aiohttp Documentation

Release 3.7.4

aiohttp contributors

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CONTENTS

Asynchronous HTTP Client/Server for *asyncio* and Python.

Current version is 3.7.4.

CHAPTER

ONE

KEY FEATURES

- Supports both *Client* and *HTTP Server*.
- Supports both *Server WebSockets* and *Client WebSockets* out-of-the-box without the Callback Hell.
- Web-server has *Middlewares*, *Signals* and plugable routing.

CHAPTER

TWO

LIBRARY INSTALLATION

```
$ pip install aiohttp
```

You may want to install *optional* *cchardet* library as faster replacement for *chardet*:

```
$ pip install cchardet
```

For speeding up DNS resolving by client API you may install *aiodns* as well. This option is highly recommended:

```
$ pip install aiodns
```

2.1 Installing speedups altogether

The following will get you `aiohttp` along with *chardet*, *aiodns* and `brotlipy` in one bundle. No need to type separate commands anymore!

```
$ pip install aiohttp[speedups]
```

CHAPTER

THREE

GETTING STARTED

3.1 Client example

```
import aiohttp
import asyncio

async def main():

    async with aiohttp.ClientSession() as session:
        async with session.get('http://python.org') as response:

            print("Status:", response.status)
            print("Content-type:", response.headers['content-type'])

            html = await response.text()
            print("Body:", html[:15], "...")

loop = asyncio.get_event_loop()
loop.run_until_complete(main())
```

This prints:

```
Status: 200
Content-type: text/html; charset=utf-8
Body: <!doctype html> ...
```

Coming from *requests* ? Read *why we need so many lines*.

3.2 Server example:

```
from aiohttp import web

async def handle(request):
    name = request.match_info.get('name', "Anonymous")
    text = "Hello, " + name
    return web.Response(text=text)

app = web.Application()
app.add_routes([web.get('/', handle),
                web.get('/{name}', handle)])
```

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```
if __name__ == '__main__':
    web.run_app(app)
```

For more information please visit *Client* and *Server* pages.

CHAPTER

FOUR

WHAT'S NEW IN AIOHTTP 3?

Go to *What's new in aiohttp 3.0* page for aiohttp 3.0 major release changes.

CHAPTER

FIVE

TUTORIAL

Polls tutorial

CHAPTER

SIX

SOURCE CODE

The project is hosted on GitHub

Please feel free to file an issue on the bug tracker if you have found a bug or have some suggestion in order to improve the library.

The library uses Azure Pipelines for Continuous Integration.

CHAPTER

SEVEN

DEPENDENCIES

- Python 3.6+
- *async_timeout*
- *attrs*
- *chardet*
- *multidict*
- *yarl*
- *Optional* *cchardet* as faster replacement for *chardet*.

  Install it explicitly via:

```
$ pip install cchardet
```

- *Optional* *aiodns* for fast DNS resolving. The library is highly recommended.

```
$ pip install aiodns
```

CHAPTER

EIGHT

COMMUNICATION CHANNELS

aio-libs discourse group: https://aio-libs.discourse.group

Feel free to post your questions and ideas here.

gitter chat https://gitter.im/aio-libs/Lobby

We support Stack Overflow. Please add *aiohttp* tag to your question there.

CHAPTER

NINE

CONTRIBUTING

Please read the *instructions for contributors* before making a Pull Request.

CHAPTER

TEN

AUTHORS AND LICENSE

The `aiohttp` package is written mostly by Nikolay Kim and Andrew Svetlov.

It's *Apache 2* licensed and freely available.

Feel free to improve this package and send a pull request to GitHub.

CHAPTER

ELEVEN

POLICY FOR BACKWARD INCOMPATIBLE CHANGES

aiohttp keeps backward compatibility.

After deprecating some *Public API* (method, class, function argument, etc.) the library guaranties the usage of *deprecated API* is still allowed at least for a year and half after publishing new release with deprecation.

All deprecations are reflected in documentation and raises `DeprecationWarning`.

Sometimes we are forced to break the own rule for sake of very strong reason. Most likely the reason is a critical bug which cannot be solved without major API change, but we are working hard for keeping these changes as rare as possible.

CHAPTER

TWELVE

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12.1 Client

The page contains all information about aiohttp Client API:

12.1.1 Client Quickstart

Eager to get started? This page gives a good introduction in how to get started with aiohttp client API.

First, make sure that aiohttp is *installed* and *up-to-date*

Let's get started with some simple examples.

Make a Request

Begin by importing the aiohttp module, and asyncio:

```
import aiohttp
import asyncio
```

Now, let's try to get a web-page. For example let's query `http://httpbin.org/get`:

```
async def main():
    async with aiohttp.ClientSession() as session:
        async with session.get('http://httpbin.org/get') as resp:
            print(resp.status)
            print(await resp.text())


loop = asyncio.get_event_loop()
loop.run_until_complete(main())
```

Now, we have a *ClientSession* called `session` and a *ClientResponse* object called `resp`. We can get all the information we need from the response. The mandatory parameter of *ClientSession.get()* coroutine is an HTTP *url* (`str` or class:*yarl.URL* instance).

In order to make an HTTP POST request use *ClientSession.post()* coroutine:

```
session.post('http://httpbin.org/post', data=b'data')
```

Other HTTP methods are available as well:

```
session.put('http://httpbin.org/put', data=b'data')
session.delete('http://httpbin.org/delete')
session.head('http://httpbin.org/get')
session.options('http://httpbin.org/get')
session.patch('http://httpbin.org/patch', data=b'data')
```

Note: Don't create a session per request. Most likely you need a session per application which performs all requests altogether.

More complex cases may require a session per site, e.g. one for Github and other one for Facebook APIs. Anyway making a session for every request is a **very bad** idea.

A session contains a connection pool inside. Connection reusage and keep-alives (both are on by default) may speed up total performance.

A session context manager usage is not mandatory but `await session.close()` method should be called in this case, e.g.:

```
session = aiohttp.ClientSession()
async with session.get('...'):
    # ...
await session.close()
```

Passing Parameters In URLs

You often want to send some sort of data in the URL's query string. If you were constructing the URL by hand, this data would be given as key/value pairs in the URL after a question mark, e.g. `httpbin.org/get?key=val`. Requests allows you to provide these arguments as a `dict`, using the `params` keyword argument. As an example, if you wanted to pass `key1=value1` and `key2=value2` to `httpbin.org/get`, you would use the following code:

```
params = {'key1': 'value1', 'key2': 'value2'}
async with session.get('http://httpbin.org/get',
                       params=params) as resp:
    expect = 'http://httpbin.org/get?key1=value1&key2=value2'
    assert str(resp.url) == expect
```

You can see that the URL has been correctly encoded by printing the URL.

For sending data with multiple values for the same key `MultiDict` may be used; the library support nested lists (`{'key': ['value1', 'value2']}`) alternative as well.

It is also possible to pass a list of 2 item tuples as parameters, in that case you can specify multiple values for each key:

```
params = [('key', 'value1'), ('key', 'value2')]
async with session.get('http://httpbin.org/get',
                       params=params) as r:
    expect = 'http://httpbin.org/get?key=value2&key=value1'
    assert str(r.url) == expect
```

You can also pass `str` content as param, but beware – content is not encoded by library. Note that + is not encoded:

```
async with session.get('http://httpbin.org/get',
                       params='key=value+1') as r:
        assert str(r.url) == 'http://httpbin.org/get?key=value+1'
```

Note: *aiohttp* internally performs URL canonicalization before sending request.

Canonicalization encodes *host* part by *IDNA* codec and applies *requoting* to *path* and *query* parts.

For example `URL('http://example.com//%30?a=%31')` is converted to `URL('http://example.com/%D0%BF%D1%83%D1%82%D1%8C/0?a=1')`.

Sometimes canonicalization is not desirable if server accepts exact representation and does not requote URL itself.

To disable canonicalization use `encoded=True` parameter for URL construction:

```
await session.get(
    URL('http://example.com/%30', encoded=True))
```

Warning: Passing *params* overrides `encoded=True`, never use both options.

Response Content and Status Code

We can read the content of the server's response and its status code. Consider the GitHub time-line again:

```
async with session.get('https://api.github.com/events') as resp:
    print(resp.status)
    print(await resp.text())
```

prints out something like:

```
200
'[{"created_at":"2015-06-12T14:06:22Z","public":true,"actor":{...
```

`aiohttp` automatically decodes the content from the server. You can specify custom encoding for the *text()* method:

```
await resp.text(encoding='windows-1251')
```

Binary Response Content

You can also access the response body as bytes, for non-text requests:

```
print(await resp.read())
```

```
b'[{"created_at":"2015-06-12T14:06:22Z","public":true,"actor":{...
```

The `gzip` and `deflate` transfer-encodings are automatically decoded for you.

You can enable `brotli` transfer-encodings support, just install brotlipy.

JSON Request

Any of session's request methods like *request()*, *ClientSession.get()*, ClientSesssion.post() etc. accept *json* parameter:

```
async with aiohttp.ClientSession() as session:
    async with session.post(url, json={'test': 'object'})
```

By default session uses python's standard json module for serialization. But it is possible to use different serializer. *ClientSession* accepts json_serialize parameter:

```
import ujson

async with aiohttp.ClientSession(
        json_serialize=ujson.dumps) as session:
    await session.post(url, json={'test': 'object'})
```

Note: ujson library is faster than standard json but slightly incompatible.

JSON Response Content

There's also a built-in JSON decoder, in case you're dealing with JSON data:

```
async with session.get('https://api.github.com/events') as resp:
    print(await resp.json())
```

In case that JSON decoding fails, *json()* will raise an exception. It is possible to specify custom encoding and decoder functions for the *json()* call.

Note: The methods above reads the whole response body into memory. If you are planning on reading lots of data, consider using the streaming response method documented below.

Streaming Response Content

While methods *read()*, *json()* and *text()* are very convenient you should use them carefully. All these methods load the whole response in memory. For example if you want to download several gigabyte sized files, these methods will load all the data in memory. Instead you can use the *content* attribute. It is an instance of the *aiohttp.StreamReader* class. The gzip and deflate transfer-encodings are automatically decoded for you:

```
async with session.get('https://api.github.com/events') as resp:
    await resp.content.read(10)
```

In general, however, you should use a pattern like this to save what is being streamed to a file:

```
with open(filename, 'wb') as fd:
    while True:
        chunk = await resp.content.read(chunk_size)
        if not chunk:
            break
        fd.write(chunk)
```

It is not possible to use *read()*, *json()* and *text()* after explicit reading from *content*.

More complicated POST requests

Typically, you want to send some form-encoded data – much like an HTML form. To do this, simply pass a dictionary to the *data* argument. Your dictionary of data will automatically be form-encoded when the request is made:

```
payload = {'key1': 'value1', 'key2': 'value2'}
async with session.post('http://httpbin.org/post',
                        data=payload) as resp:
    print(await resp.text())
```

```
{
  ...
  "form": {
    "key2": "value2",
    "key1": "value1"
  },
  ...
}
```

If you want to send data that is not form-encoded you can do it by passing a `bytes` instead of a `dict`. This data will be posted directly and content-type set to 'application/octet-stream' by default:

```
async with session.post(url, data=b'\x00Binary-data\x00') as resp:
    ...
```

If you want to send JSON data:

```
async with session.post(url, json={'example': 'test'}) as resp:
    ...
```

To send text with appropriate content-type just use `data` argument:

```
async with session.post(url, data='') as resp:
    ...
```

POST a Multipart-Encoded File

To upload Multipart-encoded files:

```
url = 'http://httpbin.org/post'
files = {'file': open('report.xls', 'rb')}

await session.post(url, data=files)
```

You can set the `filename` and `content_type` explicitly:

```
url = 'http://httpbin.org/post'
data = FormData()
data.add_field('file',
               open('report.xls', 'rb'),
               filename='report.xls',
               content_type='application/vnd.ms-excel')

await session.post(url, data=data)
```

If you pass a file object as data parameter, aiohttp will stream it to the server automatically. Check `StreamReader` for supported format information.

See also:

Working with Multipart

Streaming uploads

aiohttp supports multiple types of streaming uploads, which allows you to send large files without reading them into memory.

As a simple case, simply provide a file-like object for your body:

```
with open('massive-body', 'rb') as f:
   await session.post('http://httpbin.org/post', data=f)
```

Or you can use *asynchronous generator*:

```
async def file_sender(file_name=None):
    async with aiofiles.open(file_name, 'rb') as f:
        chunk = await f.read(64*1024)
        while chunk:
            yield chunk
            chunk = await f.read(64*1024)

# Then you can use file_sender as a data provider:

async with session.post('http://httpbin.org/post',
                        data=file_sender(file_name='huge_file')) as resp:
    print(await resp.text())
```

Because the *content* attribute is a *StreamReader* (provides async iterator protocol), you can chain get and post requests together:

```
resp = await session.get('http://python.org')
await session.post('http://httpbin.org/post',
                   data=resp.content)
```

Note: Python 3.5 has no native support for asynchronous generators, use `async_generator` library as workaround.

Deprecated since version 3.1: `aiohttp` still supports `aiohttp.streamer` decorator but this approach is deprecated in favor of *asynchronous generators* as shown above.

WebSockets

aiohttp works with client websockets out-of-the-box.

You have to use the *aiohttp.ClientSession.ws_connect()* coroutine for client websocket connection. It accepts a *url* as a first parameter and returns *ClientWebSocketResponse*, with that object you can communicate with websocket server using response's methods:

```
async with session.ws_connect('http://example.org/ws') as ws:
    async for msg in ws:
        if msg.type == aiohttp.WSMsgType.TEXT:
            if msg.data == 'close cmd':
                await ws.close()
                break
            else:
                await ws.send_str(msg.data + '/answer')
        elif msg.type == aiohttp.WSMsgType.ERROR:
            break
```

You **must** use the only websocket task for both reading (e.g. `await ws.receive()` or `async for msg in ws:`) and writing but may have multiple writer tasks which can only send data asynchronously (by `await ws.send_str('data')` for example).

Timeouts

Timeout settings are stored in *ClientTimeout* data structure.

By default *aiohttp* uses a *total* 300 seconds (5min) timeout, it means that the whole operation should finish in 5 minutes.

The value could be overridden by *timeout* parameter for the session (specified in seconds):

```
timeout = aiohttp.ClientTimeout(total=60)
async with aiohttp.ClientSession(timeout=timeout) as session:
    ...
```

Timeout could be overridden for a request like *ClientSession.get()*:

```
async with session.get(url, timeout=timeout) as resp:
    ...
```

Supported *ClientTimeout* fields are:

`total`

The maximal number of seconds for the whole operation including connection establishment, request sending and response reading.

`connect`

The maximal number of seconds for connection establishment of a new connection or for waiting for a free connection from a pool if pool connection limits are exceeded.

`sock_connect`

The maximal number of seconds for connecting to a peer for a new connection, not given from a pool.

`sock_read`

The maximal number of seconds allowed for period between reading a new data portion from a peer.

All fields are floats, `None` or `0` disables a particular timeout check, see the *`ClientTimeout`* reference for defaults and additional details.

Thus the default timeout is:

```
aiohttp.ClientTimeout(total=5*60, connect=None,
                      sock_connect=None, sock_read=None)
```

Note: *aiohttp* **ceils** timeout if the value is equal or greater than 5 seconds. The timeout expires at the next integer second greater than `current_time + timeout`.

The ceiling is done for the sake of optimization, when many concurrent tasks are scheduled to wake-up at the almost same but different absolute times. It leads to very many event loop wakeups, which kills performance.

The optimization shifts absolute wakeup times by scheduling them to exactly the same time as other neighbors, the loop wakes up once-per-second for timeout expiration.

Smaller timeouts are not rounded to help testing; in the real life network timeouts usually greater than tens of seconds.

12.1.2 Advanced Client Usage

Client Session

`ClientSession` is the heart and the main entry point for all client API operations.

Create the session first, use the instance for performing HTTP requests and initiating WebSocket connections.

The session contains a cookie storage and connection pool, thus cookies and connections are shared between HTTP requests sent by the same session.

Custom Request Headers

If you need to add HTTP headers to a request, pass them in a `dict` to the *headers* parameter.

For example, if you want to specify the content-type directly:

```
url = 'http://example.com/image'
payload = b'GIF89a\x01\x00\x01\x00\x00\xff\x00,\x00\x00'
          b'\x00\x00\x01\x00\x01\x00\x00\x02\x00;'
headers = {'content-type': 'image/gif'}

await session.post(url,
                   data=payload,
                   headers=headers)
```

You also can set default headers for all session requests:

```
headers={"Authorization": "Basic bG9naW46cGFzcw=="}
async with aiohttp.ClientSession(headers=headers) as session:
    async with session.get("http://httpbin.org/headers") as r:
        json_body = await r.json()
        assert json_body['headers']['Authorization'] == \
            'Basic bG9naW46cGFzcw=='
```

Typical use case is sending JSON body. You can specify content type directly as shown above, but it is more convenient to use special keyword `json`:

```
await session.post(url, json={'example': 'text'})
```

For *text/plain*

```
await session.post(url, data=', !')
```

Custom Cookies

To send your own cookies to the server, you can use the *cookies* parameter of *ClientSession* constructor:

```
url = 'http://httpbin.org/cookies'
cookies = {'cookies_are': 'working'}
async with ClientSession(cookies=cookies) as session:
    async with session.get(url) as resp:
        assert await resp.json() == {
           "cookies": {"cookies_are": "working"}}
```

Note: `httpbin.org/cookies` endpoint returns request cookies in JSON-encoded body. To access session cookies see *ClientSession.cookie_jar*.

ClientSession may be used for sharing cookies between multiple requests:

```
async with aiohttp.ClientSession() as session:
    await session.get(
        'http://httpbin.org/cookies/set?my_cookie=my_value')
    filtered = session.cookie_jar.filter_cookies(
        'http://httpbin.org')
    assert filtered['my_cookie'].value == 'my_value'
    async with session.get('http://httpbin.org/cookies') as r:
        json_body = await r.json()
        assert json_body['cookies']['my_cookie'] == 'my_value'
```

Response Headers and Cookies

We can view the server's response *ClientResponse.headers* using a `CIMultiDictProxy`:

```
assert resp.headers == {
    'ACCESS-CONTROL-ALLOW-ORIGIN': '*',
    'CONTENT-TYPE': 'application/json',
    'DATE': 'Tue, 15 Jul 2014 16:49:51 GMT',
    'SERVER': 'gunicorn/18.0',
    'CONTENT-LENGTH': '331',
    'CONNECTION': 'keep-alive'}
```

The dictionary is special, though: it's made just for HTTP headers. According to RFC 7230, HTTP Header names are case-insensitive. It also supports multiple values for the same key as HTTP protocol does.

So, we can access the headers using any capitalization we want:

```
assert resp.headers['Content-Type'] == 'application/json'

assert resp.headers.get('content-type') == 'application/json'
```

All headers are converted from binary data using UTF-8 with `surrogateescape` option. That works fine on most cases but sometimes unconverted data is needed if a server uses nonstandard encoding. While these headers are malformed from **RFC 7230** perspective they may be retrieved by using *`ClientResponse.raw_headers`* property:

```
assert resp.raw_headers == (
    (b'SERVER', b'nginx'),
    (b'DATE', b'Sat, 09 Jan 2016 20:28:40 GMT'),
    (b'CONTENT-TYPE', b'text/html; charset=utf-8'),
    (b'CONTENT-LENGTH', b'12150'),
    (b'CONNECTION', b'keep-alive'))
```

If a response contains some *HTTP Cookies*, you can quickly access them:

```
url = 'http://example.com/some/cookie/setting/url'
async with session.get(url) as resp:
    print(resp.cookies['example_cookie_name'])
```

Note: Response cookies contain only values, that were in `Set-Cookie` headers of the **last** request in redirection chain. To gather cookies between all redirection requests please use *aiohttp.ClientSession* object.

Redirection History

If a request was redirected, it is possible to view previous responses using the *`history`* attribute:

```
resp = await session.get('http://example.com/some/redirect/')
assert resp.status == 200
assert resp.url = URL('http://example.com/some/other/url/')
assert len(resp.history) == 1
assert resp.history[0].status == 301
assert resp.history[0].url = URL(
    'http://example.com/some/redirect/')
```

If no redirects occurred or `allow_redirects` is set to `False`, history will be an empty sequence.

Cookie Jar

Cookie Safety

By default *`ClientSession`* uses strict version of *`aiohttp.CookieJar`*. **RFC 2109** explicitly forbids cookie accepting from URLs with IP address instead of DNS name (e.g. `http://127.0.0.1:80/cookie`).

It's good but sometimes for testing we need to enable support for such cookies. It should be done by passing `unsafe=True` to *`aiohttp.CookieJar`* constructor:

```
jar = aiohttp.CookieJar(unsafe=True)
session = aiohttp.ClientSession(cookie_jar=jar)
```

Cookie Quoting Routine

The client uses the `SimpleCookie` quoting routines conform to the **RFC 2109**, which in turn references the character definitions from **RFC 2068**. They provide a two-way quoting algorithm where any non-text character is translated into a 4 character sequence: a forward-slash followed by the three-digit octal equivalent of the character. Any `\` or `"` is quoted with a preceding `\` slash. Because of the way browsers really handle cookies (as opposed to what the RFC says) we also encode `,` and `;`.

Some backend systems does not support quoted cookies. You can skip this quotation routine by passing `quote_cookie=False` to the *CookieJar* constructor:

```
jar = aiohttp.CookieJar(quote_cookie=False)
session = aiohttp.ClientSession(cookie_jar=jar)
```

Dummy Cookie Jar

Sometimes cookie processing is not desirable. For this purpose it's possible to pass *aiohttp.DummyCookieJar* instance into client session:

```
jar = aiohttp.DummyCookieJar()
session = aiohttp.ClientSession(cookie_jar=jar)
```

Uploading pre-compressed data

To upload data that is already compressed before passing it to aiohttp, call the request function with the used compression algorithm name (usually `deflate` or `gzip`) as the value of the `Content-Encoding` header:

```
async def my_coroutine(session, headers, my_data):
    data = zlib.compress(my_data)
    headers = {'Content-Encoding': 'deflate'}
    async with session.post('http://httpbin.org/post',
                            data=data,
                            headers=headers)
        pass
```

Disabling content type validation for JSON responses

The standard explicitly restricts JSON `Content-Type` HTTP header to `application/json` or any extended form, e.g. `application/vnd.custom-type+json`. Unfortunately, some servers send a wrong type, like `text/html`.

This can be worked around in two ways:

1. Pass the expected type explicitly (in this case checking will be strict, without the extended form support, so `custom/xxx+type` won't be accepted):

   `await resp.json(content_type='custom/type').`

2. Disable the check entirely:

   `await resp.json(content_type=None).`

Client Tracing

The execution flow of a specific request can be followed attaching listeners coroutines to the signals provided by the *TraceConfig* instance, this instance will be used as a parameter for the *ClientSession* constructor having as a result a client that triggers the different signals supported by the *TraceConfig*. By default any instance of *ClientSession* class comes with the signals ability disabled. The following snippet shows how the start and the end signals of a request flow can be followed:

```
async def on_request_start(
        session, trace_config_ctx, params):
    print("Starting request")

async def on_request_end(session, trace_config_ctx, params):
    print("Ending request")

trace_config = aiohttp.TraceConfig()
trace_config.on_request_start.append(on_request_start)
trace_config.on_request_end.append(on_request_end)
async with aiohttp.ClientSession(
        trace_configs=[trace_config]) as client:
    client.get('http://example.com/some/redirect/')
```

The `trace_configs` is a list that can contain instances of *TraceConfig* class that allow run the signals handlers coming from different *TraceConfig* instances. The following example shows how two different *TraceConfig* that have a different nature are installed to perform their job in each signal handle:

```
from mylib.traceconfig import AuditRequest
from mylib.traceconfig import XRay

async with aiohttp.ClientSession(
        trace_configs=[AuditRequest(), XRay()]) as client:
    client.get('http://example.com/some/redirect/')
```

All signals take as a parameters first, the *ClientSession* instance used by the specific request related to that signals and second, a `SimpleNamespace` instance called `trace_config_ctx`. The `trace_config_ctx` object can be used to share the state through to the different signals that belong to the same request and to the same *TraceConfig* class, perhaps:

```
async def on_request_start(
        session, trace_config_ctx, params):
    trace_config_ctx.start = asyncio.get_event_loop().time()

async def on_request_end(session, trace_config_ctx, params):
    elapsed = asyncio.get_event_loop().time() - trace_config_ctx.start
    print("Request took {}".format(elapsed))
```

The `trace_config_ctx` param is by default a `SimpleNampespace` that is initialized at the beginning of the request flow. However, the factory used to create this object can be overwritten using the `trace_config_ctx_factory` constructor param of the *TraceConfig* class.

The `trace_request_ctx` param can given at the beginning of the request execution, accepted by all of the HTTP verbs, and will be passed as a keyword argument for the `trace_config_ctx_factory` factory. This param is useful to pass data that is only available at request time, perhaps:

```
async def on_request_start(
        session, trace_config_ctx, params):
    print(trace_config_ctx.trace_request_ctx)
```

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```
session.get('http://example.com/some/redirect/',
            trace_request_ctx={'foo': 'bar'})
```

See also:

Tracing Reference section for more information about the different signals supported.

Connectors

To tweak or change *transport* layer of requests you can pass a custom *connector* to `ClientSession` and family. For example:

```
conn = aiohttp.TCPConnector()
session = aiohttp.ClientSession(connector=conn)
```

Note: By default *session* object takes the ownership of the connector, among other things closing the connections once the *session* is closed. If you are keen on share the same *connector* through different *session* instances you must give the *connector_owner* parameter as **False** for each *session* instance.

See also:

Connectors section for more information about different connector types and configuration options.

Limiting connection pool size

To limit amount of simultaneously opened connections you can pass *limit* parameter to *connector*:

```
conn = aiohttp.TCPConnector(limit=30)
```

The example limits total amount of parallel connections to *30*.

The default is *100*.

If you explicitly want not to have limits, pass *0*. For example:

```
conn = aiohttp.TCPConnector(limit=0)
```

To limit amount of simultaneously opened connection to the same endpoint (`(host, port, is_ssl)` triple) you can pass *limit_per_host* parameter to *connector*:

```
conn = aiohttp.TCPConnector(limit_per_host=30)
```

The example limits amount of parallel connections to the same to *30*.

The default is *0* (no limit on per host bases).

Tuning the DNS cache

By default *TCPConnector* comes with the DNS cache table enabled, and resolutions will be cached by default for *10* seconds. This behavior can be changed either to change of the TTL for a resolution, as can be seen in the following example:

```
conn = aiohttp.TCPConnector(ttl_dns_cache=300)
```

or disabling the use of the DNS cache table, meaning that all requests will end up making a DNS resolution, as the following example shows:

```
conn = aiohttp.TCPConnector(use_dns_cache=False)
```

Resolving using custom nameservers

In order to specify the nameservers to when resolving the hostnames, *aiodns* is required:

```
from aiohttp.resolver import AsyncResolver

resolver = AsyncResolver(nameservers=["8.8.8.8", "8.8.4.4"])
conn = aiohttp.TCPConnector(resolver=resolver)
```

Unix domain sockets

If your HTTP server uses UNIX domain sockets you can use *UnixConnector*:

```
conn = aiohttp.UnixConnector(path='/path/to/socket')
session = aiohttp.ClientSession(connector=conn)
```

Named pipes in Windows

If your HTTP server uses Named pipes you can use `NamedPipeConnector`:

```
conn = aiohttp.NamedPipeConnector(path=r'\\.\pipe\<name-of-pipe>')
session = aiohttp.ClientSession(connector=conn)
```

It will only work with the ProactorEventLoop

SSL control for TCP sockets

By default *aiohttp* uses strict checks for HTTPS protocol. Certification checks can be relaxed by setting *ssl* to `False`:

```
r = await session.get('https://example.com', ssl=False)
```

If you need to setup custom ssl parameters (use own certification files for example) you can create a `ssl.SSLContext` instance and pass it into the proper *ClientSession* method:

```
sslcontext = ssl.create_default_context(
   cafile='/path/to/ca-bundle.crt')
r = await session.get('https://example.com', ssl=sslcontext)
```

If you need to verify *self-signed* certificates, you can do the same thing as the previous example, but add another call to `ssl.SSLContext.load_cert_chain()` with the key pair:

```
sslcontext = ssl.create_default_context(
   cafile='/path/to/ca-bundle.crt')
sslcontext.load_cert_chain('/path/to/client/public/device.pem',
                           '/path/to/client/private/device.key')
r = await session.get('https://example.com', ssl=sslcontext)
```

There is explicit errors when ssl verification fails

aiohttp.ClientConnectorSSLError:

```
try:
    await session.get('https://expired.badssl.com/')
except aiohttp.ClientConnectorSSLError as e:
    assert isinstance(e, ssl.SSLError)
```

aiohttp.ClientConnectorCertificateError:

```
try:
    await session.get('https://wrong.host.badssl.com/')
except aiohttp.ClientConnectorCertificateError as e:
    assert isinstance(e, ssl.CertificateError)
```

If you need to skip both ssl related errors

aiohttp.ClientSSLError:

```
try:
    await session.get('https://expired.badssl.com/')
except aiohttp.ClientSSLError as e:
    assert isinstance(e, ssl.SSLError)

try:
    await session.get('https://wrong.host.badssl.com/')
except aiohttp.ClientSSLError as e:
    assert isinstance(e, ssl.CertificateError)
```

You may also verify certificates via *SHA256* fingerprint:

```
# Attempt to connect to https://www.python.org
# with a pin to a bogus certificate:
bad_fp = b'0'*64
exc = None
try:
    r = await session.get('https://www.python.org',
                          ssl=aiohttp.Fingerprint(bad_fp))
except aiohttp.FingerprintMismatch as e:
    exc = e
assert exc is not None
assert exc.expected == bad_fp

# www.python.org cert's actual fingerprint
assert exc.got == b'...'
```

Note that this is the fingerprint of the DER-encoded certificate. If you have the certificate in PEM format, you can convert it to DER with e.g:

```
openssl x509 -in crt.pem -inform PEM -outform DER > crt.der
```

Note: Tip: to convert from a hexadecimal digest to a binary byte-string, you can use `binascii.unhexlify()`.

ssl parameter could be passed to *TCPConnector* as default, the value from *ClientSession.get()* and others override default.

