint32_t id)`
 Set the ID of the message.
- `uint32_t getId () const`
 Get the ID of the message.

Private Attributes

- `bool headerIsRendered`
 Used to track whether or not the header has been rendered to a string.
- `bool errorIsSet`
 Tracks whether or not an error has been set.
- `Type type`
 The `Message::Type` of the message.
- `uint32_t id`
 The ID number of the message.
- `size_t port`
 The port to which the message is targeted.
- `size_t statusCode`
 The status code of the message.
- `size_t contentLength`
 The contentLength of the message.
- `Ghoti::shared_string_view renderedHeader`
 A cached version of the HTTP/1.1 header.
- `Ghoti::shared_string_view message`
 The status message.
- `Ghoti::shared_string_view method`
 The HTTP method.
- `Ghoti::shared_string_view domain`
 The domain target of the message.
- `Ghoti::shared_string_view target`
 The URL target of the message.
- `Ghoti::shared_string_view version`
 The HTTP version of the message.
- `Ghoti::shared_string_view messageBody`
 The content body of the message.
- `std::map< Ghoti::shared_string_view, std::vector< Ghoti::shared_string_view > > headers`
 A collection of headers and their associated values.
- `std::promise< bool > readyPromise`
 The promise used for asynchronous notification of when the message has been processed.
- `std::future< bool > readyFuture`
 The future used for asynchronous notification of when the message has been processed.

3.3.1 Detailed Description

Represents a HTTP message.

3.3.2 Member Enumeration Documentation

3.3.2.1 Type

enum [Ghoti::Wave::Message::Type](#)

Indicates whether the message is a request or a response.

Enumerator

REQUEST	A HTTP Request.
RESPONSE	A HTTP Response.

3.3.3 Constructor & Destructor Documentation

3.3.3.1 Message()

```
Message::Message (
    Type type )
```

The constructor.

Messages must have an associated type.

Parameters

<i>type</i>	The Message::Type of the HTTP message.
-------------	--

3.3.4 Member Function Documentation

3.3.4.1 addFieldValue()

```
void Message::addFieldValue (
    const Ghoti::shared_string_view & name,
    const Ghoti::shared_string_view & value )
```

Add a header key/value pair.

Parameters

<i>name</i>	The field name.
<i>value</i>	The field value.

3.3.4.2 adoptContents()

```
void Message::adoptContents (
    Message & source )
```

Move the contents of `source` into the `this` object, except for the promise and future attributes.

This method is necessary because the parser may have already started populating a [Message](#) object. A client, however, must supply the [Message](#) object so that the client can know when the promise/future is fulfilled. The only way to accomplish this is to provide a way for the parser to have a provided [Message](#) "adopt" the contents of an existing message, but not bother the associated promise/future of the target.

Parameters

<i>source</i>	The Message whose contents will be adopted into <code>this</code> .
---------------	---

3.3.4.3 getContentLength()

```
size_t Message::getContentLength ( ) const
```

Get the content length of the message body.

Returns

The content length of the message body.

3.3.4.4 getDomain()

```
const shared_string_view & Message::getDomain ( ) const
```

Get the domain to which the message is targeted.

Returns

The target domain.

3.3.4.5 getFields()

```
const map< shared_string_view, vector< shared_string_view > > & Message::getFields ( ) const
```

Get the map of all header field key/value pairs.

fields[field name] = [field value]

3.3.4.6 getId()

```
uint32_t Message::getId ( ) const
```

Get the ID of the message.

Returns

The ID number of the message.

3.3.4.7 getMessage()

```
const shared_string_view & Message::getMessage ( ) const
```

Get the status message.

Returns

The status message.

3.3.4.8 getMessageBody()

```
const shared_string_view & Message::getMessageBody ( ) const
```

Get the content body of the message.

Returns

The content body.

3.3.4.9 `getMethod()`

```
const shared_string_view & Message::getMethod ( ) const
```

Get the HTTP method of the message.

Returns

The HTTP method.

3.3.4.10 `getPort()`

```
size_t Message::getPort ( ) const
```

Get the port to which the message is targeted.

Returns

The target port.

3.3.4.11 `getReadyFuture()`

```
future< bool > & Message::getReadyFuture ( )
```

Get the future which will indicate when the message has been fully processed.

Returns

The future used to monitor the status of the message.

3.3.4.12 getRenderedHeader1()

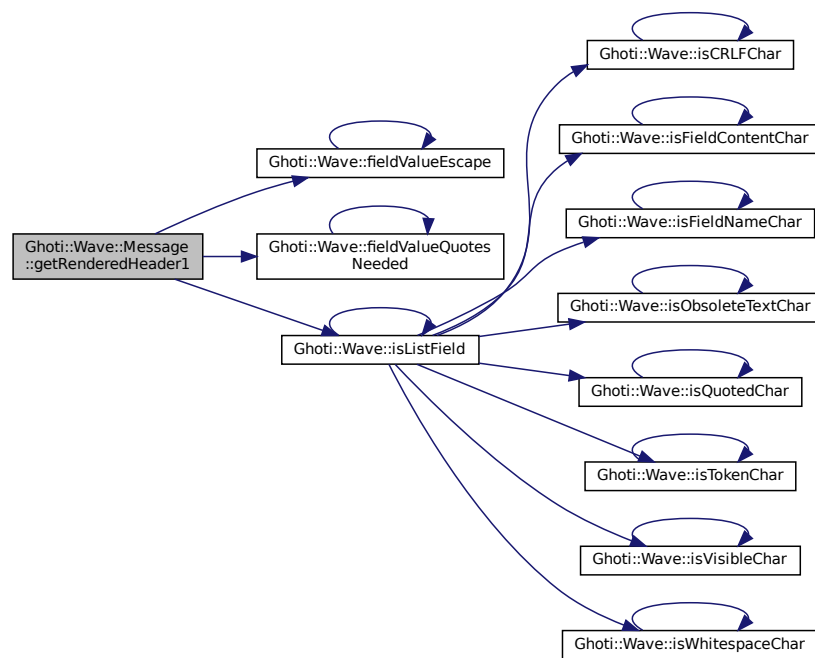
```
const shared_string_view & Message::getRenderedHeader1 ( )
```

Get the HTTP/1.1 rendered header as a string.

Returns

A string containing the HTTP/1.1 rendered header.

Here is the call graph for this function:



3.3.4.13 getStatusCode()

```
size_t Message::getStatusCode ( ) const
```

Get the status code of the message.

Returns

The status code of the message.

3.3.4.14 `getTarget()`

```
const shared_string_view & Message::getTarget ( ) const
```

Get the URL target of the message.

Returns

The URL target.

3.3.4.15 `getType()`

```
Message::Type Message::getType ( ) const
```

Get the [Message::Type](#) of the message.

Returns

The [Message::Type](#) of the message.

3.3.4.16 `getVersion()`

```
const shared_string_view & Message::getVersion ( ) const
```

Get the HTTP version of the message.

Returns

The HTTP version.

3.3.4.17 `hasError()`

```
bool Message::hasError ( ) const
```

Indicates that the message has an error.

Returns

`true` if there is an error, `false` otherwise.

3.3.4.18 `setDomain()`

```
Message & Message::setDomain (
    const Ghoti::shared_string_view & domain )
```

Set the domain to which the message is targeted.

Parameters

<i>domain</i>	The target domain.
---------------	--------------------

Returns

The [Message](#) object.

3.3.4.19 setErrorMessage()

```
Message & Message::setErrorMessage (
    const Ghoti::shared_string_view & message )
```

Set an error message description.

Parameters

<i>message</i>	The error message description.
----------------	--------------------------------

Returns

The [Message](#) object.

3.3.4.20 setId()

```
Message & Message::setId (
    uint32_t id )
```

Set the ID of the message.

Parameters

<i>id</i>	The ID number of the message.
-----------	-------------------------------

Returns

The [Message](#) object.

3.3.4.21 setMessage()

```
Message & Message::setMessage (
    const Ghoti::shared_string_view & message )
```

Set a status message.

Parameters

<i>The</i>	status message description.
------------	-----------------------------

Returns

The [Message](#) object.

3.3.4.22 setMessageBody()

```
Message & Message::setMessageBody (
    const Ghoti::shared_string_view & body )
```

Set the content body of the message.

Parameters

<i>body</i>	The content body.
-------------	-------------------

Returns

The [Message](#) object.

3.3.4.23 setMethod()

```
Message & Message::setMethod (
    const Ghoti::shared_string_view & method )
```

Set the HTTP method of the message.

Parameters

<i>method</i>	The HTTP method.
---------------	------------------

Returns

The [Message](#) object.

3.3.4.24 setPort()

```
Message & Message::setPort (
    size_t port )
```

Set the port to which the message is targeted.

Parameters

<i>port</i>	The target port.
-------------	------------------

Returns

The [Message](#) object.

3.3.4.25 setReady()

```
void Message::setReady (
    bool isError )
```

Notify the associated promise/future that the message is completed.

Note that a value of `true` only indicates that the message completed and the response was parsed. It does not indicate anything about the response code of the message (e.g., the status code may be 404, but because the response actually came from the server, this value should be `true`).

A value of `false` indicates that there was a problem either in delivering the message (such as a write failure) or an error in parsing the response.

Parameters

<i>requestCompleted</i>	<code>true</code> if this is the result of a successful HTTP request, otherwise <code>false</code> .
-------------------------	--

3.3.4.26 setStatusCode()

```
Message & Message::setStatusCode (
    size_t statusCode )
```

Set the status code of the message.

Per the HTTP spec, this must be a 3-digit number.

Parameters

<i>statusCode</i>	The status code of the message.
-------------------	---------------------------------

Returns

The [Message](#) object.