Proxy support

aiohttp supports plain HTTP proxies and HTTP proxies that can be upgraded to HTTPS via the HTTP CONNECT method. aiohttp does not support proxies that must be connected to via `https://`. To connect, use the *proxy* parameter:

```
async with aiohttp.ClientSession() as session:
    async with session.get("http://python.org",
                           proxy="http://proxy.com") as resp:
        print(resp.status)
```

It also supports proxy authorization:

```
async with aiohttp.ClientSession() as session:
    proxy_auth = aiohttp.BasicAuth('user', 'pass')
    async with session.get("http://python.org",
                           proxy="http://proxy.com",
                           proxy_auth=proxy_auth) as resp:
        print(resp.status)
```

Authentication credentials can be passed in proxy URL:

```
session.get("http://python.org",
            proxy="http://user:pass@some.proxy.com")
```

Contrary to the `requests` library, it won't read environment variables by default. But you can do so by passing `trust_env=True` into *aiohttp.ClientSession* constructor for extracting proxy configuration from *HTTP_PROXY* or *HTTPS_PROXY environment variables* (both are case insensitive):

```
async with aiohttp.ClientSession(trust_env=True) as session:
    async with session.get("http://python.org") as resp:
        print(resp.status)
```

Proxy credentials are given from `~/.netrc` file if present (see *aiohttp.ClientSession* for more details).

Graceful Shutdown

When *ClientSession* closes at the end of an `async with` block (or through a direct *ClientSession.close()* call), the underlying connection remains open due to asyncio internal details. In practice, the underlying connection will close after a short while. However, if the event loop is stopped before the underlying connection is closed, a `ResourceWarning: unclosed transport` warning is emitted (when warnings are enabled).

To avoid this situation, a small delay must be added before closing the event loop to allow any open underlying connections to close.

For a *ClientSession* without SSL, a simple zero-sleep (`await asyncio.sleep(0)`) will suffice:

```
async def read_website():
    async with aiohttp.ClientSession() as session:
        async with session.get('http://example.org/') as resp:
            await resp.read()

loop = asyncio.get_event_loop()
loop.run_until_complete(read_website())
# Zero-sleep to allow underlying connections to close
loop.run_until_complete(asyncio.sleep(0))
loop.close()
```

For a *ClientSession* with SSL, the application must wait a short duration before closing:

```
...
# Wait 250 ms for the underlying SSL connections to close
loop.run_until_complete(asyncio.sleep(0.250))
loop.close()
```

Note that the appropriate amount of time to wait will vary from application to application.

All if this will eventually become obsolete when the asyncio internals are changed so that aiohttp itself can wait on the underlying connection to close. Please follow issue #1925 for the progress on this.

12.1.3 Client Reference

Client Session

Client session is the recommended interface for making HTTP requests.

Session encapsulates a *connection pool* (*connector* instance) and supports keepalives by default. Unless you are connecting to a large, unknown number of different servers over the lifetime of your application, it is suggested you use a single session for the lifetime of your application to benefit from connection pooling.

Usage example:

```
import aiohttp
import asyncio

async def fetch(client):
    async with client.get('http://python.org') as resp:
        assert resp.status == 200
        return await resp.text()

async def main():
    async with aiohttp.ClientSession() as client:
        html = await fetch(client)
        print(html)

loop = asyncio.get_event_loop()
loop.run_until_complete(main())
```

The client session supports the context manager protocol for self closing.

class aiohttp.**ClientSession**(*, *connector=None*, *loop=None*, *cookies=None*, *headers=None*, *skip_auto_headers=None*, *auth=None*, *json_serialize=json.dumps*, *version=aiohttp.HttpVersion11*, *cookie_jar=None*, *read_timeout=None*, *conn_timeout=None*, *timeout=sentinel*, *raise_for_status=False*, *connector_owner=True*, *auto_decompress=True*, *read_bufsize=2 ** 16*, *requote_redirect_url=False*, *trust_env=False*, *trace_configs=None*)

The class for creating client sessions and making requests.

Parameters

- **connector** (aiohttp.BaseConnector) – BaseConnector sub-class instance to support connection pooling.
- **loop** – event loop used for processing HTTP requests.

  If *loop* is None the constructor borrows it from *connector* if specified.

  asyncio.get_event_loop() is used for getting default event loop otherwise.

  Deprecated since version 2.0.
- **cookies** (*dict*) – Cookies to send with the request (optional)
- **headers** – HTTP Headers to send with every request (optional).

  May be either *iterable of key-value pairs* or Mapping (e.g. dict, CIMultiDict).
- **skip_auto_headers** – set of headers for which autogeneration should be skipped.

  aiohttp autogenerates headers like User-Agent or Content-Type if these headers are not explicitly passed. Using skip_auto_headers parameter allows to skip that generation. Note that Content-Length autogeneration can't be skipped.

  Iterable of str or istr (optional)
- **auth** (aiohttp.BasicAuth) – an object that represents HTTP Basic Authorization (optional)
- **version** – supported HTTP version, HTTP 1.1 by default.
- **cookie_jar** – Cookie Jar, AbstractCookieJar instance.

  By default every session instance has own private cookie jar for automatic cookies processing but user may redefine this behavior by providing own jar implementation.

  One example is not processing cookies at all when working in proxy mode.

  If no cookie processing is needed, a *aiohttp.DummyCookieJar* instance can be provided.
- **json_serialize** (*callable*) – Json *serializer* callable.

  By default json.dumps() function.
- **raise_for_status** (*bool*) – Automatically call *ClientResponse.raise_for_status()* for each response, False by default.

  This parameter can be overridden when you making a request, e.g.:

```
client_session = aiohttp.ClientSession(raise_for_status=True)
resp = await client_session.get(url, raise_for_status=False)
async with resp:
    assert resp.status == 200
```

Set the parameter to `True` if you need `raise_for_status` for most of cases but override `raise_for_status` for those requests where you need to handle responses with status 400 or higher.

- **`timeout`** –

  a *`ClientTimeout`* settings structure, 300 seconds (5min) total timeout by default.

  New in version 3.3.

- **`read_timeout`** (*`float`*) – Request operations timeout. `read_timeout` is cumulative for all request operations (request, redirects, responses, data consuming). By default, the read timeout is 5*60 seconds. Use `None` or `0` to disable timeout checks.

  Deprecated since version 3.3: Use `timeout` parameter instead.

- **`conn_timeout`** (*`float`*) – timeout for connection establishing (optional). Values `0` or `None` mean no timeout.

  Deprecated since version 3.3: Use `timeout` parameter instead.

- **`connector_owner`** (*`bool`*) – Close connector instance on session closing.

  Setting the parameter to `False` allows to share connection pool between sessions without sharing session state: cookies etc.

- **`auto_decompress`** (*`bool`*) –

  Automatically decompress response body, `True` by default

  New in version 2.3.

- **`read_bufsize`** (*`int`*) –

  Size of the read buffer (*`ClientResponse.content`*). 64 KiB by default.

  New in version 3.7.

- **`trust_env`** (*`bool`*) – Get proxies information from *HTTP_PROXY* / *HTTPS_PROXY* environment variables if the parameter is `True` (`False` by default).

  Get proxy credentials from `~/.netrc` file if present.

  See also:

  `.netrc` documentation: https://www.gnu.org/software/inetutils/manual/html_node/The-_002enetrc-file.html

  New in version 2.3.

  Changed in version 3.0: Added support for `~/.netrc` file.

- **`requote_redirect_url`** (*`bool`*) –

  Apply *URL requoting* for redirection URLs if automatic redirection is enabled (`True` by default).

  New in version 3.5.

- **`trace_configs`** – A list of *`TraceConfig`* instances used for client tracing. `None` (default) is used for request tracing disabling. See *Tracing Reference* for more information.

`closed`

`True` if the session has been closed, `False` otherwise.

A read-only property.

connector
aiohttp.BaseConnector derived instance used for the session.

A read-only property.

cookie_jar
The session cookies, `AbstractCookieJar` instance.

Gives access to cookie jar's content and modifiers.

A read-only property.

requote_redirect_url
aiohttp re quote's redirect urls by default, but some servers require exact url from location header. To disable *re-quote* system set *requote_redirect_url* attribute to `False`.

New in version 2.1.

Note: This parameter affects all subsequent requests.

Deprecated since version 3.5: The attribute modification is deprecated.

loop
A loop instance used for session creation.

A read-only property.

Deprecated since version 3.5.

timeout
Default client timeouts, *ClientTimeout* instance. The value can be tuned by passing *timeout* parameter to *ClientSession* constructor.

New in version 3.7.

headers
HTTP Headers that sent with every request

May be either *iterable of key-value pairs* or `Mapping` (e.g. `dict`, `CIMultiDict`).

New in version 3.7.

skip_auto_headers
Set of headers for which autogeneration skipped.

`frozenset` of `str` or `istr` (optional)

New in version 3.7.

auth
An object that represents HTTP Basic Authorization.

BasicAuth (optional)

New in version 3.7.

json_serialize
Json serializer callable.

By default `json.dumps()` function.

New in version 3.7.

connector_owner
Should connector be closed on session closing

`bool` (optional)

New in version 3.7.

raise_for_status
Should *`ClientResponse.raise_for_status()`* be called for each response

Either `bool` or `callable`

New in version 3.7.

auto_decompress
Should the body response be automatically decompressed

`bool` default is `True`

New in version 3.7.

trust_env
Should get proxies information from HTTP_PROXY / HTTPS_PROXY environment variables or ~/.netrc file if present

`bool` default is `False`

New in version 3.7.

trace_config
A list of *`TraceConfig`* instances used for client tracing. `None` (default) is used for request tracing disabling. See *Tracing Reference* for more information.

New in version 3.7.

coroutine async-with request(*method*, *url*, *, *params=None*, *data=None*, *json=None*, *cookies=None*, *headers=None*, *skip_auto_headers=None*, *auth=None*, *allow_redirects=True*, *max_redirects=10*, *compress=None*, *chunked=None*, *expect100=False*, *raise_for_status=None*, *read_until_eof=True*, *read_bufsize=None*, *proxy=None*, *proxy_auth=None*, *timeout=sentinel*, *ssl=None*, *verify_ssl=None*, *fingerprint=None*, *ssl_context=None*, *proxy_headers=None*)
Performs an asynchronous HTTP request. Returns a response object.

Parameters

- **method** (*str*) – HTTP method
- **url** – Request URL, `str` or `URL`.
- **params** – Mapping, iterable of tuple of *key*/*value* pairs or string to be sent as parameters in the query string of the new request. Ignored for subsequent redirected requests (optional)

  Allowed values are:

  – `collections.abc.Mapping` e.g. `dict`, `aiohttp.MultiDict` or `aiohttp.MultiDictProxy`

  – `collections.abc.Iterable` e.g. `tuple` or `list`

  – `str` with preferably url-encoded content (**Warning:** content will not be encoded by *aiohttp*)

- **data** – The data to send in the body of the request. This can be a *FormData* object or anything that can be passed into *FormData*, e.g. a dictionary, bytes, or file-like object. (optional)
- **json** – Any json compatible python object (optional). *json* and *data* parameters could not be used at the same time.
- **cookies** (*dict*) –

  HTTP Cookies to send with the request (optional)

  Global session cookies and the explicitly set cookies will be merged when sending the request.

  New in version 3.5.
- **headers** (*dict*) – HTTP Headers to send with the request (optional)
- **skip_auto_headers** – set of headers for which autogeneration should be skipped.

  aiohttp autogenerates headers like `User-Agent` or `Content-Type` if these headers are not explicitly passed. Using `skip_auto_headers` parameter allows to skip that generation.

  Iterable of `str` or `istr` (optional)
- **auth** (`aiohttp.BasicAuth`) – an object that represents HTTP Basic Authorization (optional)
- **allow_redirects** (*bool*) – If set to `False`, do not follow redirects. `True` by default (optional).
- **max_redirects** (*int*) – Maximum number of redirects to follow. `10` by default.
- **compress** (*bool*) – Set to `True` if request has to be compressed with deflate encoding. If *compress* can not be combined with a *Content-Encoding* and *Content-Length* headers. `None` by default (optional).
- **chunked** (*int*) – Enable chunked transfer encoding. It is up to the developer to decide how to chunk data streams. If chunking is enabled, aiohttp encodes the provided chunks in the "Transfer-encoding: chunked" format. If *chunked* is set, then the *Transfer-encoding* and *content-length* headers are disallowed. `None` by default (optional).
- **expect100** (*bool*) – Expect 100-continue response from server. `False` by default (optional).
- **raise_for_status** (*bool*) –

  Automatically call *ClientResponse.raise_for_status()* for response if set to `True`. If set to `None` value from `ClientSession` will be used. `None` by default (optional).

  New in version 3.4.
- **read_until_eof** (*bool*) – Read response until EOF if response does not have Content-Length header. `True` by default (optional).
- **read_bufsize** (*int*) –

  Size of the read buffer (*ClientResponse.content*). `None` by default, it means that the session global value is used.

  New in version 3.7.
- **proxy** – Proxy URL, `str` or `URL` (optional)

- **proxy_auth** (aiohttp.BasicAuth) – an object that represents proxy HTTP Basic Authorization (optional)
- **timeout** (*int*) – override the session's timeout.

  Changed in version 3.3: The parameter is *ClientTimeout* instance, float is still supported for sake of backward compatibility.

  If float is passed it is a *total* timeout (in seconds).
- **ssl** –

  SSL validation mode. None for default SSL check (ssl.create_default_context() is used), False for skip SSL certificate validation, *aiohttp.Fingerprint* for fingerprint validation, ssl.SSLContext for custom SSL certificate validation.

  Supersedes *verify_ssl*, *ssl_context* and *fingerprint* parameters.

  New in version 3.0.
- **verify_ssl** (*bool*) – Perform SSL certificate validation for *HTTPS* requests (enabled by default). May be disabled to skip validation for sites with invalid certificates.

  New in version 2.3.

  Deprecated since version 3.0: Use ssl=False
- **fingerprint** (*bytes*) – Pass the SHA256 digest of the expected certificate in DER format to verify that the certificate the server presents matches. Useful for certificate pinning.

  Warning: use of MD5 or SHA1 digests is insecure and removed.

  New in version 2.3.

  Deprecated since version 3.0: Use ssl=aiohttp.Fingerprint(digest)
- **ssl_context** (*ssl.SSLContext*) – ssl context used for processing *HTTPS* requests (optional).

  ssl_context may be used for configuring certification authority channel, supported SSL options etc.

  New in version 2.3.

  Deprecated since version 3.0: Use ssl=ssl_context
- **proxy_headers** (*abc.Mapping*) – HTTP headers to send to the proxy if the parameter proxy has been provided.

  New in version 2.3.
- **trace_request_ctx** – Object used to give as a kw param for each new *TraceConfig* object instantiated, used to give information to the tracers that is only available at request time.

  New in version 3.0.

Return ClientResponse a *client response* object.

coroutine async-with get(*url*, *, *allow_redirects=True*, ***kwargs*)

Perform a GET request.

In order to modify inner request parameters, provide *kwargs*.

Parameters

- **url** – Request URL, str or URL
- **allow_redirects** (*bool*) – If set to False, do not follow redirects. True by default (optional).

Return ClientResponse a *client response* object.

coroutine async-with post(*url*, *, *data=None*, ***kwargs*)
Perform a POST request.

In order to modify inner request parameters, provide *kwargs*.

Parameters

- **url** – Request URL, str or URL
- **data** – Data to send in the body of the request; see request for details (optional)

Return ClientResponse a *client response* object.

coroutine async-with put(*url*, *, *data=None*, ***kwargs*)
Perform a PUT request.

In order to modify inner request parameters, provide *kwargs*.

Parameters

- **url** – Request URL, str or URL
- **data** – Data to send in the body of the request; see request for details (optional)

Return ClientResponse a *client response* object.

coroutine async-with delete(*url*, ***kwargs*)
Perform a DELETE request.

In order to modify inner request parameters, provide *kwargs*.

Parameters **url** – Request URL, str or URL

Return ClientResponse a *client response* object.

coroutine async-with head(*url*, *, *allow_redirects=False*, ***kwargs*)
Perform a HEAD request.

In order to modify inner request parameters, provide *kwargs*.

Parameters

- **url** – Request URL, str or URL
- **allow_redirects** (*bool*) – If set to False, do not follow redirects. False by default (optional).

Return ClientResponse a *client response* object.

coroutine async-with options(*url*, *, *allow_redirects=True*, ***kwargs*)
Perform an OPTIONS request.

In order to modify inner request parameters, provide *kwargs*.

Parameters

- **url** – Request URL, str or URL
- **allow_redirects** (*bool*) – If set to False, do not follow redirects. True by default (optional).

Return ClientResponse a *client response* object.

coroutine async-with patch(*url*, *, *data=None*, ***kwargs*)
Perform a PATCH request.

In order to modify inner request parameters, provide *kwargs*.

Parameters

- **url** – Request URL, str or URL
- **data** – Data to send in the body of the request; see request for details (optional)

Return ClientResponse a *client response* object.

coroutine async-with ws_connect(*url*, *, *method='GET'*, *protocols=()*, *timeout=10.0*, *receive_timeout=None*, *auth=None*, *autoclose=True*, *autoping=True*, *heartbeat=None*, *origin=None*, *headers=None*, *proxy=None*, *proxy_auth=None*, *ssl=None*, *verify_ssl=None*, *fingerprint=None*, *ssl_context=None*, *proxy_headers=None*, *compress=0*, *max_msg_size=4194304*)
Create a websocket connection. Returns a *ClientWebSocketResponse* object.

Parameters

- **url** – Websocket server url, str or URL
- **protocols** (*tuple*) – Websocket protocols
- **timeout** (*float*) – Timeout for websocket to close. 10 seconds by default
- **receive_timeout** (*float*) – Timeout for websocket to receive complete message. None (unlimited) seconds by default
- **auth** (aiohttp.BasicAuth) – an object that represents HTTP Basic Authorization (optional)
- **autoclose** (*bool*) – Automatically close websocket connection on close message from server. If *autoclose* is False then close procedure has to be handled manually. True by default
- **autoping** (*bool*) – automatically send *pong* on *ping* message from server. True by default
- **heartbeat** (*float*) – Send *ping* message every *heartbeat* seconds and wait *pong* response, if *pong* response is not received then close connection. The timer is reset on any data reception.(optional)
- **origin** (*str*) – Origin header to send to server(optional)
- **headers** (*dict*) – HTTP Headers to send with the request (optional)
- **proxy** (*str*) – Proxy URL, str or URL (optional)
- **proxy_auth** (aiohttp.BasicAuth) – an object that represents proxy HTTP Basic Authorization (optional)
- **ssl** –

  SSL validation mode. None for default SSL check (ssl.create_default_context() is used), False for skip SSL certificate validation, *aiohttp.Fingerprint* for fingerprint validation, ssl.SSLContext for custom SSL certificate validation.

  Supersedes *verify_ssl*, *ssl_context* and *fingerprint* parameters.

  New in version 3.0.

- **verify_ssl** (*bool*) – Perform SSL certificate validation for *HTTPS* requests (enabled by default). May be disabled to skip validation for sites with invalid certificates.

  New in version 2.3.

  Deprecated since version 3.0: Use `ssl=False`

- **fingerprint** (*bytes*) – Pass the SHA256 digest of the expected certificate in DER format to verify that the certificate the server presents matches. Useful for certificate pinning.

  Note: use of MD5 or SHA1 digests is insecure and deprecated.

  New in version 2.3.

  Deprecated since version 3.0: Use `ssl=aiohttp.Fingerprint(digest)`

- **ssl_context** (*ssl.SSLContext*) – ssl context used for processing *HTTPS* requests (optional).

  ssl_context may be used for configuring certification authority channel, supported SSL options etc.

  New in version 2.3.

  Deprecated since version 3.0: Use `ssl=ssl_context`

- **proxy_headers** (*dict*) – HTTP headers to send to the proxy if the parameter proxy has been provided.

  New in version 2.3.

- **compress** (*int*) –

  Enable Per-Message Compress Extension support. 0 for disable, 9 to 15 for window bit support. Default value is 0.

  New in version 2.3.

- **max_msg_size** (*int*) –

  maximum size of read websocket message, 4 MB by default. To disable the size limit use `0`.

  New in version 3.3.

- **method** (*str*) –

  HTTP method to establish WebSocket connection, `'GET'` by default.

  New in version 3.5.

coroutine close()
Close underlying connector.

Release all acquired resources.

detach()
Detach connector from session without closing the former.

Session is switched to closed state anyway.

Basic API

While we encourage *ClientSession* usage we also provide simple coroutines for making HTTP requests.

Basic API is good for performing simple HTTP requests without keepaliving, cookies and complex connection stuff like properly configured SSL certification chaining.

async-with aiohttp.**request**(*method*, *url*, ***, *params=None*, *data=None*, *json=None*, *headers=None*, *cookies=None*, *auth=None*, *allow_redirects=True*, *max_redirects=10*, *encoding='utf-8'*, *version=HttpVersion(major=1, minor=1)*, *compress=None*, *chunked=None*, *expect100=False*, *raise_for_status=False*, *read_bufsize=None*, *connector=None*, *loop=None*, *read_until_eof=True*, *timeout=sentinel*)

Asynchronous context manager for performing an asynchronous HTTP request. Returns a *ClientResponse* response object.

Parameters

- **method** (*str*) – HTTP method
- **url** – Requested URL, str or URL
- **params** (*dict*) – Parameters to be sent in the query string of the new request (optional)
- **data** – The data to send in the body of the request. This can be a *FormData* object or anything that can be passed into *FormData*, e.g. a dictionary, bytes, or file-like object. (optional)
- **json** – Any json compatible python object (optional). *json* and *data* parameters could not be used at the same time.
- **headers** (*dict*) – HTTP Headers to send with the request (optional)
- **cookies** (*dict*) – Cookies to send with the request (optional)
- **auth** (aiohttp.BasicAuth) – an object that represents HTTP Basic Authorization (optional)
- **allow_redirects** (*bool*) – If set to False, do not follow redirects. True by default (optional).
- **version** (*aiohttp.protocol.HttpVersion*) – Request HTTP version (optional)
- **compress** (*bool*) – Set to True if request has to be compressed with deflate encoding. False instructs aiohttp to not compress data. None by default (optional).
- **chunked** (*int*) – Enables chunked transfer encoding. None by default (optional).
- **expect100** (*bool*) – Expect 100-continue response from server. False by default (optional).
- **raise_for_status** (*bool*) –

  Automatically call *ClientResponse.raise_for_status()* for response if set to True. If set to None value from ClientSession will be used. None by default (optional).

  New in version 3.4.

- **connector** (aiohttp.BaseConnector) – BaseConnector sub-class instance to support connection pooling.
- **read_until_eof** (*bool*) – Read response until EOF if response does not have Content-Length header. True by default (optional).

- **read_bufsize** (*int*) –

  Size of the read buffer (*ClientResponse.content*). None by default, it means that the session global value is used.

  New in version 3.7.

- **timeout** – a *ClientTimeout* settings structure, 300 seconds (5min) total timeout by default.

- **loop** –

  event loop used for processing HTTP requests. If param is None, asyncio.get_event_loop() is used for getting default event loop.

  Deprecated since version 2.0.

Return ClientResponse a *client response* object.

Usage:

```
import aiohttp

async def fetch():
    async with aiohttp.request('GET',
              'http://python.org/') as resp:
        assert resp.status == 200
        print(await resp.text())
```

Connectors

Connectors are transports for aiohttp client API.

There are standard connectors:

1. *TCPConnector* for regular *TCP sockets* (both *HTTP* and *HTTPS* schemes supported).
2. *UnixConnector* for connecting via UNIX socket (it's used mostly for testing purposes).

All connector classes should be derived from *BaseConnector*.

By default all *connectors* support *keep-alive connections* (behavior is controlled by *force_close* constructor's parameter).

BaseConnector

class aiohttp.**BaseConnector**(*, *keepalive_timeout=15*, *force_close=False*, *limit=100*, *limit_per_host=0*, *enable_cleanup_closed=False*, *loop=None*)

Base class for all connectors.

Parameters

- **keepalive_timeout** (*float*) – timeout for connection reusing after releasing (optional). Values 0. For disabling *keep-alive* feature use force_close=True flag.
- **limit** (*int*) – total number simultaneous connections. If *limit* is None the connector has no limit (default: 100).
- **limit_per_host** (*int*) – limit simultaneous connections to the same endpoint. Endpoints are the same if they are have equal (host, port, is_ssl) triple. If *limit* is 0 the connector has no limit (default: 0).

- **force_close** (*bool*) – close underlying sockets after connection releasing (optional).
- **enable_cleanup_closed** (*bool*) – some SSL servers do not properly complete SSL shutdown process, in that case asyncio leaks ssl connections. If this parameter is set to True, aiohttp additionally aborts underlining transport after 2 seconds. It is off by default.
- **loop** – event loop used for handling connections. If param is `None`, `asyncio.get_event_loop()` is used for getting default event loop.

  Deprecated since version 2.0.

closed
Read-only property, `True` if connector is closed.

force_close
Read-only property, `True` if connector should ultimately close connections on releasing.

limit
The total number for simultaneous connections. If limit is 0 the connector has no limit. The default limit size is 100.

limit_per_host
The limit for simultaneous connections to the same endpoint.

Endpoints are the same if they are have equal `(host, port, is_ssl)` triple.

If *limit_per_host* is `None` the connector has no limit per host.

Read-only property.

coroutine close()
Close all opened connections.

coroutine connect(*request*)
Get a free connection from pool or create new one if connection is absent in the pool.

The call may be paused if *limit* is exhausted until used connections returns to pool.

Parameters **request** (*aiohttp.ClientRequest*) – request object which is connection initiator.

Returns *Connection* object.

coroutine _create_connection(*req*)
Abstract method for actual connection establishing, should be overridden in subclasses.

TCPConnector

class aiohttp.**TCPConnector**(*, *ssl=None*, *verify_ssl=True*, *fingerprint=None*, *use_dns_cache=True*, *ttl_dns_cache=10*, *family=0*, *ssl_context=None*, *local_addr=None*, *resolver=None*, *keepalive_timeout=sentinel*, *force_close=False*, *limit=100*, *limit_per_host=0*, *enable_cleanup_closed=False*, *loop=None*)
Connector for working with *HTTP* and *HTTPS* via *TCP* sockets.

The most common transport. When you don't know what connector type to use, use a *TCPConnector* instance.

TCPConnector inherits from *BaseConnector*.

Constructor accepts all parameters suitable for *BaseConnector* plus several TCP-specific ones:

param ssl

SSL validation mode. `None` for default SSL check (`ssl.create_default_context()` is used), `False` for skip SSL certificate validation, *`aiohttp.Fingerprint`* for fingerprint validation, `ssl.SSLContext` for custom SSL certificate validation.

Supersedes *verify_ssl*, *ssl_context* and *fingerprint* parameters.

New in version 3.0.

Parameters

- **`verify_ssl`** (*`bool`*) – perform SSL certificate validation for *HTTPS* requests (enabled by default). May be disabled to skip validation for sites with invalid certificates.

  Deprecated since version 2.3: Pass *verify_ssl* to `ClientSession.get()` etc.

- **`fingerprint`** (*`bytes`*) – pass the SHA256 digest of the expected certificate in DER format to verify that the certificate the server presents matches. Useful for certificate pinning.

  Note: use of MD5 or SHA1 digests is insecure and deprecated.

  Deprecated since version 2.3: Pass *verify_ssl* to `ClientSession.get()` etc.

- **`use_dns_cache`** (*`bool`*) – use internal cache for DNS lookups, `True` by default.

  Enabling an option *may* speedup connection establishing a bit but may introduce some *side effects* also.

- **`ttl_dns_cache`** (*`int`*) – expire after some seconds the DNS entries, `None` means cached forever. By default 10 seconds (optional).

  In some environments the IP addresses related to a specific HOST can change after a specific time. Use this option to keep the DNS cache updated refreshing each entry after N seconds.

- **`limit`** (*`int`*) – total number simultaneous connections. If *limit* is `None` the connector has no limit (default: 100).

- **`limit_per_host`** (*`int`*) – limit simultaneous connections to the same endpoint. Endpoints are the same if they are have equal `(host, port, is_ssl)` triple. If *limit* is `0` the connector has no limit (default: 0).

- **`resolver`** (*`aiohttp.abc.AbstractResolver`*) – custom resolver instance to use. `aiohttp.DefaultResolver` by default (asynchronous if `aiodns>=1.1` is installed).

  Custom resolvers allow to resolve hostnames differently than the way the host is configured.

  The resolver is `aiohttp.ThreadedResolver` by default, asynchronous version is pretty robust but might fail in very rare cases.

- **`family`** (*`int`*) – TCP socket family, both IPv4 and IPv6 by default. For *IPv4* only use `socket.AF_INET`, for *IPv6* only – `socket.AF_INET6`.

  family is `0` by default, that means both IPv4 and IPv6 are accepted. To specify only concrete version please pass `socket.AF_INET` or `socket.AF_INET6` explicitly.

- **`ssl_context`** (*`ssl.SSLContext`*) – SSL context used for processing *HTTPS* requests (optional).

  ssl_context may be used for configuring certification authority channel, supported SSL options etc.

- **`local_addr`** (*`tuple`*) – tuple of `(local_host, local_port)` used to bind socket locally if specified.

- **force_close** (*bool*) – close underlying sockets after connection releasing (optional).
- **enable_cleanup_closed** (*bool*) – Some ssl servers do not properly complete SSL shutdown process, in that case asyncio leaks SSL connections. If this parameter is set to True, aiohttp additionally aborts underlining transport after 2 seconds. It is off by default.

family
TCP socket family e.g. `socket.AF_INET` or `socket.AF_INET6`

Read-only property.

dns_cache
Use quick lookup in internal *DNS* cache for host names if `True`.

Read-only `bool` property.

cached_hosts
The cache of resolved hosts if *dns_cache* is enabled.

Read-only `types.MappingProxyType` property.

clear_dns_cache(*self*, *host=None*, *port=None*)
Clear internal *DNS* cache.

Remove specific entry if both *host* and *port* are specified, clear all cache otherwise.

UnixConnector

class aiohttp.**UnixConnector**(*path*, ***, *conn_timeout=None*, *keepalive_timeout=30*, *limit=100*, *force_close=False*, *loop=None*)
Unix socket connector.

Use *UnixConnector* for sending *HTTP/HTTPS* requests through *UNIX Sockets* as underlying transport.

UNIX sockets are handy for writing tests and making very fast connections between processes on the same host.

UnixConnector is inherited from *BaseConnector*.