3.3.4.27 setTarget()

```
Message & Message::setTarget (
    const Ghoti::shared_string_view & target )
```

Set the URL target of the message.

Parameters

<i>target</i>	The URL target.
---------------	-----------------

Returns

The [Message](#) object.

3.3.4.28 setVersion()

```
Message & Message::setVersion (
    const Ghoti::shared_string_view & version )
```

Set the HTTP version of the message.

Parameters

<i>version</i>	The HTTP version.
----------------	-------------------

Returns

The [Message](#) object.

3.3.5 Member Data Documentation

3.3.5.1 headers

```
std::map<Ghoti::shared_string_view, std::vector<Ghoti::shared_string_view> > Ghoti::Wave::↔
Message::headers [private]
```

A collection of headers and their associated values.

```
headers[field name] = [field value]
```

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

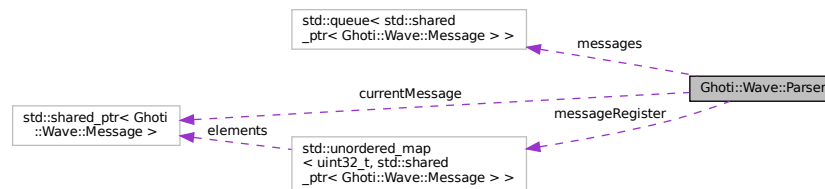
- include/wave/[message.hpp](#)
- src/[message.cpp](#)

3.4 Ghoti::Wave::Parser Class Reference

Parses a HTTP/1.1 data stream into discrete messages.

```
#include <parser.hpp>
```

Collaboration diagram for Ghoti::Wave::Parser:



Public Types

- enum [Type](#) { [REQUEST](#) , [RESPONSE](#) }
Represents the type of parsing being performed.

Public Member Functions

- [Parser](#) (Type type)
The constructor.
- void [processChunk](#) (const char *buffer, size_t len)
Process a chunk of data.
- void [parseMessageTarget](#) (const Ghoti::shared_string_view &target)
- void [registerMessage](#) (std::shared_ptr< [Message](#) > message)
Use the provided [Message](#) as the recipient of parsing for the [Message](#)'s id.

Public Attributes

- std::queue< std::shared_ptr< [Message](#) > > [messages](#)
A queue of messages that have been parsed so far.

Private Types

- enum [ReadStateMajor](#) { [NEW_HEADER](#) , [FIELD_LINE](#) , [MESSAGE_BODY](#) }
Primary state tracking values.
- enum [ReadStateMinor](#) {
[BEGINNING_OF_REQUEST_LINE](#) , [BEGINNING_OF_STATUS_LINE](#) , [BEGINNING_OF_FIELD_LINE](#) ,
[CRLF](#) ,
[AFTER_CRLF](#) , [BEGINNING_OF_REQUEST](#) , [BEGINNING_OF_STATUS](#) , [METHOD](#) ,
[AFTER_METHOD](#) , [REQUEST_TARGET](#) , [AFTER_REQUEST_TARGET](#) , [HTTP_VERSION](#) ,
[AFTER_HTTP_VERSION](#) , [RESPONSE_CODE](#) , [REASON_PHRASE](#) , [FIELD_NAME](#) ,
[AFTER_FIELD_NAME](#) , [BEFORE_FIELD_VALUE](#) , [FIELD_VALUE](#) , [SINGLETON_FIELD_VALUE](#) ,
[LIST_FIELD_VALUE](#) , [UNQUOTED_FIELD_VALUE](#) , [QUOTED_FIELD_VALUE_OPEN](#) , [QUOTED_FIELD_VALUE_PROCESS](#)
,
[QUOTED_FIELD_VALUE_ESCAPE](#) , [QUOTED_FIELD_VALUE_CLOSE](#) , [AFTER_FIELD_VALUE](#) ,
[FIELD_VALUE_COMMA](#) ,
[AFTER_FIELD_VALUE_COMMA](#) , [AFTER_HEADER_FIELDS](#) , [MESSAGE_START](#) , [MESSAGE_READ](#) }
Secondary state tracking values.

Private Member Functions

- `std::shared_ptr< Message > createNewMessage () const`
Create a new message whose `Message::Type` matches the `Parser::Type` of this parser.

Private Attributes

- `Type type`
The `Parser::Type` of HTTP/1.1 stream that will be processed.
- `size_t cursor`
An internal counter that indicates the character currently being processed.
- `ReadStateMajor readStateMajor`
Tracks the primary state for the parsing state machine.
- `ReadStateMinor readStateMinor`
Tracks the secondary state for the parsing state machine.
- `size_t majorStart`
Indicates the cursor position at which the major state was last updated.
- `size_t minorStart`
Indicates the cursor position at which the minor state was last updated.
- `Ghoti::shared_string_view input`
The input string, stored internally so that the stream will be processed correctly, even if it is split across multiple buffered reads.
- `Ghoti::shared_string_view errorMessage`
An error message to communicate a parsing issue.
- `Ghoti::shared_string_view tempFieldName`
The field name currently being processed.
- `Ghoti::shared_string_view tempFieldValue`
The field value currently being processed.
- `std::unordered_map< uint32_t, std::shared_ptr< Message > > messageRegister`
A map to store a `Message` associated with a sequence.
- `std::shared_ptr< Message > currentMessage`
The current message being parsed.
- `size_t contentLength`
The content length that was encountered when parsing the header.

3.4.1 Detailed Description

Parses a HTTP/1.1 data stream into discrete messages.

3.4.2 Member Enumeration Documentation

3.4.2.1 ReadStateMajor

```
enum Ghoti::Wave::Parser::ReadStateMajor [private]
```

Primary state tracking values.

These values are used to indicate which major stage the parser is in while parsing the message stream.

The parser uses two stages, to make the parser switch cases easier to follow and to reuse common stages in different contexts (e.g., CRLF).

Enumerator

NEW_HEADER	Expect a new message header.
FIELD_LINE	Expect a new header field.
MESSAGE_BODY	Expect the message body.

3.4.2.2 ReadStateMinor

```
enum Ghoti::Wave::Parser::ReadStateMinor [private]
```

Secondary state tracking values.

These values are used to indicate which "part" of the primary state is being tracked.

Enumerator

BEGINNING_OF_REQUEST_LINE	A request line is starting.
BEGINNING_OF_STATUS_LINE	A status line is starting.
BEGINNING_OF_FIELD_LINE	A header field line is starting.
CRLF	Expect a CRLF.
AFTER_CRLF	A CRLF has been identified.
BEGINNING_OF_REQUEST	Optional whitespace parsed, request line is now starting.
BEGINNING_OF_STATUS	Optional whitespace parsed, status line is now starting.
METHOD	Method expected.
AFTER_METHOD	Method successfully parsed.
REQUEST_TARGET	Expect request target.
AFTER_REQUEST_TARGET	Request target successfully parsed.
HTTP_VERSION	HTTP version expected.
AFTER_HTTP_VERSION	HTTP version successfully parsed.
RESPONSE_CODE	Response Code Expected.
REASON_PHRASE	Reason Phrase Expected.
FIELD_NAME	Header field name expected.
AFTER_FIELD_NAME	Header field name successfully parsed.
BEFORE_FIELD_VALUE	Header field value about to be processed.
FIELD_VALUE	Header field value expected.
SINGLETON_FIELD_VALUE	Singleton header field value expected.
LIST_FIELD_VALUE	List of header fields expected.
UNQUOTED_FIELD_VALUE	Unquoted field value expected.
QUOTED_FIELD_VALUE_OPEN	Quoted field value begin.
QUOTED_FIELD_VALUE_PROCESS	Quoted field value is being processed.
QUOTED_FIELD_VALUE_ESCAPE	Quoted field value char is being escaped.
QUOTED_FIELD_VALUE_CLOSE	Quoted field value is being closed.
AFTER_FIELD_VALUE	Field value processed.
FIELD_VALUE_COMMA	Field value comma expected.
AFTER_FIELD_VALUE_COMMA	Field value comma processed.
AFTER_HEADER_FIELDS	Header fields processed.
MESSAGE_START	Message started.
MESSAGE_READ	Message being read.

3.4.2.3 Type

enum [Ghoti::Wave::Parser::Type](#)

Represents the type of parsing being performed.

Enumerator

REQUEST	This is a Request stream.
RESPONSE	This is a Response stream.

3.4.3 Constructor & Destructor Documentation

3.4.3.1 Parser()

```
Parser::Parser (
    Type type )
```

The constructor.

HTTP/1.1 streams do not have an interchangeable syntax, so the stream type must be declared.

The stream will accept an array of bytes, and it will remember its previous parsing position.

Parameters

<i>type</i>	The Parser::Type of the message stream.
-------------	---

3.4.4 Member Function Documentation

3.4.4.1 createNewMessage()

```
shared_ptr< Message > Parser::createNewMessage ( ) const [private]
```

Create a new message whose [Message::Type](#) matches the [Parser::Type](#) of this parser.

This function should really only be used by [Parser::Type::Request](#) parsing, since all [Parser::Type::Response](#) streams should have already registered a [Message](#) object to receive the parsed message.

Returns

A properly typed message.

3.4.4.2 processChunk()

```
void Parser::processChunk (
    const char * buffer,
    size_t len )
```

Process a chunk of data.

Parameters

<i>buffer</i>	The buffer to be processed.
<i>len</i>	The length of the buffer in bytes.

3.4.4.3 registerMessage()

```
void Parser::registerMessage (
    std::shared_ptr< Message > message )
```

Use the provided [Message](#) as the recipient of parsing for the [Message](#)'s id.

If a [Message](#) with the target ID already exists, then the provided message will adopt the contents of the existing data.