Usage:

```
conn = UnixConnector(path='/path/to/socket')
session = ClientSession(connector=conn)
async with session.get('http://python.org') as resp:
    ...
```

Constructor accepts all parameters suitable for *BaseConnector* plus UNIX-specific one:

Parameters **path** (*str*) – Unix socket path

path
Path to *UNIX socket*, read-only `str` property.

Connection

class aiohttp.**Connection**

Encapsulates single connection in connector object.

End user should never create *Connection* instances manually but get it by *BaseConnector.connect()* coroutine.

closed

bool read-only property, True if connection was closed, released or detached.

loop

Event loop used for connection

Deprecated since version 3.5.

transport

Connection transport

close()

Close connection with forcibly closing underlying socket.

release()

Release connection back to connector.

Underlying socket is not closed, the connection may be reused later if timeout (30 seconds by default) for connection was not expired.

Response object

class aiohttp.**ClientResponse**

Client response returned by ClientSession.request() and family.

User never creates the instance of ClientResponse class but gets it from API calls.

ClientResponse supports async context manager protocol, e.g.:

```
resp = await client_session.get(url)
async with resp:
    assert resp.status == 200
```

After exiting from async with block response object will be *released* (see *release()* coroutine).

version

Response's version, HttpVersion instance.

status

HTTP status code of response (int), e.g. 200.

reason

HTTP status reason of response (str), e.g. "OK".

ok

Boolean representation of HTTP status code (bool). True if status is less than 400; otherwise, False.

method

Request's method (str).

url

URL of request (URL).

real_url
Unmodified URL of request with URL fragment unstripped (URL).

New in version 3.2.

connection
Connection used for handling response.

content
Payload stream, which contains response's BODY (*StreamReader*). It supports various reading methods depending on the expected format. When chunked transfer encoding is used by the server, allows retrieving the actual http chunks.

Reading from the stream may raise *aiohttp.ClientPayloadError* if the response object is closed before response receives all data or in case if any transfer encoding related errors like misformed chunked encoding of broken compression data.

cookies
HTTP cookies of response (*Set-Cookie* HTTP header, SimpleCookie).

headers
A case-insensitive multidict proxy with HTTP headers of response, CIMultiDictProxy.

raw_headers
Unmodified HTTP headers of response as unconverted bytes, a sequence of `(key, value)` pairs.

links
Link HTTP header parsed into a MultiDictProxy.

For each link, key is link param *rel* when it exists, or link url as str otherwise, and value is MultiDictProxy of link params and url at key *url* as URL instance.

New in version 3.2.

content_type
Read-only property with *content* part of *Content-Type* header.

Note: Returns value is `'application/octet-stream'` if no Content-Type header present in HTTP headers according to **RFC 2616**. To make sure Content-Type header is not present in the server reply, use *headers* or *raw_headers*, e.g. `'CONTENT-TYPE' not in resp.headers`.

---

charset
Read-only property that specifies the *encoding* for the request's BODY.

The value is parsed from the *Content-Type* HTTP header.

Returns str like `'utf-8'` or None if no *Content-Type* header present in HTTP headers or it has no charset information.

content_disposition
Read-only property that specified the *Content-Disposition* HTTP header.

Instance of *ContentDisposition* or None if no *Content-Disposition* header present in HTTP headers.

history
A Sequence of *ClientResponse* objects of preceding requests (earliest request first) if there were redirects, an empty sequence otherwise.

close()
Close response and underlying connection.

For *keep-alive* support see *release()*.

coroutine read()
Read the whole response's body as bytes.

Close underlying connection if data reading gets an error, release connection otherwise.

Raise an *aiohttp.ClientResponseError* if the data can't be read.

Return bytes read *BODY*.

See also:

close(), *release()*.

coroutine release()
It is not required to call *release* on the response object. When the client fully receives the payload, the underlying connection automatically returns back to pool. If the payload is not fully read, the connection is closed

raise_for_status()
Raise an *aiohttp.ClientResponseError* if the response status is 400 or higher.

Do nothing for success responses (less than 400).

coroutine text(*encoding=None*)
Read response's body and return decoded str using specified *encoding* parameter.

If *encoding* is None content encoding is autocalculated using Content-Type HTTP header and *chardet* tool if the header is not provided by server.

cchardet is used with fallback to *chardet* if *cchardet* is not available.

Close underlying connection if data reading gets an error, release connection otherwise.

Parameters **encoding** (*str*) – text encoding used for *BODY* decoding, or None for encoding autodetection (default).

Return str decoded *BODY*

Raises **LookupError** – if the encoding detected by chardet or cchardet is unknown by Python (e.g. VISCII).

Note: If response has no charset info in Content-Type HTTP header *cchardet* / *chardet* is used for content encoding autodetection.

It may hurt performance. If page encoding is known passing explicit *encoding* parameter might help:

```
await resp.text('ISO-8859-1')
```

---

coroutine json(*, *encoding=None*, *loads=json.loads*, *content_type='application/json'*)
Read response's body as *JSON*, return dict using specified *encoding* and *loader*. If data is not still available a read call will be done,

If *encoding* is None content encoding is autocalculated using *cchardet* or *chardet* as fallback if *cchardet* is not available.

if response's *content-type* does not match *content_type* parameter *aiohttp.ContentTypeError* get raised. To disable content type check pass None value.

Parameters

- **encoding** (*str*) – text encoding used for *BODY* decoding, or `None` for encoding autodetection (default).

  By the standard JSON encoding should be `UTF-8` but practice beats purity: some servers return non-UTF responses. Autodetection works pretty fine anyway.

- **loads** (*callable*) – `callable()` used for loading *JSON* data, `json.loads()` by default.

- **content_type** (*str*) – specify response's content-type, if content type does not match raise *aiohttp.ClientResponseError*. To disable *content-type* check, pass `None` as value. (default: *application/json*).

Returns *BODY* as *JSON* data parsed by *loads* parameter or `None` if *BODY* is empty or contains white-spaces only.

request_info
A namedtuple with request URL and headers from `ClientRequest` object, *aiohttp.RequestInfo* instance.

get_encoding()
Automatically detect content encoding using `charset` info in `Content-Type` HTTP header. If this info is not exists or there are no appropriate codecs for encoding then *cchardet* / *chardet* is used.

Beware that it is not always safe to use the result of this function to decode a response. Some encodings detected by cchardet are not known by Python (e.g. VISCII).

Raises **RuntimeError** – if called before the body has been read, for *cchardet* usage

New in version 3.0.

ClientWebSocketResponse

To connect to a websocket server `aiohttp.ws_connect()` or *aiohttp.ClientSession.ws_connect()* coroutines should be used, do not create an instance of class *ClientWebSocketResponse* manually.

class aiohttp.**ClientWebSocketResponse**
Class for handling client-side websockets.

closed
Read-only property, `True` if *close()* has been called or *CLOSE* message has been received from peer.

protocol
Websocket *subprotocol* chosen after `start()` call.

May be `None` if server and client protocols are not overlapping.

get_extra_info(*name*, *default=None*)
Reads extra info from connection's transport

exception()
Returns exception if any occurs or returns None.

coroutine ping(*message=b''*)
Send *PING* to peer.

Parameters **message** – optional payload of *ping* message, `str` (converted to *UTF-8* encoded bytes) or `bytes`.

Changed in version 3.0: The method is converted into coroutine

coroutine pong(*message=b''*)
Send *PONG* to peer.

Parameters **message** – optional payload of *pong* message, `str` (converted to *UTF-8* encoded bytes) or `bytes`.

Changed in version 3.0: The method is converted into coroutine

coroutine send_str(*data*, *compress=None*)
Send *data* to peer as *TEXT* message.

Parameters

- **data** (*str*) – data to send.
- **compress** (*int*) – sets specific level of compression for single message, `None` for not overriding per-socket setting.

Raises **TypeError** – if data is not `str`

Changed in version 3.0: The method is converted into coroutine, *compress* parameter added.

coroutine send_bytes(*data*, *compress=None*)
Send *data* to peer as *BINARY* message.

Parameters

- **data** – data to send.
- **compress** (*int*) – sets specific level of compression for single message, `None` for not overriding per-socket setting.

Raises **TypeError** – if data is not `bytes`, `bytearray` or `memoryview`.

Changed in version 3.0: The method is converted into coroutine, *compress* parameter added.

coroutine send_json(*data*, *compress=None*, *, *dumps=json.dumps*)
Send *data* to peer as JSON string.

Parameters

- **data** – data to send.
- **compress** (*int*) – sets specific level of compression for single message, `None` for not overriding per-socket setting.
- **dumps** (*callable*) – any *callable* that accepts an object and returns a JSON string (`json.dumps()` by default).

Raises

- **RuntimeError** – if connection is not started or closing
- **ValueError** – if data is not serializable object
- **TypeError** – if value returned by `dumps(data)` is not `str`

Changed in version 3.0: The method is converted into coroutine, *compress* parameter added.

coroutine close(*, *code=1000*, *message=b''*)
A coroutine that initiates closing handshake by sending *CLOSE* message. It waits for close response from server. To add a timeout to *close()* call just wrap the call with *asyncio.wait()* or *asyncio.wait_for()*.

Parameters

- **code** (*int*) – closing code
- **message** – optional payload of *close* message, `str` (converted to *UTF-8* encoded bytes) or `bytes`.

coroutine receive()
A coroutine that waits upcoming *data* message from peer and returns it.

The coroutine implicitly handles *PING*, *PONG* and *CLOSE* without returning the message.

It process *ping-pong game* and performs *closing handshake* internally.

Returns *WSMessage*

coroutine receive_str()
A coroutine that calls *receive()* but also asserts the message type is *TEXT*.

Return str peer's message content.

Raises **TypeError** – if message is *BINARY*.

coroutine receive_bytes()
A coroutine that calls *receive()* but also asserts the message type is *BINARY*.

Return bytes peer's message content.

Raises **TypeError** – if message is *TEXT*.

coroutine receive_json(*, *loads=json.loads*)
A coroutine that calls *receive_str()* and loads the JSON string to a Python dict.

Parameters **loads** (*callable*) – any *callable* that accepts `str` and returns `dict` with parsed JSON (`json.loads()` by default).

Return dict loaded JSON content

Raises

- **TypeError** – if message is *BINARY*.
- **ValueError** – if message is not valid JSON.

Utilities

ClientTimeout

class aiohttp.**ClientTimeout**(*, *total=None*, *connect=None*, *sock_connect=None*, *sock_read=None*)
A data class for client timeout settings.

See *Timeouts* for usage examples.

total
Total number of seconds for the whole request.

`float`, `None` by default.

connect
Maximal number of seconds for acquiring a connection from pool. The time consists connection establishment for a new connection or waiting for a free connection from a pool if pool connection limits are exceeded.

For pure socket connection establishment time use *sock_connect*.

`float`, `None` by default.

sock_connect
Maximal number of seconds for connecting to a peer for a new connection, not given from a pool. See also *connect*.

float, None by default.

sock_read
Maximal number of seconds for reading a portion of data from a peer.

float, None by default.

New in version 3.3.

RequestInfo

class aiohttp.**RequestInfo**
A data class with request URL and headers from ClientRequest object, available as *ClientResponse.request_info* attribute.

url
Requested *url*, yarl.URL instance.

method
Request HTTP method like 'GET' or 'POST', str.

headers
HTTP headers for request, multidict.CIMultiDict instance.

real_url
Requested *url* with URL fragment unstripped, yarl.URL instance.

New in version 3.2.

BasicAuth

class aiohttp.**BasicAuth**(*login*, *password=''*, *encoding='latin1'*)
HTTP basic authentication helper.

Parameters

- **login** (*str*) – login
- **password** (*str*) – password
- **encoding** (*str*) – encoding ('latin1' by default)

Should be used for specifying authorization data in client API, e.g. *auth* parameter for ClientSession.request().

classmethod decode(*auth_header*, *encoding='latin1'*)
Decode HTTP basic authentication credentials.

Parameters

- **auth_header** (*str*) – The Authorization header to decode.
- **encoding** (*str*) – (optional) encoding ('latin1' by default)

Returns decoded authentication data, *BasicAuth*.

classmethod from_url(*url*)
Constructed credentials info from url's *user* and *password* parts.

Returns credentials data, *BasicAuth* or None is credentials are not provided.

New in version 2.3.

encode()
Encode credentials into string suitable for `Authorization` header etc.

Returns encoded authentication data, `str`.

CookieJar

class aiohttp.**CookieJar**(*, *unsafe=False*, *quote_cookie=True*, *loop=None*)
The cookie jar instance is available as *`ClientSession.cookie_jar`*.

The jar contains `Morsel` items for storing internal cookie data.

API provides a count of saved cookies:

```
len(session.cookie_jar)
```

These cookies may be iterated over:

```
for cookie in session.cookie_jar:
    print(cookie.key)
    print(cookie["domain"])
```

The class implements `collections.abc.Iterable`, `collections.abc.Sized` and `aiohttp.AbstractCookieJar` interfaces.

Implements cookie storage adhering to RFC 6265.

Parameters

- **unsafe** (*bool*) – (optional) Whether to accept cookies from IPs.
- **quote_cookie** (*bool*) –

  (optional) Whether to quote cookies according to RFC 2109. Some backend systems (not compatible with RFC mentioned above) does not support quoted cookies.

  New in version 3.7.

- **loop** (*bool*) – an event loop instance. See `aiohttp.abc.AbstractCookieJar`

  Deprecated since version 2.0.

update_cookies(*cookies*, *response_url=None*)
Update cookies returned by server in `Set-Cookie` header.

Parameters

- **cookies** – a `collections.abc.Mapping` (e.g. `dict`, `SimpleCookie`) or *iterable* of *pairs* with cookies returned by server's response.
- **response_url** (*str*) – URL of response, `None` for *shared cookies*. Regular cookies are coupled with server's URL and are sent only to this server, shared ones are sent in every client request.

filter_cookies(*request_url*)
Return jar's cookies acceptable for URL and available in `Cookie` header for sending client requests for given URL.

Parameters **response_url** (*str*) – request's URL for which cookies are asked.

Returns `http.cookies.SimpleCookie` with filtered cookies for given URL.

save (*file_path*)
Write a pickled representation of cookies into the file at provided path.

Parameters **file_path** – Path to file where cookies will be serialized, `str` or `pathlib.Path` instance.

load (*file_path*)
Load a pickled representation of cookies from the file at provided path.

Parameters **file_path** – Path to file from where cookies will be imported, `str` or `pathlib.Path` instance.

class aiohttp.**DummyCookieJar**(*, *loop=None*)
Dummy cookie jar which does not store cookies but ignores them.

Could be useful e.g. for web crawlers to iterate over Internet without blowing up with saved cookies information.

To install dummy cookie jar pass it into session instance:

```
jar = aiohttp.DummyCookieJar()
session = aiohttp.ClientSession(cookie_jar=DummyCookieJar())
```

class aiohttp.**Fingerprint**(*digest*)
Fingerprint helper for checking SSL certificates by *SHA256* digest.

Parameters **digest** (*bytes*) – *SHA256* digest for certificate in DER-encoded binary form (see `ssl.SSLSocket.getpeercert()`).

To check fingerprint pass the object into *ClientSession.get()* call, e.g.:

```
import hashlib

with open(path_to_cert, 'rb') as f:
    digest = hashlib.sha256(f.read()).digest()

await session.get(url, ssl=aiohttp.Fingerprint(digest))
```

New in version 3.0.