Parameters

<i>message</i>	The object that should receive the desired messages.
----------------	--

3.4.5 Member Data Documentation

3.4.5.1 messageRegister

```
std::unordered_map<uint32_t, std::shared_ptr<Message> > Ghoti::Wave::Parser::messageRegister
[private]
```

A map to store a [Message](#) associated with a sequence.

This approach is used so that the parser can be informed of the existence of an expected message. This way, the supplied [Message](#) object can act as the recipient of the message as it is parsed.

The registered message should be the same message that was provided to the caller of the [Client::sendRequest\(\)](#) function.

```
messageRegister[ID] = message
```

3.4.5.2 messages

```
std::queue<std::shared_ptr<Message> > Ghoti::Wave::Parser::messages
```

A queue of messages that have been parsed so far.

The calling session manager may pop messages from the queue as needed.

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

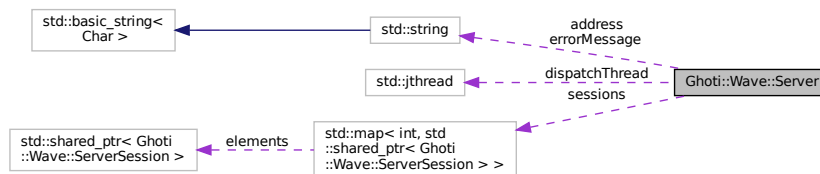
- include/wave/parser.hpp
- src/parser.cpp

3.5 Ghoti::Wave::Server Class Reference

The base [Server](#) class.

```
#include <server.hpp>
```

Collaboration diagram for Ghoti::Wave::Server:



Public Types

- enum [ErrorCode](#) { [NO_ERROR](#) , [SERVER_ALREADY_RUNNING](#) , [START_FAILED](#) }

These are the error codes that the [Server](#) may generate when control functions fail.

Public Member Functions

- [Server](#) ()
The constructor.
- [~Server](#) ()
The destructor.
- [Server](#) & [clearError](#) ()
Clears any error code and error message that may be set.
- [ErrorCode](#) [getErrorCode](#) () const
Returns the [Server::ErrorCode](#) error that was most recently generated.
- const std::string & [getErrorMessage](#) () const
Returns an error message string that was most recently generated.
- bool [isRunning](#) () const

- Returns whether or not the server is running.*
- [Server & setPort](#) (uint16_t port)
 - Set the port that the server is listening on.*
- uint16_t [getPort](#) () const
 - Return the server's current port setting.*
- [Server & setAddress](#) (const char *ip)
 - Set the ip address that the server is listening on.*
- const std::string & [getAddress](#) () const
 - Return the server's current ip address setting.*
- int [getSocketHandle](#) () const
 - Returns the socket handle of the server (if set).*
- [Server & start](#) ()
 - Start the server listening on the designated ip address and port.*
- [Server & stop](#) ()
 - Signal the server to stop listening and terminate its thread pool.*
- void [dispatchLoop](#) (std::stop_token token)
 - The Dispatch loop used by the thread pool to handle asynchronous reading and writing of the server ports.*

Private Attributes

- Ghoti::Pool::Pool [workers](#)
 - The thread pool worker queue.*
- std::map< int, std::shared_ptr< [Ghoti::Wave::ServerSession](#) > > [sessions](#)
 - Stores active sessions.*
- std::jthread [dispatchThread](#)
 - The dispatch thread used to monitor for new connections and to dispatch read/write tasks as needed by the sessions.*
- [ErrorCode](#) [errorCode](#)
 - The most recently generated error code.*
- std::string [errorMessage](#)
 - The most recently generated error message.*
- bool [running](#)
 - Stores whether or not the server is set to be running.*
- int [hSocket](#)
 - The socket handle to which the running server is attached.*
- std::string [address](#)
 - The ip address that the server is configured to use.*
- uint16_t [port](#)
 - The port that the server is configured to use.*

3.5.1 Detailed Description

The base [Server](#) class.

This class is the foundation of the Ghoti.io HTTP server. It serves as the interface to control and expand the server programmatically.

3.5.2 Member Enumeration Documentation

3.5.2.1 ErrorCode

```
enum Ghoti::Wave::Server::ErrorCode
```

These are the error codes that the [Server](#) may generate when control functions fail.

Enumerator

NO_ERROR	No error.
SERVER_ALREADY_RUNNING	The change could not be applied because the server is already running.
START_FAILED	The server could not be started.

3.5.3 Constructor & Destructor Documentation

3.5.3.1 Server()

```
Server::Server ( )
```

The constructor.

The constructor only creates the server object. It does not begin listening for connections. In order to begin listening for connections, the [Server.start\(\)](#) function must be called.

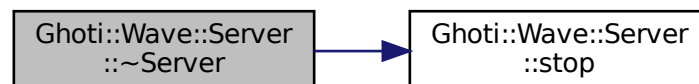
By default, the server will bind to "127.0.0.1" and a port number assigned by the operating system. This default functionality can be changed by using [Server.setAddress\(\)](#) and [Server.setPort\(\)](#), respectively.

3.5.3.2 ~Server()

```
Server::~~Server ( )
```

The destructor.

The destructor will call [Server.stop\(\)](#). Here is the call graph for this function:



3.5.4 Member Function Documentation

3.5.4.1 clearError()

```
Server & Server::clearError ( )
```

Clears any error code and error message that may be set.

Error messages are not cleared automatically. This function must be called explicitly.

Returns

The server object.

3.5.4.2 dispatchLoop()

```
void Server::dispatchLoop (
    std::stop_token token )
```

The Dispatch loop used by the thread pool to handle asynchronous reading and writing of the server ports.

Parameters

<i>stop_token</i>	The stop token provided by the jthread to indicate that the thread should be safely shut down.
-------------------	--

3.5.4.3 getAddress()

```
const string & Server::getAddress ( ) const
```

Return the server's current ip address setting.

This setting does not imply that the server is active.

Returns

The current ip address.

3.5.4.4 getErrorCode()

```
Server::ErrorCode Server::getErrorCode ( ) const
```

Returns the [Server::ErrorCode](#) error that was most recently generated.

Calling the function does not clear the error. The error must be cleared explicitly by calling [Server::clearError\(\)](#).

Returns

The [Server::ErrorCode](#) error that was most recently generated.

3.5.4.5 getErrorMessage()

```
const std::string & Server::getErrorMessage ( ) const
```

Returns an error message string that was most recently generated.

Calling the function does not clear the error. The error must be cleared explicitly by calling [Server::clearError\(\)](#).

Returns

The error message string that was most recently generated.

3.5.4.6 getPort()

```
uint16_t Server::getPort ( ) const
```

Return the server's current port setting.

This setting does not imply that the server is active.

Returns

The current port number.

3.5.4.7 getSocketHandle()

```
int Server::getSocketHandle ( ) const
```

Returns the socket handle of the server (if set).

Returns

The socket handle of the server.

3.5.4.8 isRunning()

```
bool Server::isRunning ( ) const
```

Returns whether or not the server is running.

Returns

True/False whether or not the server is running.

3.5.4.9 setAddress()

```
Server & Server::setAddress (
    const char * ip )
```

Set the ip address that the server is listening on.

This setting cannot be changed if the server is running. If the server is running, then an error will be set.

Parameters

<i>ip</i>	The ip address that the server should listen on.
-----------	--

Returns

The server object.

3.5.4.10 setPort()

```
Server & Server::setPort (
    uint16_t port )
```

Set the port that the server is listening on.

This setting cannot be changed if the server is running. If the server is running, then an error will be set.

Parameters

<i>port</i>	The port number that the server should listen on.
-------------	---

Returns

The server object.

3.5.4.11 start()

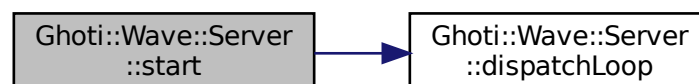
```
Server & Server::start ( )
```

Start the server listening on the designated ip address and port.

Returns

The server object.

Here is the call graph for this function:



3.5.4.12 stop()

```
Server & Server::stop ( )
```

Signal the server to stop listening and terminate its thread pool.

Returns

The server object.

3.5.5 Member Data Documentation

3.5.5.1 sessions

```
std::map<int, std::shared_ptr<Ghoti::Wave::ServerSession> > Ghoti::Wave::Server::sessions
[private]
```

Stores active sessions.

The sessions are keyed by the socket handle to which the session is associated.

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

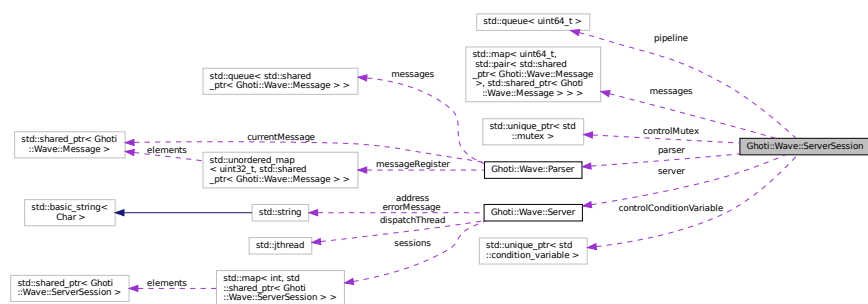
- include/wave/server.hpp
- src/server.cpp

3.6 Ghoti::Wave::ServerSession Class Reference

Represents a persistent connection with a client.

```
#include <serverSession.hpp>
```

Collaboration diagram for Ghoti::Wave::ServerSession:



Public Member Functions

- [ServerSession](#) (int [hClient](#), [Server](#) *[server](#))
The constructor.
- [~ServerSession](#) ()
The destructor.
- bool [hasReadDataWaiting](#) ()
Checks to see whether or not the session has data waiting to be read from the socket.
- bool [hasWriteDataWaiting](#) ()
Checks to see whether or not the session has data waiting to be written to the socket.
- bool [isFinished](#) ()
Indicates whether or not the session has completed all communications and may be terminated.
- void [read](#) ()
Perform a read from the session.
- void [write](#) ()
Perform a write to the session.

Public Attributes

- std::unique_ptr< std::mutex > [controlMutex](#)
Used to synchronize access to the session to make it thread safe.
- std::unique_ptr< std::condition_variable > [controlConditionVariable](#)
Used to synchronize access to the session to make it thread safe.

Private Attributes

- int [hClient](#)
The socket handle to the client.
- size_t [requestSequence](#)
A monotonically increasing counter to track request/response pairs.
- size_t [writeOffset](#)
A byte offset used to track how many bytes of a message have been written, so that individual write attempts do not duplicate data.
- bool [working](#)
Tracks whether or not the session has work queued.
- bool [finished](#)
Tracks whether or not the session has completed all pending communications.
- [Parser](#) [parser](#)
The parser object used to parse the raw HTTP stream.
- [Server](#) * [server](#)
A pointer to the server object.
- std::map< uint64_t, std::pair< std::shared_ptr< [Message](#) >, std::shared_ptr< [Message](#) > > > [messages](#)
Tracks request/response pairs.
- std::queue< uint64_t > [pipeline](#)
Simple queue to track which request sequence # should be parsed next.

3.6.1 Detailed Description

Represents a persistent connection with a client.

3.6.2 Constructor & Destructor Documentation

3.6.2.1 ServerSession()

```
ServerSession::ServerSession (
    int hClient,
    Server * server )
```

The constructor.

Parameters

<i>hClient</i>	The socket handle to the client connection.
<i>server</i>	A pointer to the parent Server object.

3.6.3 Member Function Documentation

3.6.3.1 hasReadDataWaiting()

```
bool ServerSession::hasReadDataWaiting ( )
```

Checks to see whether or not the session has data waiting to be read from the socket.

This is non-blocking mutex controlled. If the session is currently working, then this function will return false.

Returns

Whether or not the session has data waiting to be read from the socket.

3.6.3.2 hasWriteDataWaiting()

```
bool ServerSession::hasWriteDataWaiting ( )
```

Checks to see whether or not the session has data waiting to be written to the socket.

This is non-blocking mutex controlled. If the session is currently working, then this function will return false.

Returns

Whether or not the session has data waiting to be written to the socket.

3.6.3.3 isFinished()

```
bool ServerSession::isFinished ( )
```

Indicates whether or not the session has completed all communications and may be terminated.

Returns

`true` if all communications have completed, `false` otherwise.

3.6.3.4 read()

```
void ServerSession::read ( )
```

Perform a read from the session.

This function is intended to be called by the server's thread pool worker queue, probably in a lambda expression.

3.6.3.5 write()

```
void ServerSession::write ( )
```

Perform a write to the session.

This function is intended to be called by the server's thread pool worker queue, probably in a lambda expression.

3.6.4 Member Data Documentation

3.6.4.1 messages

```
std::map<uint64_t, std::pair<std::shared_ptr<Message>, std::shared_ptr<Message> > > Ghoti←  
::Wave::ServerSession::messages [private]
```

Tracks request/response pairs.

```
messages[request sequence #] = <request, response>
```

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

- [include/wave/serverSession.hpp](#)
- [src/serverSession.cpp](#)

Chapter 4

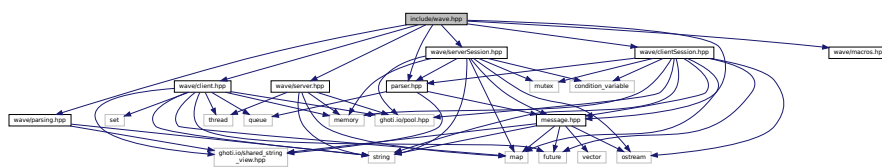
File Documentation

4.1 include/wave.hpp File Reference

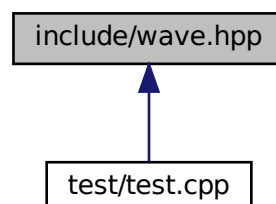
Header file supplied for use by 3rd party code so that they can easily include all necessary headers for the Ghoti.io Wave library.

```
#include "wave/client.hpp"
#include "wave/clientSession.hpp"
#include "wave/macros.hpp"
#include "wave/message.hpp"
#include "wave/parser.hpp"
#include "wave/parsing.hpp"
#include "wave/server.hpp"
#include "wave/serverSession.hpp"
```

Include dependency graph for wave.hpp:



This graph shows which files directly or indirectly include this file:



4.1.1 Detailed Description

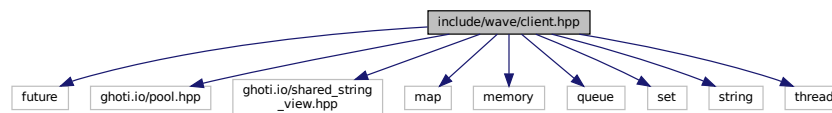
Header file supplied for use by 3rd party code so that they can easily include all necessary headers for the Ghoti.io Wave library.

4.2 include/wave/client.hpp File Reference

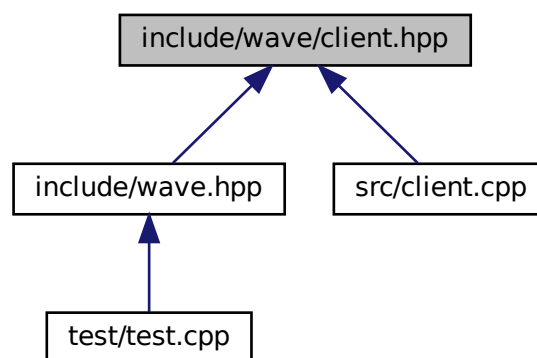
Header file for declaring the Client class.

```
#include <future>
#include <ghoti.io/pool.hpp>
#include <ghoti.io/shared_string_view.hpp>
#include <map>
#include <memory>
#include <queue>
#include <set>
#include <string>
#include <thread>
```

Include dependency graph for client.hpp:



This graph shows which files directly or indirectly include this file:



Classes

- class [Ghoti::Wave::Client](#)

Represents a client and all of its HTTP connections.

4.2.1 Detailed Description

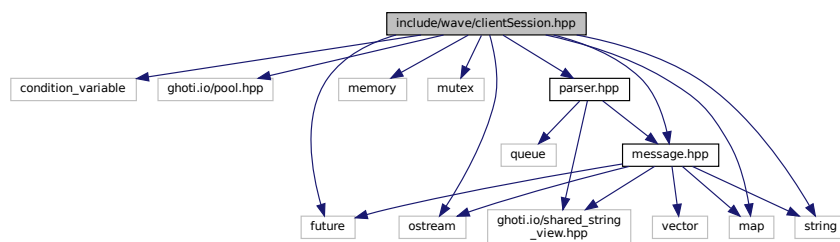
Header file for declaring the Client class.

4.3 include/wave/clientSession.hpp File Reference

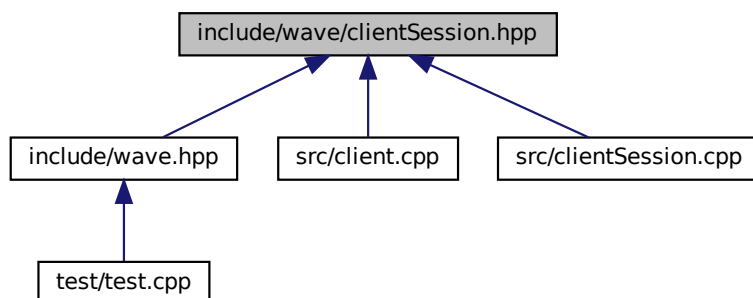
Header file for declaring the ClientSession class.

```
#include <condition_variable>
#include <ghoti.io/pool.hpp>
#include <future>
#include <memory>
#include <mutex>
#include <ostream>
#include "parser.hpp"
#include <map>
#include "message.hpp"
#include <string>
```

Include dependency graph for clientSession.hpp:



This graph shows which files directly or indirectly include this file:



Classes

- class [Ghoti::Wave::ClientSession](#)

Represents a connection to a particular domain/port pair.

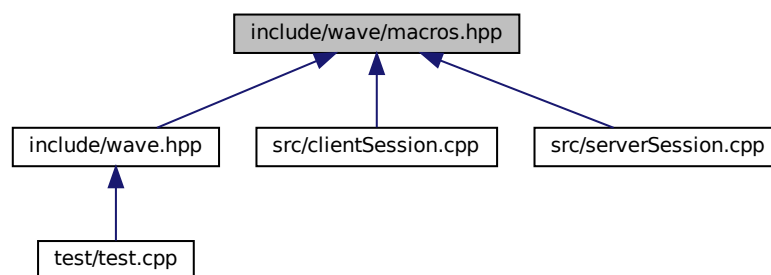
4.3.1 Detailed Description

Header file for declaring the ClientSession class.

4.4 include/wave/macros.hpp File Reference

Header file for declaring the Client class.

This graph shows which files directly or indirectly include this file:



Variables

- constexpr size_t `Ghoti::Wave::MAXBUFFERSIZE` = 4096

4.4.1 Detailed Description

Header file for declaring the Client class.

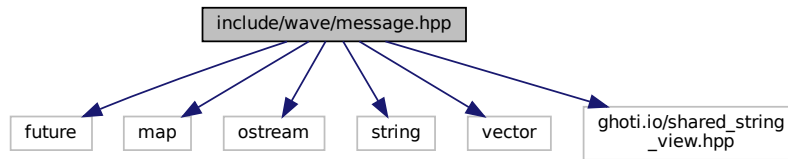
4.5 include/wave/message.hpp File Reference

Header file for declaring the Message class.