FormData

A *FormData* object contains the form data and also handles encoding it into a body that is either `multipart/form-data` or `application/x-www-form-urlencoded`. `multipart/form-data` is used if at least one field is an `io.IOBase` object or was added with at least one optional argument to *add_field* (`content_type`, `filename`, or `content_transfer_encoding`). Otherwise, `application/x-www-form-urlencoded` is used.

FormData instances are callable and return a `Payload` on being called.

class aiohttp.**FormData**(*fields*, *quote_fields=True*, *charset=None*)
Helper class for multipart/form-data and application/x-www-form-urlencoded body generation.

Parameters **fields** – A container for the key/value pairs of this form.

Possible types are:

- `dict`
- `tuple` or `list`
- `io.IOBase`, e.g. a file-like object

- multidict.MultiDict or multidict.MultiDictProxy

If it is a tuple or list, it must be a valid argument for *add_fields*.

For dict, multidict.MultiDict, and multidict.MultiDictProxy, the keys and values must be valid *name* and *value* arguments to *add_field*, respectively.

add_field(*name*, *value*, *content_type=None*, *filename=None*, *content_transfer_encoding=None*)

Add a field to the form.

Parameters

- **name** (*str*) – Name of the field
- **value** – Value of the field

  Possible types are:

  – str

  – bytes, bytesarray, or memoryview

  – io.IOBase, e.g. a file-like object
- **content_type** (*str*) – The field's content-type header (optional)
- **filename** (*str*) – The field's filename (optional)

  If this is not set and value is a bytes, bytesarray, or memoryview object, the *name* argument is used as the filename unless content_transfer_encoding is specified.

  If filename is not set and value is an io.IOBase object, the filename is extracted from the object if possible.
- **content_transfer_encoding** (*str*) – The field's content-transfer-encoding header (optional)

add_fields(*fields*)

Add one or more fields to the form.

Parameters **fields** – An iterable containing:

- io.IOBase, e.g. a file-like object
- multidict.MultiDict or multidict.MultiDictProxy
- tuple or list of length two, containing a name-value pair

Client exceptions

Exception hierarchy has been significantly modified in version 2.0. aiohttp defines only exceptions that covers connection handling and server response misbehaviors. For developer specific mistakes, aiohttp uses python standard exceptions like ValueError or TypeError.

Reading a response content may raise a *ClientPayloadError* exception. This exception indicates errors specific to the payload encoding. Such as invalid compressed data, malformed chunked-encoded chunks or not enough data that satisfy the content-length header.

All exceptions are available as members of *aiohttp* module.

exception aiohttp.**ClientError**

Base class for all client specific exceptions.

Derived from Exception

class aiohttp.**ClientPayloadError**
This exception can only be raised while reading the response payload if one of these errors occurs:

1. invalid compression
2. malformed chunked encoding
3. not enough data that satisfy `Content-Length` HTTP header.

Derived from *ClientError*

exception aiohttp.**InvalidURL**
URL used for fetching is malformed, e.g. it does not contain host part.

Derived from *ClientError* and `ValueError`

url
Invalid URL, `yarl.URL` instance.

class aiohttp.**ContentDisposition**
Represent Content-Disposition header

value

A `str` instance. Value of Content-Disposition header itself, e.g. `attachment`.

filename

A `str` instance. Content filename extracted from parameters. May be `None`.

parameters

Read-only mapping contains all parameters.

Response errors

exception aiohttp.**ClientResponseError**
These exceptions could happen after we get response from server.

Derived from *ClientError*

request_info
Instance of *RequestInfo* object, contains information about request.

status
HTTP status code of response (`int`), e.g. `400`.

message
Message of response (`str`), e.g. `"OK"`.

headers
Headers in response, a list of pairs.

history
History from failed response, if available, else empty tuple.

A `tuple` of *ClientResponse* objects used for handle redirection responses.

code
HTTP status code of response (`int`), e.g. `400`.

Deprecated since version 3.1.

class aiohttp.**WSServerHandshakeError**
Web socket server response error.

Derived from *ClientResponseError*

class aiohttp.**ContentTypeError**
Invalid content type.

Derived from *ClientResponseError*

New in version 2.3.

class aiohttp.**TooManyRedirects**
Client was redirected too many times.

Maximum number of redirects can be configured by using parameter `max_redirects` in `request`.

Derived from *ClientResponseError*

New in version 3.2.

Connection errors

class aiohttp.**ClientConnectionError**
These exceptions related to low-level connection problems.

Derived from *ClientError*

class aiohttp.**ClientOSError**
Subset of connection errors that are initiated by an `OSError` exception.

Derived from *ClientConnectionError* and `OSError`

class aiohttp.**ClientConnectorError**
Connector related exceptions.

Derived from *ClientOSError*

class aiohttp.**ClientProxyConnectionError**
Derived from *ClientConnectorError*

class aiohttp.**ServerConnectionError**
Derived from *ClientConnectionError*

class aiohttp.**ClientSSLError**
Derived from *ClientConnectorError*

class aiohttp.**ClientConnectorSSLError**
Response ssl error.

Derived from *ClientSSLError* and `ssl.SSLError`

class aiohttp.**ClientConnectorCertificateError**
Response certificate error.

Derived from *ClientSSLError* and `ssl.CertificateError`

class aiohttp.**ServerDisconnectedError**
Server disconnected.

Derived from `ServerDisconnectionError`

message
Partially parsed HTTP message (optional).

class aiohttp.**ServerTimeoutError**
Server operation timeout: read timeout, etc.

Derived from *ServerConnectionError* and asyncio.TimeoutError

class aiohttp.**ServerFingerprintMismatch**
Server fingerprint mismatch.

Derived from *ServerConnectionError*

Hierarchy of exceptions

- *ClientError*
  - *ClientResponseError*
    - *ContentTypeError*
    - *WSServerHandshakeError*
    - ClientHttpProxyError
  - *ClientConnectionError*
    - *ClientOSError*
      - *ClientConnectorError*
      - *ClientSSLError*
      - *ClientConnectorCertificateError*
      - *ClientConnectorSSLError*
      - *ClientProxyConnectionError*
      - *ServerConnectionError*
      - *ServerDisconnectedError*
      - *ServerTimeoutError*
      - *ServerFingerprintMismatch*
  - *ClientPayloadError*
  - *InvalidURL*

12.1.4 Tracing Reference

New in version 3.0.

A reference for client tracing API.

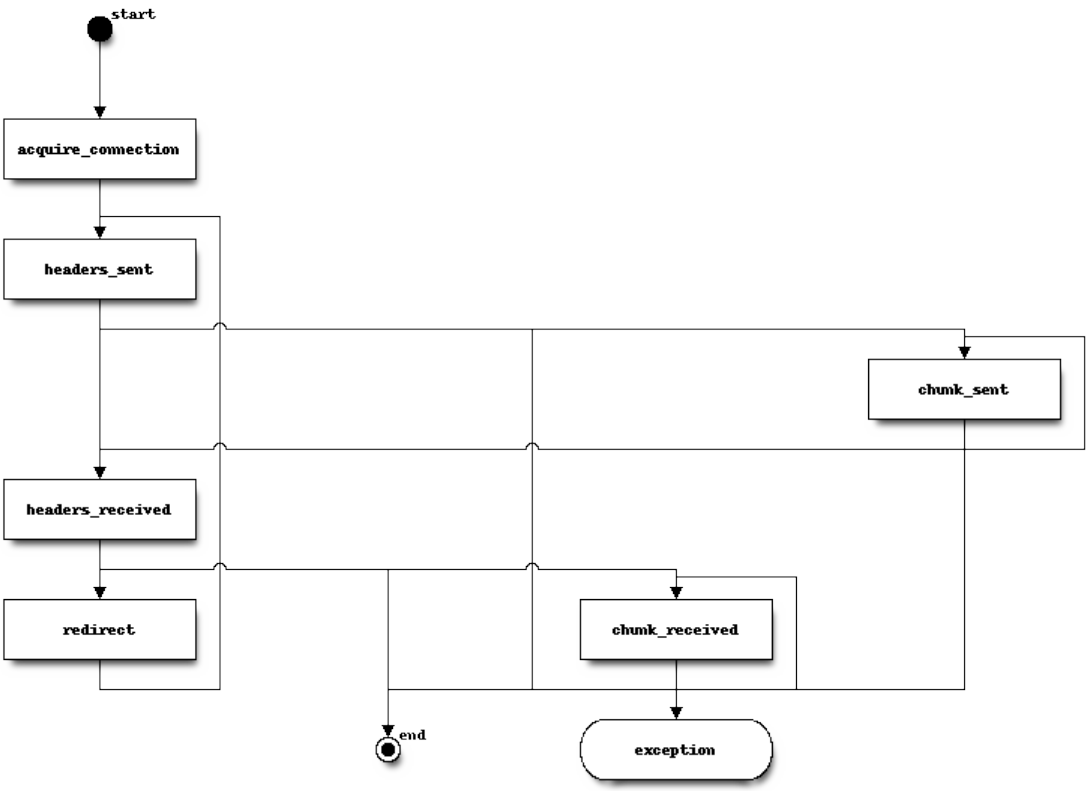
See also:

Client Tracing for tracing usage instructions.

Request life cycle

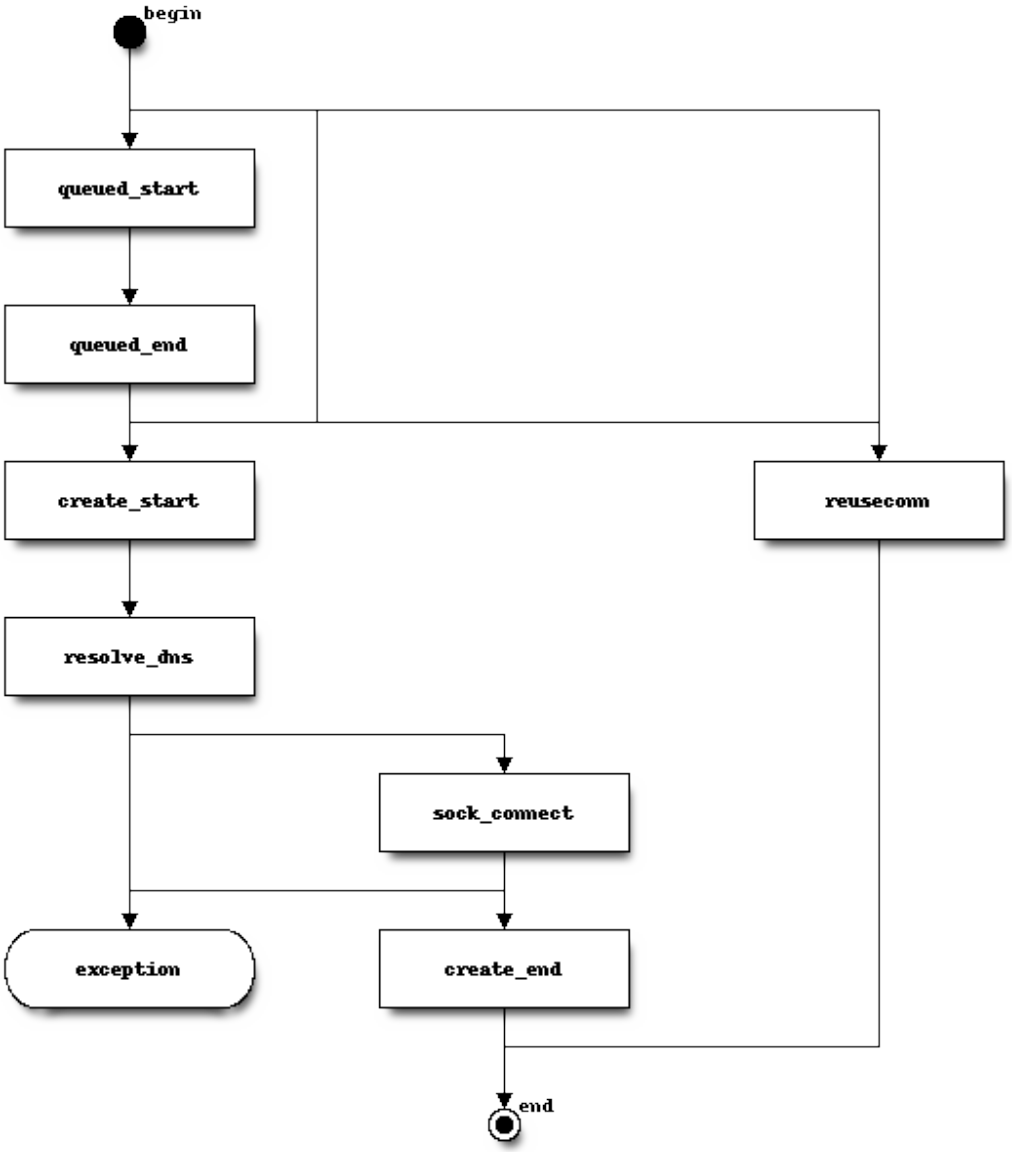
A request goes through the following stages and corresponding fallbacks.

Overview



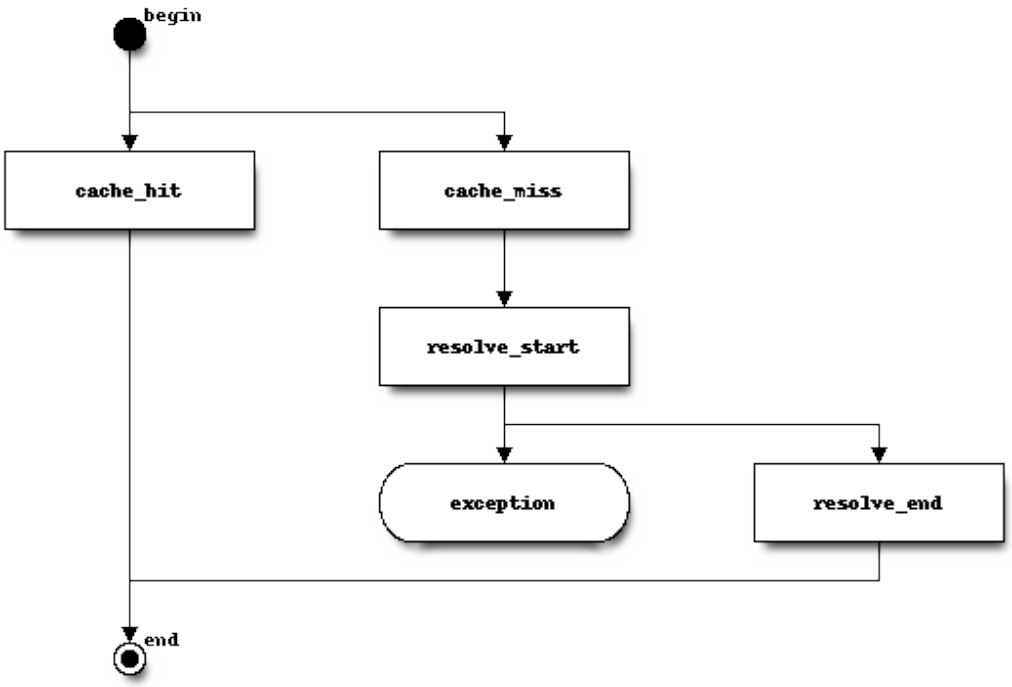
Name	Description
start	on_request_start
redirect	on_request_redirect
acquire_connection	Connection acquiring
headers_received	
exception	on_request_exception
end	on_request_end
headers_sent	
chunk_sent	on_request_chunk_sent
chunk_received	on_response_chunk_received

Connection acquiring



Name	Description
begin	
end	
queued_start	on_connection_queued_start
create_start	on_connection_create_start
reuseconn	on_connection_reuseconn
queued_end	on_connection_queued_end
create_end	on_connection_create_end
exception	Exception raised
resolve_dns	DNS resolving
sock_connect	Connection establishment

DNS resolving



Name	Description
begin	
end	
exception	Exception raised
resolve_end	on_dns_resolvehost_end
resolve_start	on_dns_resolvehost_start
cache_hit	on_dns_cache_hit
cache_miss	on_dns_cache_miss

TraceConfig

class aiohttp.**TraceConfig**(*trace_config_ctx_factory=SimpleNamespace*)

Trace config is the configuration object used to trace requests launched by a *ClientSession* object using different events related to different parts of the request flow.