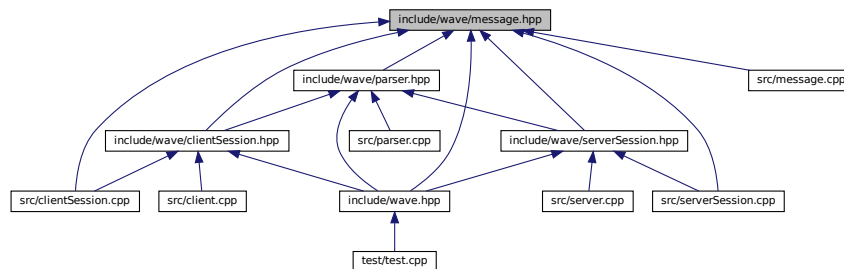
```
#include <future>
#include <map>
#include <ostream>
#include <string>
#include <vector>
```

```
#include <ghoti.io/shared_string_view.hpp>
```

Include dependency graph for message.hpp:



This graph shows which files directly or indirectly include this file:



Classes

- class [Ghoti::Wave::Message](#)
Represents a HTTP message.

Functions

- `std::ostream & Ghoti::Wave::operator<< (std::ostream &out, Message &message)`
Helper function to output a [Message](#) to a stream.

4.5.1 Detailed Description

Header file for declaring the Message class.

4.5.2 Function Documentation

4.5.2.1 `operator<<()`

```
ostream & Ghoti::Wave::operator<< (
    std::ostream & out,
    Message & message )
```

Helper function to output a Message to a stream.

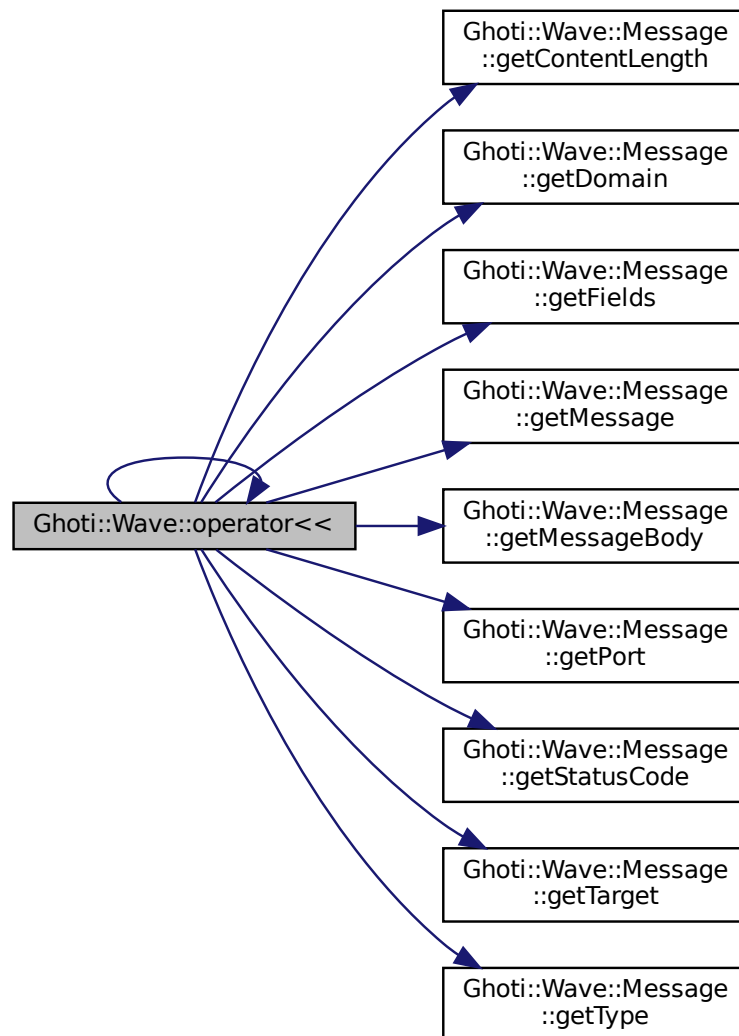
Parameters

<i>out</i>	The output stream.
<i>message</i>	The Message to be inserted into the stream.

Returns

The output stream.

Here is the call graph for this function:

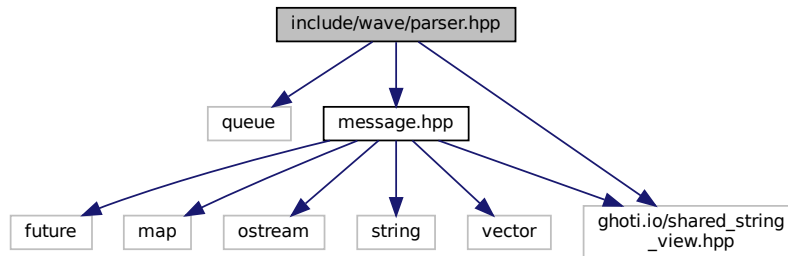


4.6 include/wave/parser.hpp File Reference

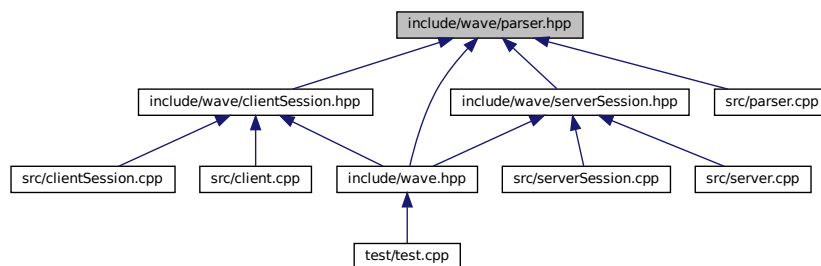
Header file for declaring the Session class.


```
#include <queue>
#include "message.hpp"
#include <ghoti.io/shared_string_view.hpp>
```

Include dependency graph for parser.hpp:



This graph shows which files directly or indirectly include this file:



Classes

- class [Ghoti::Wave::Parser](#)
Parses a HTTP/1.1 data stream into discrete messages.

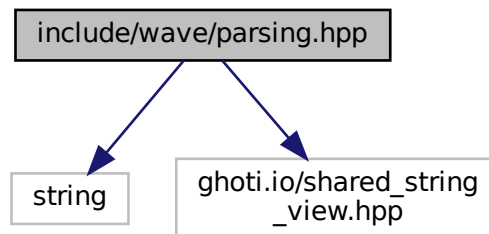
4.6.1 Detailed Description

Header file for declaring the Session class.

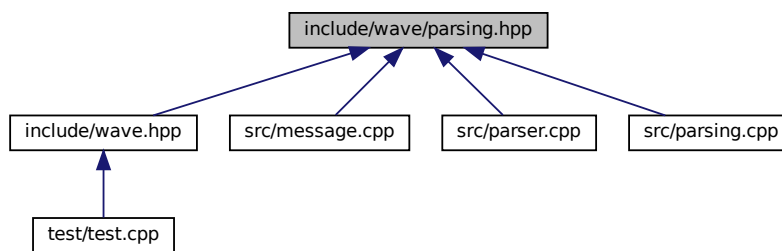
4.7 include/wave/parsing.hpp File Reference

Header file for declaring text parsing functions.

```
#include <string>
#include <ghoti.io/shared_string_view.hpp>
Include dependency graph for parsing.hpp:
```



This graph shows which files directly or indirectly include this file:



Functions

- bool [Ghoti::Wave::isListField](#) (const Ghoti::shared_string_view &name)
Identify a field name as accepting a list-based set of values.
- bool [Ghoti::Wave::isTokenChar](#) (uint8_t c)
Identify valid Token characters.
- bool [Ghoti::Wave::isWhitespaceChar](#) (uint8_t c)
Identify valid whitespace characters.
- bool [Ghoti::Wave::isVisibleChar](#) (uint8_t c)
Identify valid Visible (printing) characters.
- bool [Ghoti::Wave::isObsoleteTextChar](#) (uint8_t c)
Identify valid obs-text characters.
- bool [Ghoti::Wave::isFieldNameChar](#) (uint8_t c)
Identify valid field-name characters.
- bool [Ghoti::Wave::isQuotedChar](#) (uint8_t c)
Identify valid quoted characters.
- bool [Ghoti::Wave::isFieldContentChar](#) (uint8_t c)

Identify valid field-content characters.

- bool [Ghoti::Wave::isCRLFChar](#) (uint8_t c)

Identify CRLF characters.

- bool [Ghoti::Wave::fieldValueQuotesNeeded](#) (const Ghoti::shared_string_view &str)

Indicate whether or not the string contains a character which makes it necessary to wrap the string in double quotes.

- std::string [Ghoti::Wave::fieldValueEscape](#) (const Ghoti::shared_string_view &str)

Escape a field value.

4.7.1 Detailed Description

Header file for declaring text parsing functions.

4.7.2 Function Documentation

4.7.2.1 fieldValueEscape()

```
std::string Ghoti::Wave::fieldValueEscape (
    const Ghoti::shared_string_view & str )
```

Escape a field value.

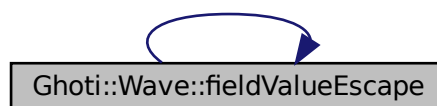
Parameters

<i>str</i>	The field value to be escaped.
------------	--------------------------------

Returns

The escaped field value.

Here is the call graph for this function:



4.7.2.2 fieldValueQuotesNeeded()

```
bool Ghoti::Wave::fieldValueQuotesNeeded (
    const Ghoti::shared_string_view & str )
```

Indicate whether or not the string contains a character which makes it necessary to wrap the string in double quotes.

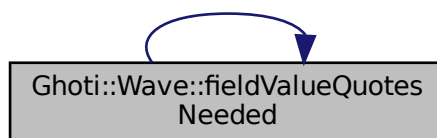
Parameters

<i>str</i>	The string in question.
------------	-------------------------

Returns

Whether or not the string needs to be wrapped in double quotes.

Here is the call graph for this function:



4.7.2.3 isCRLFChar()

```
bool Ghoti::Wave::isCRLFChar (
    uint8_t c )
```

Identify CRLF characters.

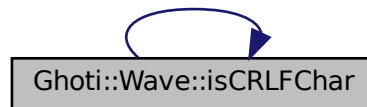
Parameters

<i>c</i>	The character to test.
----------	------------------------

Returns

Whether or not the character is a valid CRLF character.

Here is the call graph for this function:

**4.7.2.4 isFieldContentChar()**

```
bool Ghoti::Wave::isFieldContentChar (
    uint8_t c )
```

Identify valid field-content characters.

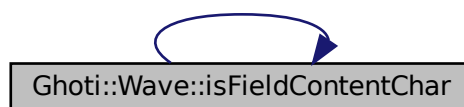
Parameters

<code>c</code>	The character to test.
----------------	------------------------

Returns

Whether or not the character is a valid field-content character.

Here is the call graph for this function:



4.7.2.5 isFieldNameChar()

```
bool Ghoti::Wave::isFieldNameChar (
    uint8_t c )
```

Identify valid field-name characters.

Parameters

<i>c</i>	The character to test.
----------	------------------------

Returns

Whether or not the character is a valid field-name character.

Here is the call graph for this function:



4.7.2.6 isListField()

```
bool Ghoti::Wave::isListField (
    const Ghoti::shared_string_view & name )
```

Identify a field name as accepting a list-based set of values.

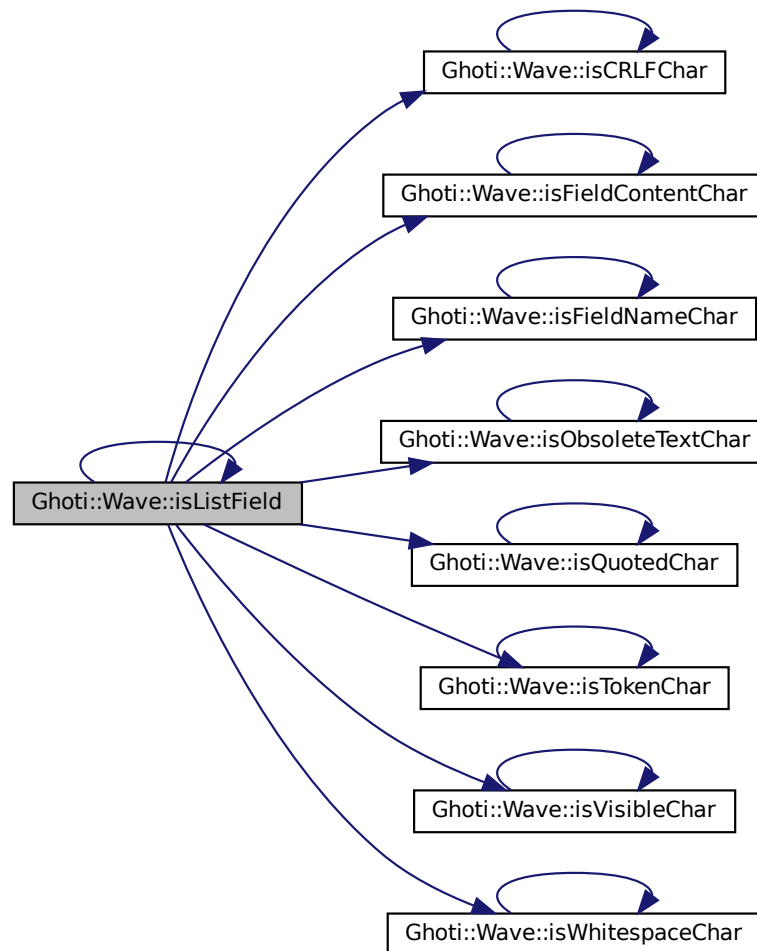
Parameters

<i>name</i>	The field name. The field name must be uppercase.
-------------	---

Returns

Whether or not the field name is recognized as a list-based field.

Here is the call graph for this function:

**4.7.2.7 isObsoleteTextChar()**

```
bool Ghoti::Wave::isObsoleteTextChar (
    uint8_t c )
```

Identify valid obs-text characters.

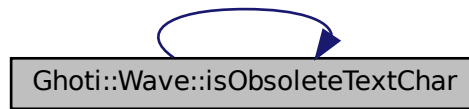
Parameters

<code>c</code>	The character to test.
----------------	------------------------

Returns

Whether or not the character is a valid obs-text character.

Here is the call graph for this function:

**4.7.2.8 isQuotedChar()**

```
bool Ghoti::Wave::isQuotedChar (
    uint8_t c )
```

Identify valid quoted characters.

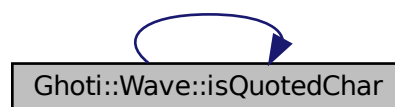
Parameters

<code>c</code>	The character to test.
----------------	------------------------

Returns

Whether or not the character is a valid quoted character.

Here is the call graph for this function:



4.7.2.9 isTokenChar()

```
bool Ghoti::Wave::isTokenChar (
    uint8_t c )
```

Identify valid Token characters.

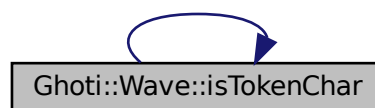
Parameters

<i>c</i>	The character to test.
----------	------------------------

Returns

Whether or not the character is a valid token character.

Here is the call graph for this function:



4.7.2.10 isVisibleChar()

```
bool Ghoti::Wave::isVisibleChar (
    uint8_t c )
```

Identify valid Visible (printing) characters.

Parameters

<i>c</i>	The character to test.
----------	------------------------

Returns

Whether or not the character is a valid visible character.

Here is the call graph for this function:

**4.7.2.11 isWhitespaceChar()**

```
bool Ghoti::Wave::isWhitespaceChar (
    uint8_t c )
```

Identify valid whitespace characters.

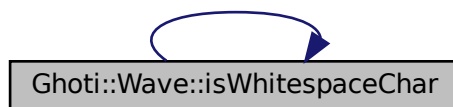
Parameters

<code>c</code>	The character to test.
----------------	------------------------

Returns

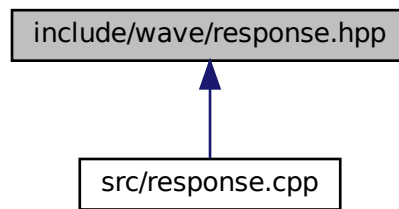
Whether or not the character is a valid visible character.

Here is the call graph for this function:

**4.8 include/wave/response.hpp File Reference**

Header file for declaring the Response class.

This graph shows which files directly or indirectly include this file:



4.8.1 Detailed Description

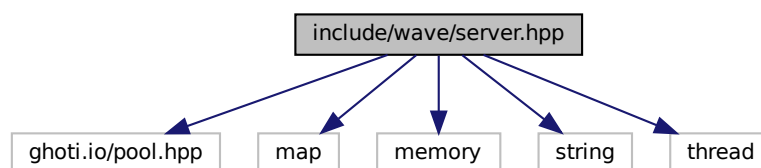
Header file for declaring the Response class.

4.9 include/wave/server.hpp File Reference

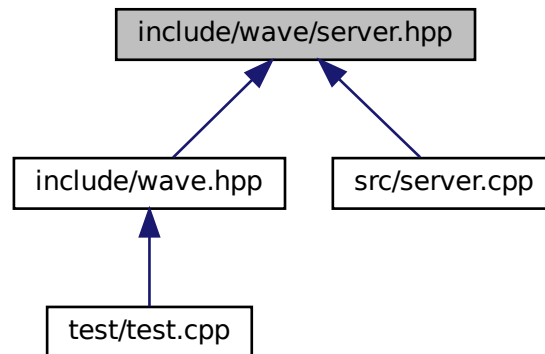
Header file for declaring the Server class.

```
#include <ghoti.io/pool.hpp>
#include <map>
#include <memory>
#include <string>
#include <thread>
```

Include dependency graph for server.hpp:



This graph shows which files directly or indirectly include this file:



Classes

- class [Ghoti::Wave::Server](#)
The base [Server](#) class.

4.9.1 Detailed Description

Header file for declaring the Server class.

4.10 include/wave/serverSession.hpp File Reference

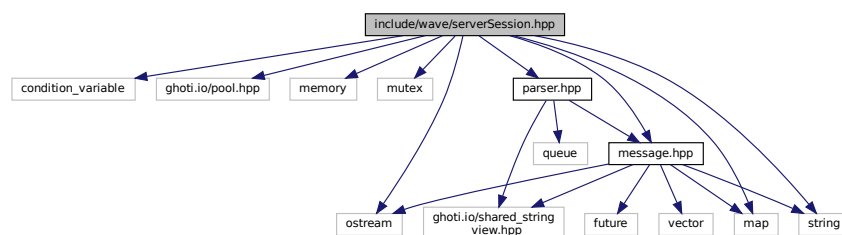
Header file for declaring the ServerSession class.

```

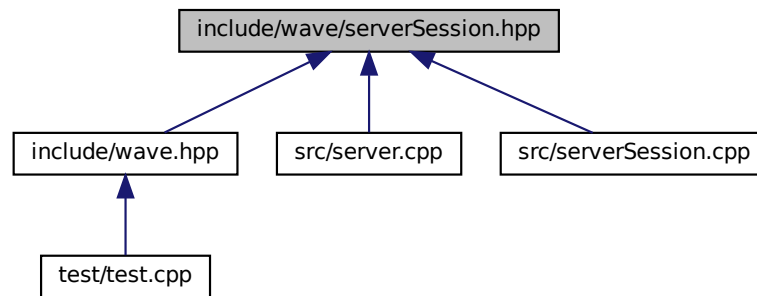
#include <condition_variable>
#include <ghoti.io/pool.hpp>
#include <memory>
#include <mutex>
#include <ostream>
#include "parser.hpp"
#include <map>
#include "message.hpp"
#include <string>

```

Include dependency graph for serverSession.hpp:



This graph shows which files directly or indirectly include this file:



Classes

- class [Ghoti::Wave::ServerSession](#)
Represents a persistent connection with a client.

4.10.1 Detailed Description

Header file for declaring the `ServerSession` class.

4.11 src/client.cpp File Reference

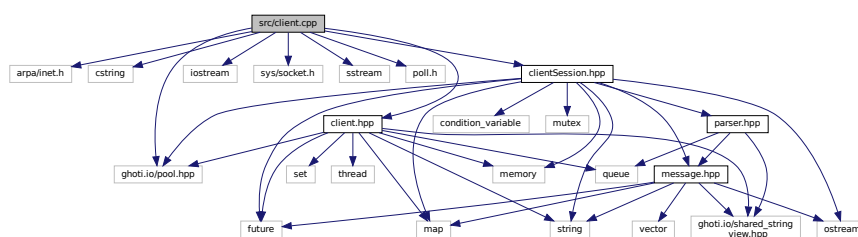
Define the [Ghoti::Wave::Client](#) class.

```

#include <arpa/inet.h>
#include <cstring>
#include <ghoti.io/pool.hpp>
#include <iostream>
#include <sys/socket.h>
#include <sstream>
#include <poll.h>
#include "client.hpp"
#include "clientSession.hpp"

```

Include dependency graph for `client.cpp`:



4.11.1 Detailed Description

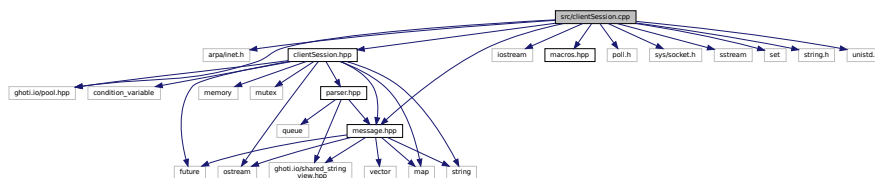
Define the [Ghoti::Wave::Client](#) class.

4.12 src/clientSession.cpp File Reference

Define the [Ghoti::Wave::ClientSession](#) class.

```
#include <arpa/inet.h>
#include "clientSession.hpp"
#include <ghoti.io/pool.hpp>
#include <iostream>
#include "macros.hpp"
#include "message.hpp"
#include <poll.h>
#include <sys/socket.h>
#include <sstream>
#include <set>
#include <string.h>
#include <unistd.h>
```

Include dependency graph for clientSession.cpp:



4.12.1 Detailed Description

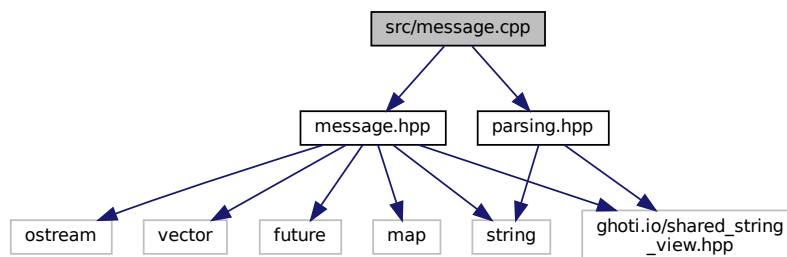
Define the [Ghoti::Wave::ClientSession](#) class.

4.13 src/message.cpp File Reference

Define the [Ghoti::Wave::Message](#) class.

```
#include "message.hpp"
#include "parsing.hpp"
```

Include dependency graph for message.cpp:



4.13.1 Detailed Description

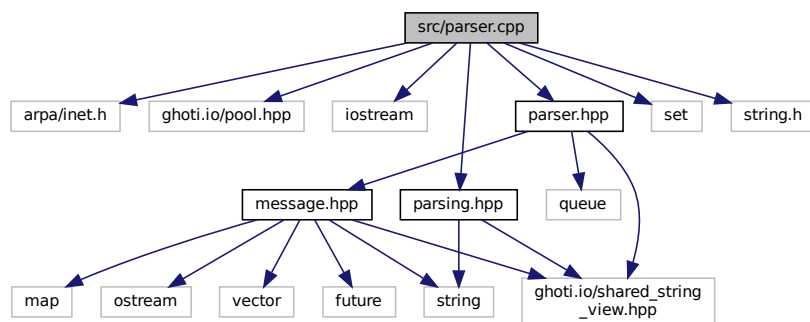
Define the [Ghoti::Wave::Message](#) class.

4.14 src/parser.cpp File Reference

Define the [Ghoti::Wave::Parser](#) class.

```
#include <arpa/inet.h>
#include <ghoti.io/pool.hpp>
#include <iostream>
#include "parser.hpp"
#include "parsing.hpp"
#include <set>
#include <string.h>
```

Include dependency graph for parser.cpp:



Macros

- **#define SET_NEW_HEADER**
- **#define SET_MINOR_STATE**(nextState)
- **#define SET_MAJOR_STATE**(nextMajorState, nextMinorState)
- **#define READ_WHITESPACE_OPTIONAL**(nextState)
- **#define READ_WHITESPACE_REQUIRED**(nextState, statusCode, errorMessage)
- **#define READ_CRLF_OPTIONAL**(nextState)
- **#define READ_CRLF_REQUIRED**(nextState, statusCode, errorMessage)
- **#define REQUEST_STATUS_ERROR** (this->type == REQUEST ? "Error reading request line." : "Error reading status line.")

4.14.1 Detailed Description

Define the [Ghoti::Wave::Parser](#) class.

4.14.2 Macro Definition Documentation

4.14.2.1 READ_CRLF_OPTIONAL

```
#define READ_CRLF_OPTIONAL(  
    nextState )
```

Value:

```
while (this->cursor < input_length) { \
    if ((this->input[this->cursor] != '\r') && (this->input[this->cursor] != '\n')) { \
        SET_MINOR_STATE(nextState); \
        break; \
    } \
    ++this->cursor; \
}
```

4.14.2.2 READ_CRLF_REQUIRED

```
#define READ_CRLF_REQUIRED(  
    nextState,  
    statusCode,  
    errorMessage )
```

Value:

```
size_t len = this->cursor - this->minorStart; \
while ((this->cursor < input_length) && (len < 2)) { \
    if (((len == 0) && !((this->input[this->cursor] == '\r') || (this->input[this->cursor] == '\n'))) \
        || ((len == 1) && (this->input[this->cursor] != '\n'))) { \
        this->currentMessage->setStatusCode(statusCode).setErrorMessage(errorMessage); \
    } \
    if (!this->currentMessage->hasError() && (this->input[this->cursor] == '\n')) { \
        SET_MINOR_STATE(nextState); \
        ++this->cursor; \
        break; \
    } \
    ++this->cursor; \
    ++len; \
}
```

4.14.2.3 READ_WHITESPACE_OPTIONAL

```
#define READ_WHITESPACE_OPTIONAL(  
    nextState )
```

Value:

```
while ((this->cursor < input_length) && ( \
    isspace(this->input[this->cursor]) \
    && (this->input[this->cursor] != '\n') \
    && (this->input[this->cursor] != '\r'))) { \
    ++this->cursor; \
} \
if ((this->cursor < input_length) && ( \
    !isspace(this->input[this->cursor]) \
    || (this->input[this->cursor] == '\n') \
    || (this->input[this->cursor] == '\r'))) { \
    SET_MINOR_STATE(nextState); \
}
```


4.14.2.4 READ_WHITESPACE_REQUIRED

```
#define READ_WHITESPACE_REQUIRED(
    nextState,
    statusCode,
    errorMessage )
```

Value:

```
while ((this->cursor < input_length) && ( \
    isspace(this->input[this->cursor]) \
    && (this->input[this->cursor] != '\n') \
    && (this->input[this->cursor] != '\r'))) { \
    ++this->cursor; \
} \
if (this->cursor < input_length) { \
    if (this->cursor > this->minorStart) { \
        SET_MINOR_STATE(nextState); \
    } \
    else { \
        this->currentMessage->setStatusCode(statusCode).setErrorMessage(errorMessage); \
    } \
}
```

4.14.2.5 SET_MAJOR_STATE

```
#define SET_MAJOR_STATE(
    nextMajorState,
    nextMinorState )
```

Value:

```
this->readStateMajor = nextMajorState; \
this->majorStart = this->cursor; \
SET_MINOR_STATE(nextMinorState);
```

4.14.2.6 SET_MINOR_STATE

```
#define SET_MINOR_STATE(
    nextState )
```

Value:

```
this->readStateMinor = nextState; \
this->minorStart = this->cursor;
```

4.14.2.7 SET_NEW_HEADER

```
#define SET_NEW_HEADER
```

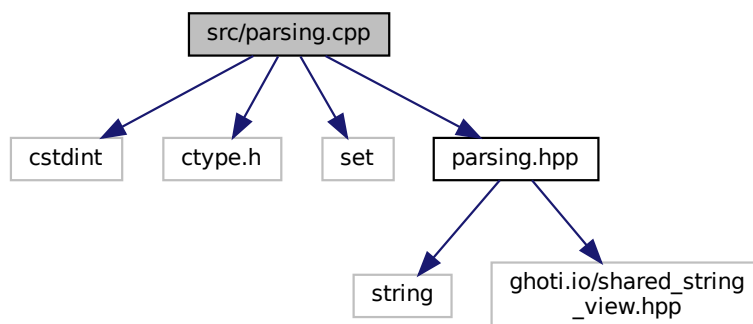
Value:

```
this->readStateMajor = NEW_HEADER; \
this->readStateMinor = this->type == REQUEST \
    ? BEGINNING_OF_REQUEST_LINE \
    : BEGINNING_OF_STATUS_LINE; \
this->majorStart = this->cursor; \
this->minorStart = this->cursor; \
this->contentLength = 0;
```

4.15 src/parsing.cpp File Reference

Define the text parsing functions.

```
#include <cstdint>
#include <ctype.h>
#include <set>
#include "parsing.hpp"
Include dependency graph for parsing.cpp:
```



Functions

- bool **Ghoti::Wave::isListField** (const shared_string_view &name)
- bool **Ghoti::Wave::isTokenChar** (uint8_t c)
Identify valid Token characters.
- bool **Ghoti::Wave::isWhitespaceChar** (uint8_t c)
Identify valid whitespace characters.
- bool **Ghoti::Wave::isVisibleChar** (uint8_t c)
Identify valid Visible (printing) characters.
- bool **Ghoti::Wave::isObsoleteTextChar** (uint8_t c)
Identify valid obs-text characters.
- bool **Ghoti::Wave::isFieldNameChar** (uint8_t c)
Identify valid field-name characters.
- bool **Ghoti::Wave::isQuotedChar** (uint8_t c)
Identify valid quoted characters.
- bool **Ghoti::Wave::isFieldContentChar** (uint8_t c)
Identify valid field-content characters.
- bool **Ghoti::Wave::isCRLFChar** (uint8_t c)
Identify CRLF characters.
- bool **Ghoti::Wave::fieldValueQuotesNeeded** (const shared_string_view &str)
- string **Ghoti::Wave::fieldValueEscape** (const shared_string_view &str)

4.15.1 Detailed Description

Define the text parsing functions.

4.15.2 Function Documentation

4.15.2.1 isCRLFChar()

```
bool Ghoti::Wave::isCRLFChar (
    uint8_t c )
```

Identify CRLF characters.

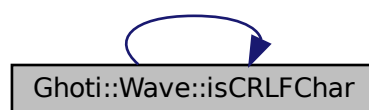
Parameters

<i>c</i>	The character to test.
----------	------------------------

Returns

Whether or not the character is a valid CRLF character.

Here is the call graph for this function:



4.15.2.2 isFieldContentChar()

```
bool Ghoti::Wave::isFieldContentChar (
    uint8_t c )
```

Identify valid field-content characters.

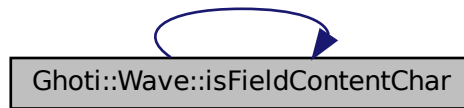
Parameters

<i>c</i>	The character to test.
----------	------------------------

Returns

Whether or not the character is a valid field-content character.

Here is the call graph for this function:



4.15.2.3 isFieldNameChar()

```
bool Ghoti::Wave::isFieldNameChar (
    uint8_t c )
```

Identify valid field-name characters.

Parameters

<code>c</code>	The character to test.
----------------	------------------------

Returns

Whether or not the character is a valid field-name character.

Here is the call graph for this function:



4.15.2.4 isObsoleteTextChar()

```
bool Ghoti::Wave::isObsoleteTextChar (
    uint8_t c )
```

Identify valid obs-text characters.

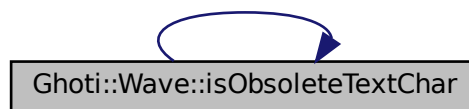
Parameters

<i>c</i>	The character to test.
----------	------------------------

Returns

Whether or not the character is a valid obs-text character.

Here is the call graph for this function:

**4.15.2.5 isQuotedChar()**

```
bool Ghoti::Wave::isQuotedChar (
    uint8_t c )
```

Identify valid quoted characters.

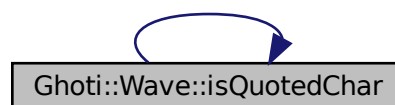
Parameters

<i>c</i>	The character to test.
----------	------------------------

Returns

Whether or not the character is a valid quoted character.

Here is the call graph for this function:



4.15.2.6 isTokenChar()

```
bool Ghoti::Wave::isTokenChar (
    uint8_t c )
```

Identify valid Token characters.

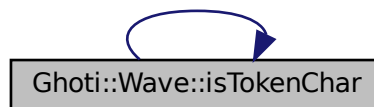
Parameters

<code>c</code>	The character to test.
----------------	------------------------

Returns

Whether or not the character is a valid token character.

Here is the call graph for this function:



4.15.2.7 isVisibleChar()

```
bool Ghoti::Wave::isVisibleChar (
    uint8_t c )
```

Identify valid Visible (printing) characters.

Parameters

<code>c</code>	The character to test.
----------------	------------------------

Returns

Whether or not the character is a valid visible character.

Here is the call graph for this function:

**4.15.2.8 isWhitespaceChar()**

```
bool Ghoti::Wave::isWhitespaceChar (
    uint8_t c )
```

Identify valid whitespace characters.

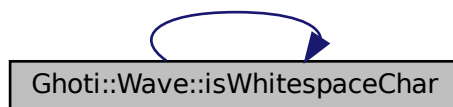
Parameters

<code>c</code>	The character to test.
----------------	------------------------

Returns

Whether or not the character is a valid visible character.

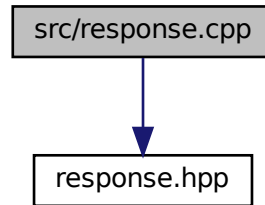
Here is the call graph for this function:

**4.16 src/response.cpp File Reference**

Define the `Ghoti::Wave::Response` class.

```
#include "response.hpp"
```

Include dependency graph for response.cpp:



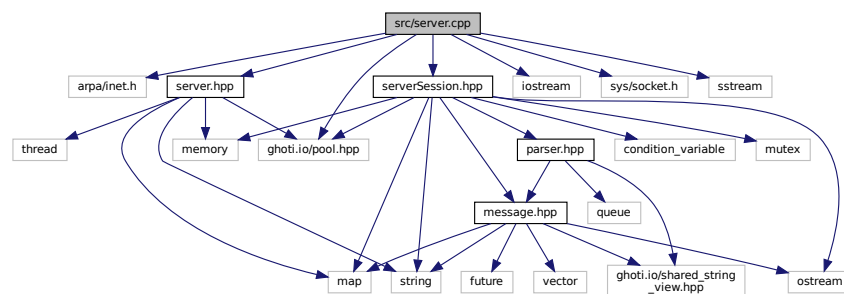
4.16.1 Detailed Description

Define the `Ghoti::Wave::Response` class.

4.17 src/server.cpp File Reference

Define the `Ghoti::Wave::Server` class.

```
#include <arpa/inet.h>
#include <ghoti.io/pool.hpp>
#include <iostream>
#include <sys/socket.h>
#include <sstream>
#include "server.hpp"
#include "serverSession.hpp"
Include dependency graph for server.cpp:
```



4.17.1 Detailed Description

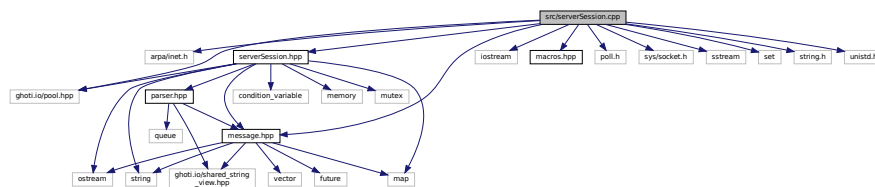
Define the `Ghoti::Wave::Server` class.

4.18 src/serverSession.cpp File Reference

Define the [Ghoti::Wave::ServerSession](#) class.

```
#include <arpa/inet.h>
#include <ghoti.io/pool.hpp>
#include <iostream>
#include "macros.hpp"
#include "message.hpp"
#include <poll.h>
#include <sys/socket.h>
#include <sstream>
#include <set>
#include "serverSession.hpp"
#include <string.h>
#include <unistd.h>
```

Include dependency graph for serverSession.cpp:



4.18.1 Detailed Description

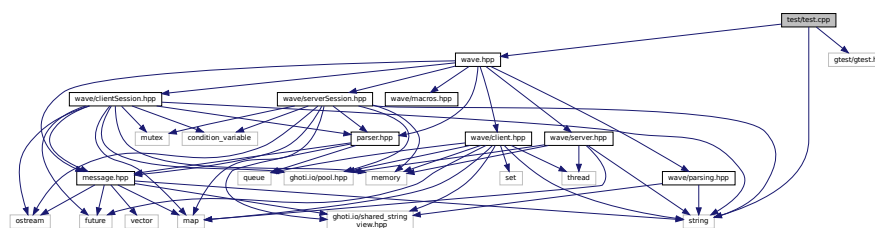
Define the [Ghoti::Wave::ServerSession](#) class.

4.19 test/test.cpp File Reference

Test the general Wave server behavior.

```
#include <string>
#include <gtest/gtest.h>
#include "wave.hpp"
```

Include dependency graph for test.cpp:



Functions

- **TEST** ([Server](#), Startup)
- **int main** (int argc, char **argv)

Variables

- [Server](#) **s** {}
- uint16_t **serverPort** = 0
- constexpr auto **quantum** {10ms}

4.19.1 Detailed Description

Test the general Wave server behavior.

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