Parameters **trace_config_ctx_factory** – factory used to create trace contexts, default class used types.SimpleNamespace

trace_config_ctx(*trace_request_ctx=None*)

Parameters **trace_request_ctx** – Will be used to pass as a kw for the trace_config_ctx_factory.

Build a new trace context from the config.

Every signal handler should have the following signature:

```
async def on_signal(session, context, params): ...
```

where session is *ClientSession* instance, context is an object returned by *trace_config_ctx()* call and params is a data class with signal parameters. The type of params depends on subscribed signal and described below.

on_request_start

Property that gives access to the signals that will be executed when a request starts.

params is *aiohttp.TraceRequestStartParams* instance.

on_request_chunk_sent

Property that gives access to the signals that will be executed when a chunk of request body is sent.

params is *aiohttp.TraceRequestChunkSentParams* instance.

New in version 3.1.

on_response_chunk_received

Property that gives access to the signals that will be executed when a chunk of response body is received.

params is *aiohttp.TraceResponseChunkReceivedParams* instance.

New in version 3.1.

on_request_redirect

Property that gives access to the signals that will be executed when a redirect happens during a request flow.

params is *aiohttp.TraceRequestRedirectParams* instance.

on_request_end

Property that gives access to the signals that will be executed when a request ends.

params is *aiohttp.TraceRequestEndParams* instance.

on_request_exception

Property that gives access to the signals that will be executed when a request finishes with an exception.

params is *aiohttp.TraceRequestExceptionParams* instance.

on_connection_queued_start

Property that gives access to the signals that will be executed when a request has been queued waiting for an available connection.

params is *aiohttp.TraceConnectionQueuedStartParams* instance.

on_connection_queued_end
Property that gives access to the signals that will be executed when a request that was queued already has an available connection.

`params` is *aiohttp.TraceConnectionQueuedEndParams* instance.

on_connection_create_start
Property that gives access to the signals that will be executed when a request creates a new connection.

`params` is *aiohttp.TraceConnectionCreateStartParams* instance.

on_connection_create_end
Property that gives access to the signals that will be executed when a request that created a new connection finishes its creation.

`params` is *aiohttp.TraceConnectionCreateEndParams* instance.

on_connection_reuseconn
Property that gives access to the signals that will be executed when a request reuses a connection.

`params` is *aiohttp.TraceConnectionReuseconnParams* instance.

on_dns_resolvehost_start
Property that gives access to the signals that will be executed when a request starts to resolve the domain related with the request.

`params` is *aiohttp.TraceDnsResolveHostStartParams* instance.

on_dns_resolvehost_end
Property that gives access to the signals that will be executed when a request finishes to resolve the domain related with the request.

`params` is *aiohttp.TraceDnsResolveHostEndParams* instance.

on_dns_cache_hit
Property that gives access to the signals that will be executed when a request was able to use a cached DNS resolution for the domain related with the request.

`params` is *aiohttp.TraceDnsCacheHitParams* instance.

on_dns_cache_miss
Property that gives access to the signals that will be executed when a request was not able to use a cached DNS resolution for the domain related with the request.

`params` is *aiohttp.TraceDnsCacheMissParams* instance.

TraceRequestStartParams

class aiohttp.**TraceRequestStartParams**
See *TraceConfig.on_request_start* for details.

method
Method that will be used to make the request.

url
URL that will be used for the request.

headers
Headers that will be used for the request, can be mutated.

TraceRequestChunkSentParams

class aiohttp.**TraceRequestChunkSentParams**
New in version 3.1.

See *TraceConfig.on_request_chunk_sent* for details.

method
Method that will be used to make the request.

url
URL that will be used for the request.

chunk
Bytes of chunk sent

TraceResponseChunkReceivedParams

class aiohttp.**TraceResponseChunkReceivedParams**
New in version 3.1.

See *TraceConfig.on_response_chunk_received* for details.

method
Method that will be used to make the request.

url
URL that will be used for the request.

chunk
Bytes of chunk received

TraceRequestEndParams

class aiohttp.**TraceRequestEndParams**
See *TraceConfig.on_request_end* for details.

method
Method used to make the request.

url
URL used for the request.

headers
Headers used for the request.

response
Response *ClientResponse*.

TraceRequestExceptionParams

class aiohttp.**TraceRequestExceptionParams**
See *TraceConfig.on_request_exception* for details.

method
Method used to make the request.

url
URL used for the request.

headers
Headers used for the request.

exception
Exception raised during the request.

TraceRequestRedirectParams

class aiohttp.**TraceRequestRedirectParams**
See *TraceConfig.on_request_redirect* for details.

method
Method used to get this redirect request.

url
URL used for this redirect request.

headers
Headers used for this redirect.

response
Response *ClientResponse* got from the redirect.

TraceConnectionQueuedStartParams

class aiohttp.**TraceConnectionQueuedStartParams**
See *TraceConfig.on_connection_queued_start* for details.

There are no attributes right now.

TraceConnectionQueuedEndParams

class aiohttp.**TraceConnectionQueuedEndParams**
See *TraceConfig.on_connection_queued_end* for details.

There are no attributes right now.

TraceConnectionCreateStartParams

class aiohttp.**TraceConnectionCreateStartParams**
See *TraceConfig.on_connection_create_start* for details.

There are no attributes right now.

TraceConnectionCreateEndParams

class aiohttp.**TraceConnectionCreateEndParams**
See *TraceConfig.on_connection_create_end* for details.

There are no attributes right now.

TraceConnectionReuseconnParams

class aiohttp.**TraceConnectionReuseconnParams**
See *TraceConfig.on_connection_reuseconn* for details.

There are no attributes right now.

TraceDnsResolveHostStartParams

class aiohttp.**TraceDnsResolveHostStartParams**
See *TraceConfig.on_dns_resolvehost_start* for details.

host
Host that will be resolved.

TraceDnsResolveHostEndParams

class aiohttp.**TraceDnsResolveHostEndParams**
See *TraceConfig.on_dns_resolvehost_end* for details.

host
Host that has been resolved.

TraceDnsCacheHitParams

class aiohttp.**TraceDnsCacheHitParams**
See *TraceConfig.on_dns_cache_hit* for details.

host
Host found in the cache.

TraceDnsCacheMissParams

class aiohttp.**TraceDnsCacheMissParams**
See *TraceConfig.on_dns_cache_miss* for details.

host
Host didn't find the cache.

12.1.5 The aiohttp Request Lifecycle

Why is aiohttp client API that way?

The first time you use aiohttp, you'll notice that a simple HTTP request is performed not with one, but with up to three steps:

```
async with aiohttp.ClientSession() as session:
    async with session.get('http://python.org') as response:
        print(await response.text())
```

It's especially unexpected when coming from other libraries such as the very popular *requests*, where the "hello world" looks like this:

```
response = requests.get('http://python.org')
print(response.text)
```

So why is the aiohttp snippet so verbose?

Because aiohttp is asynchronous, its API is designed to make the most out of non-blocking network operations. In code like this, requests will block three times, and does it transparently, while aiohttp gives the event loop three opportunities to switch context:

- When doing the `.get()`, both libraries send a GET request to the remote server. For aiohttp, this means asynchronous I/O, which is marked here with an `async with` that gives you the guarantee that not only it doesn't block, but that it's cleanly finalized.
- When doing `response.text` in requests, you just read an attribute. The call to `.get()` already preloaded and decoded the entire response payload, in a blocking manner. aiohttp loads only the headers when `.get()` is executed, letting you decide to pay the cost of loading the body afterward, in a second asynchronous operation. Hence the `await response.text()`.
- `async with aiohttp.ClientSession()` does not perform I/O when entering the block, but at the end of it, it will ensure all remaining resources are closed correctly. Again, this is done asynchronously and must be marked as such. The session is also a performance tool, as it manages a pool of connections for you, allowing you to reuse them instead of opening and closing a new one at each request. You can even manage the pool size by passing a connector object.

Using a session as a best practice

The requests library does in fact also provides a session system. Indeed, it lets you do:

```
with requests.Session() as session:
    response = session.get('http://python.org')
    print(response.text)
```

It's just not the default behavior, nor is it advertised early in the documentation. Because of this, most users take a hit in performance, but can quickly start hacking. And for requests, it's an understandable trade-off, since its goal is to be "HTTP for humans" and simplicity has always been more important than performance in this context.

However, if one uses aiohttp, one chooses asynchronous programming, a paradigm that makes the opposite trade-off: more verbosity for better performance. And so the library default behavior reflects this, encouraging you to use performant best practices from the start.

How to use the ClientSession ?

By default the *aiohttp.ClientSession* object will hold a connector with a maximum of 100 connections, putting the rest in a queue. This is quite a big number, this means you must be connected to a hundred different servers (not pages!) concurrently before even having to consider if your task needs resource adjustment.

In fact, you can picture the session object as a user starting and closing a browser: it wouldn't make sense to do that every time you want to load a new tab.

So you are expected to reuse a session object and make many requests from it. For most scripts and average-sized software, this means you can create a single session, and reuse it for the entire execution of the program. You can even pass the session around as a parameter in functions. For example, the typical "hello world":

```
import aiohttp
import asyncio

async def main():
    async with aiohttp.ClientSession() as session:
        async with session.get('http://python.org') as response:
            html = await response.text()
            print(html)

loop = asyncio.get_event_loop()
loop.run_until_complete(main())
```

Can become this:

```
import aiohttp
import asyncio

async def fetch(session, url):
    async with session.get(url) as response:
        return await response.text()

async def main():
    async with aiohttp.ClientSession() as session:
        html = await fetch(session, 'http://python.org')
        print(html)

loop = asyncio.get_event_loop()
loop.run_until_complete(main())
```

On more complex code bases, you can even create a central registry to hold the session object from anywhere in the code, or a higher level `Client` class that holds a reference to it.

When to create more than one session object then? It arises when you want more granularity with your resources management:

- you want to group connections by a common configuration. e.g: sessions can set cookies, headers, timeout values, etc. that are shared for all connections they hold.
- you need several threads and want to avoid sharing a mutable object between them.
- you want several connection pools to benefit from different queues and assign priorities. e.g: one session never uses the queue and is for high priority requests, the other one has a small concurrency limit and a very long queue, for non important requests.

12.2 Server

The page contains all information about aiohttp Server API:

12.2.1 Web Server Quickstart

Run a Simple Web Server

In order to implement a web server, first create a *request handler*.

A request handler must be a coroutine that accepts a *Request* instance as its only parameter and returns a *Response* instance:

```
from aiohttp import web

async def hello(request):
    return web.Response(text="Hello, world")
```

Next, create an *Application* instance and register the request handler on a particular *HTTP method* and *path*:

```
app = web.Application()
app.add_routes([web.get('/', hello)])
```

After that, run the application by *run_app()* call:

```
web.run_app(app)
```

That's it. Now, head over to `http://localhost:8080/` to see the results.

Alternatively if you prefer *route decorators* create a *route table* and register a *web-handler*:

```
routes = web.RouteTableDef()

@routes.get('/')
async def hello(request):
    return web.Response(text="Hello, world")

app = web.Application()
app.add_routes(routes)
web.run_app(app)
```

Both ways essentially do the same work, the difference is only in your taste: do you prefer *Django style* with famous `urls.py` or *Flask* with shiny route decorators.

aiohttp server documentation uses both ways in code snippets to emphasize their equality, switching from one style to another is very trivial.

See also:

Graceful shutdown section explains what *run_app()* does and how to implement complex server initialization/finalization from scratch.

Application runners for more handling more complex cases like *asynchronous* web application serving and multiple hosts support.

Command Line Interface (CLI)

aiohttp.web implements a basic CLI for quickly serving an *Application* in *development* over TCP/IP:

```
$ python -m aiohttp.web -H localhost -P 8080 package.module:init_func
```

`package.module:init_func` should be an importable *callable* that accepts a list of any non-parsed command-line arguments and returns an *Application* instance after setting it up:

```
def init_func(argv):
    app = web.Application()
    app.router.add_get("/", index_handler)
    return app
```

Handler

A request handler must be a coroutine that accepts a *Request* instance as its only argument and returns a *StreamResponse* derived (e.g. *Response*) instance:

```
async def handler(request):
    return web.Response()
```

Handlers are setup to handle requests by registering them with the *Application.add_routes()* on a particular route (*HTTP method* and *path* pair) using helpers like *get()* and *post()*:

```
app.add_routes([web.get('/', handler),
                web.post('/post', post_handler),
                web.put('/put', put_handler)])
```

Or use *route decorators*:

```
routes = web.RouteTableDef()

@routes.get('/')
async def get_handler(request):
    ...

@routes.post('/post')
async def post_handler(request):
    ...

@routes.put('/put')
```

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```
async def put_handler(request):
    ...

app.add_routes(routes)
```

Wildcard *HTTP method* is also supported by *route()* or *RouteTableDef.route()*, allowing a handler to serve incoming requests on a *path* having **any** *HTTP method*:

```
app.add_routes([web.route('*', '/path', all_handler)])
```

The *HTTP method* can be queried later in the request handler using the `Request.method` property.

By default endpoints added with `GET` method will accept `HEAD` requests and return the same response headers as they would for a `GET` request. You can also deny `HEAD` requests on a route:

```
web.get('/', handler, allow_head=False)
```

Here `handler` won't be called on `HEAD` request and the server will respond with `405: Method Not Allowed`.

Resources and Routes

Internally routes are served by *Application.router* (*UrlDispatcher* instance).

The *router* is a list of *resources*.

Resource is an entry in *route table* which corresponds to requested URL.

Resource in turn has at least one *route*.

Route corresponds to handling *HTTP method* by calling *web handler*.

Thus when you add a *route* the *resouce* object is created under the hood.

The library implementation **merges** all subsequent route additions for the same path adding the only resource for all HTTP methods.

Consider two examples:

```
app.add_routes([web.get('/path1', get_1),
                web.post('/path1', post_1),
                web.get('/path2', get_2),
                web.post('/path2', post_2)]
```

and:

```
app.add_routes([web.get('/path1', get_1),
                web.get('/path2', get_2),
                web.post('/path2', post_2),
                web.post('/path1', post_1)]
```

First one is *optimized*. You have got the idea.

Variable Resources

Resource may have *variable path* also. For instance, a resource with the path `'/a/{name}/c'` would match all incoming requests with paths such as `'/a/b/c'`, `'/a/1/c'`, and `'/a/etc/c'`.

A variable *part* is specified in the form `{identifier}`, where the `identifier` can be used later in a *request handler* to access the matched value for that *part*. This is done by looking up the `identifier` in the *`Request.match_info`* mapping:

```
@routes.get('/{name}')
async def variable_handler(request):
    return web.Response(
        text="Hello, {}".format(request.match_info['name']))
```

By default, each *part* matches the regular expression `[^{}/]+`.

You can also specify a custom regex in the form `{identifier:regex}`:

```
web.get(r'/{name:\d+}', handler)
```

Reverse URL Constructing using Named Resources

Routes can also be given a *name*:

```
@routes.get('/root', name='root')
async def handler(request):
    ...
```

Which can then be used to access and build a *URL* for that resource later (e.g. in a *request handler*):

```
url = request.app.router['root'].url_for().with_query({"a": "b", "c": "d"})
assert url == URL('/root?a=b&c=d')
```

A more interesting example is building *URLs* for *variable resources*:

```
app.router.add_resource(r'/{user}/info', name='user-info')
```

In this case you can also pass in the *parts* of the route:

```
url = request.app.router['user-info'].url_for(user='john_doe')
url_with_qs = url.with_query("a=b")
assert url_with_qs == '/john_doe/info?a=b'
```

Organizing Handlers in Classes

As discussed above, *handlers* can be first-class coroutines:

```
async def hello(request):
    return web.Response(text="Hello, world")

app.router.add_get('/', hello)
```

But sometimes it's convenient to group logically similar handlers into a Python *class*.

Since *aiohttp.web* does not dictate any implementation details, application developers can organize handlers in classes if they so wish:

```
class Handler:

    def __init__(self):
        pass

    async def handle_intro(self, request):
        return web.Response(text="Hello, world")

    async def handle_greeting(self, request):
        name = request.match_info.get('name', "Anonymous")
        txt = "Hello, {}".format(name)
        return web.Response(text=txt)

handler = Handler()
app.add_routes([web.get('/intro', handler.handle_intro),
                web.get('/greet/{name}', handler.handle_greeting)])
```

Class Based Views

aiohttp.web has support for *class based views*.

You can derive from *View* and define methods for handling http requests:

```
class MyView(web.View):
    async def get(self):
        return await get_resp(self.request)

    async def post(self):
        return await post_resp(self.request)
```

Handlers should be coroutines accepting *self* only and returning response object as regular *web-handler*. Request object can be retrieved by *View.request* property.

After implementing the view (`MyView` from example above) should be registered in application's router:

```
web.view('/path/to', MyView)
```

or:

```
@routes.view('/path/to')
class MyView(web.View):
    ...
```

Example will process GET and POST requests for */path/to* but raise *405 Method not allowed* exception for unimplemented HTTP methods.

Resource Views

All registered resources in a router can be viewed using the *UrlDispatcher.resources()* method:

```
for resource in app.router.resources():
    print(resource)
```

A *subset* of the resources that were registered with a *name* can be viewed using the *UrlDispatcher.named_resources()* method:

```
for name, resource in app.router.named_resources().items():
    print(name, resource)
```

Alternative ways for registering routes

Code examples shown above use *imperative* style for adding new routes: they call `app.router.add_get(...)` etc.

There are two alternatives: route tables and route decorators.

Route tables look like Django way:

```
async def handle_get(request):
    ...


async def handle_post(request):
    ...

app.router.add_routes([web.get('/get', handle_get),
                       web.post('/post', handle_post),
```

The snippet calls `add_routes()` to register a list of *route definitions* (*aiohttp.web.RouteDef* instances) created by *aiohttp.web.get()* or *aiohttp.web.post()* functions.

See also:

RouteDef and StaticDef reference.

Route decorators are closer to Flask approach:

```
routes = web.RouteTableDef()

@routes.get('/get')
async def handle_get(request):
    ...


@routes.post('/post')
async def handle_post(request):
    ...

app.router.add_routes(routes)
```

It is also possible to use decorators with class-based views:

```
routes = web.RouteTableDef()

@routes.view("/view")
class MyView(web.View):
    async def get(self):
        ...

    async def post(self):
        ...

app.router.add_routes(routes)
```

The example creates a *aiohttp.web.RouteTableDef* container first.

The container is a list-like object with additional decorators *aiohttp.web.RouteTableDef.get()*, *aiohttp.web.RouteTableDef.post()* etc. for registering new routes.

After filling the container `add_routes()` is used for adding registered *route definitions* into application's router.

See also:

RouteTableDef reference.

All tree ways (imperative calls, route tables and decorators) are equivalent, you could use what do you prefer or even mix them on your own.

New in version 2.3.

JSON Response

It is a common case to return JSON data in response, *aiohttp.web* provides a shortcut for returning JSON – *aiohttp.web.json_response()*:

```
async def handler(request):
    data = {'some': 'data'}
    return web.json_response(data)
```

The shortcut method returns *aiohttp.web.Response* instance so you can for example set cookies before returning it from handler.

User Sessions

Often you need a container for storing user data across requests. The concept is usually called a *session*.

aiohttp.web has no built-in concept of a *session*, however, there is a third-party library, `aiohttp_session`, that adds *session* support:

```
import asyncio
import time
import base64
from cryptography import fernet
from aiohttp import web
from aiohttp_session import setup, get_session, session_middleware
from aiohttp_session.cookie_storage import EncryptedCookieStorage

async def handler(request):
    session = await get_session(request)
```

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```
    last_visit = session['last_visit'] if 'last_visit' in session else None
    text = 'Last visited: {}'.format(last_visit)
    return web.Response(text=text)

async def make_app():
    app = web.Application()
    # secret_key must be 32 url-safe base64-encoded bytes
    fernet_key = fernet.Fernet.generate_key()
    secret_key = base64.urlsafe_b64decode(fernet_key)
    setup(app, EncryptedCookieStorage(secret_key))
    app.add_routes([web.get('/', handler)])
    return app

web.run_app(make_app())
```

HTTP Forms

HTTP Forms are supported out of the box.

If form's method is `"GET"` (`<form method="get">`) use `Request.query` for getting form data.

To access form data with `"POST"` method use `Request.post()` or `Request.multipart()`.

`Request.post()` accepts both `'application/x-www-form-urlencoded'` and `'multipart/form-data'` form's data encoding (e.g. `<form enctype="multipart/form-data">`). It stores files data in temporary directory. If *client_max_size* is specified *post* raises *ValueError* exception. For efficiency use `Request.multipart()`, It is especially effective for uploading large files (*File Uploads*).

Values submitted by the following form:

```
<form action="/login" method="post" accept-charset="utf-8"
      enctype="application/x-www-form-urlencoded">

    <label for="login">Login</label>
    <input id="login" name="login" type="text" value="" autofocus/>
    <label for="password">Password</label>
    <input id="password" name="password" type="password" value=""/>

    <input type="submit" value="login"/>
</form>
```

could be accessed as:

```
async def do_login(request):
    data = await request.post()
    login = data['login']
    password = data['password']
```

File Uploads

aiohttp.web has built-in support for handling files uploaded from the browser.

First, make sure that the HTML `<form>` element has its *enctype* attribute set to `enctype="multipart/form-data"`. As an example, here is a form that accepts an MP3 file:

```
<form action="/store/mp3" method="post" accept-charset="utf-8"
      enctype="multipart/form-data">

    <label for="mp3">Mp3</label>
    <input id="mp3" name="mp3" type="file" value=""/>

    <input type="submit" value="submit"/>
</form>
```

Then, in the *request handler* you can access the file input field as a *FileField* instance. *FileField* is simply a container for the file as well as some of its metadata:

```
async def store_mp3_handler(request):

    # WARNING: don't do that if you plan to receive large files!
    data = await request.post()

    mp3 = data['mp3']

    # .filename contains the name of the file in string format.
    filename = mp3.filename

    # .file contains the actual file data that needs to be stored somewhere.
    mp3_file = data['mp3'].file

    content = mp3_file.read()

    return web.Response(body=content,
                        headers=MultiDict(
                            {'CONTENT-DISPOSITION': mp3_file}))
```

You might have noticed a big warning in the example above. The general issue is that `Request.post()` reads the whole payload in memory, resulting in possible OOM (Out Of Memory) errors. To avoid this, for multipart uploads, you should use `Request.multipart()` which returns a *multipart reader*:

```
async def store_mp3_handler(request):

    reader = await request.multipart()

    # /!\ Don't forget to validate your inputs /!\

    # reader.next() will `yield` the fields of your form

    field = await reader.next()
    assert field.name == 'name'
    name = await field.read(decode=True)

    field = await reader.next()
    assert field.name == 'mp3'
    filename = field.filename
    # You cannot rely on Content-Length if transfer is chunked.
```

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```
    size = 0
    with open(os.path.join('/spool/yarrr-media/mp3/', filename), 'wb') as f:
        while True:
            chunk = await field.read_chunk()  # 8192 bytes by default.
            if not chunk:
                break
            size += len(chunk)
            f.write(chunk)

    return web.Response(text='{} sized of {} successfully stored'
                             ''.format(filename, size))
```

WebSockets

aiohttp.web supports *WebSockets* out-of-the-box.

To setup a *WebSocket*, create a *WebSocketResponse* in a *request handler* and then use it to communicate with the peer:

```
async def websocket_handler(request):

    ws = web.WebSocketResponse()
    await ws.prepare(request)

    async for msg in ws:
        if msg.type == aiohttp.WSMsgType.TEXT:
            if msg.data == 'close':
                await ws.close()
            else:
                await ws.send_str(msg.data + '/answer')
        elif msg.type == aiohttp.WSMsgType.ERROR:
            print('ws connection closed with exception %s' %
                  ws.exception())

    print('websocket connection closed')

    return ws
```

The handler should be registered as HTTP GET processor:

```
app.add_routes([web.get('/ws', websocket_handler)])
```

Redirects

To redirect user to another endpoint - raise `HTTPFound` with an absolute URL, relative URL or view name (the argument from router):

```
raise web.HTTPFound('/redirect')
```

The following example shows redirect to view named 'login' in routes:

```
async def handler(request):
    location = request.app.router['login'].url_for()
    raise web.HTTPFound(location=location)
```

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```
router.add_get('/handler', handler)
router.add_get('/login', login_handler, name='login')
```

Example with login validation:

```
@aiohttp_jinja2.template('login.html')
async def login(request):

    if request.method == 'POST':
        form = await request.post()
        error = validate_login(form)
        if error:
            return {'error': error}
        else:
            # login form is valid
            location = request.app.router['index'].url_for()
            raise web.HTTPFound(location=location)

    return {}

app.router.add_get('/', index, name='index')
app.router.add_get('/login', login, name='login')
app.router.add_post('/login', login, name='login')
```

Exceptions

aiohttp.web defines a set of exceptions for every *HTTP status code*.

Each exception is a subclass of *HTTPException* and relates to a single HTTP status code:

```
async def handler(request):
    raise aiohttp.web.HTTPFound('/redirect')
```

Warning: Returning *HTTPException* or its subclasses is deprecated and will be removed in subsequent aiohttp versions.

Each exception class has a status code according to **RFC 2068**: codes with 100-300 are not really errors; 400s are client errors, and 500s are server errors.

HTTP Exception hierarchy chart:

```
Exception
  HTTPException
    HTTPSuccessful
      * 200 - HTTPOk
      * 201 - HTTPCreated
      * 202 - HTTPAccepted
      * 203 - HTTPNonAuthoritativeInformation
      * 204 - HTTPNoContent
      * 205 - HTTPResetContent
      * 206 - HTTPPartialContent
    HTTPRedirection
```

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```
      * 300 - HTTPMultipleChoices
      * 301 - HTTPMovedPermanently
      * 302 - HTTPFound
      * 303 - HTTPSeeOther
      * 304 - HTTPNotModified
      * 305 - HTTPUseProxy
      * 307 - HTTPTemporaryRedirect
      * 308 - HTTPPermanentRedirect
    HTTPError
      HTTPClientError
        * 400 - HTTPBadRequest
        * 401 - HTTPUnauthorized
        * 402 - HTTPPaymentRequired
        * 403 - HTTPForbidden
        * 404 - HTTPNotFound
        * 405 - HTTPMethodNotAllowed
        * 406 - HTTPNotAcceptable
        * 407 - HTTPProxyAuthenticationRequired
        * 408 - HTTPRequestTimeout
        * 409 - HTTPConflict
        * 410 - HTTPGone
        * 411 - HTTPLengthRequired
        * 412 - HTTPPreconditionFailed
        * 413 - HTTPRequestEntityTooLarge
        * 414 - HTTPRequestURITooLong
        * 415 - HTTPUnsupportedMediaType
        * 416 - HTTPRequestRangeNotSatisfiable
        * 417 - HTTPExpectationFailed
        * 421 - HTTPMisdirectedRequest
        * 422 - HTTPUnprocessableEntity
        * 424 - HTTPFailedDependency
        * 426 - HTTPUpgradeRequired
        * 428 - HTTPPreconditionRequired
        * 429 - HTTPTooManyRequests
        * 431 - HTTPRequestHeaderFieldsTooLarge
        * 451 - HTTPUnavailableForLegalReasons
      HTTPServerError
        * 500 - HTTPInternalServerError
        * 501 - HTTPNotImplemented
        * 502 - HTTPBadGateway
        * 503 - HTTPServiceUnavailable
        * 504 - HTTPGatewayTimeout
        * 505 - HTTPVersionNotSupported
        * 506 - HTTPVariantAlsoNegotiates
        * 507 - HTTPInsufficientStorage
        * 510 - HTTPNotExtended
        * 511 - HTTPNetworkAuthenticationRequired
```

All HTTP exceptions have the same constructor signature:

```
HTTPNotFound(*, headers=None, reason=None,
             body=None, text=None, content_type=None)
```

If not directly specified, *headers* will be added to the *default response headers*.

Classes `HTTPMultipleChoices`, `HTTPMovedPermanently`, `HTTPFound`, `HTTPSeeOther`, `HTTPUseProxy`, `HTTPTemporaryRedirect` have the following constructor signature:

```
HTTPFound(location, *, headers=None, reason=None,
          body=None, text=None, content_type=None)
```

where *location* is value for *Location HTTP header*.

`HTTPMethodNotAllowed` is constructed by providing the incoming unsupported method and list of allowed methods:

```
HTTPMethodNotAllowed(method, allowed_methods, *,
                     headers=None, reason=None,
                     body=None, text=None, content_type=None)
```

12.2.2 Web Server Advanced

Unicode support

aiohttp does *requoting* of incoming request path.

Unicode (non-ASCII) symbols are processed transparently on both *route adding* and *resolving* (internally everything is converted to *percent-encoding* form by *yarl* library).

But in case of custom regular expressions for *Variable Resources* please take care that URL is *percent encoded*: if you pass Unicode patterns they don't match to *requoted* path.

Peer disconnection

When a client peer is gone a subsequent reading or writing raises `OSError` or more specific exception like `ConnectionResetError`.

The reason for disconnection is vary; it can be a network issue or explicit socket closing on the peer side without reading the whole server response.

aiohttp handles disconnection properly but you can handle it explicitly, e.g.:

```
async def handler(request):
    try:
        text = await request.text()
    except OSError:
        # disconnected
```

Passing a coroutine into run_app and Gunicorn

run_app() accepts either application instance or a coroutine for making an application. The coroutine based approach allows to perform async IO before making an app:

```
async def app_factory():
    await pre_init()
    app = web.Application()
    app.router.add_get(...)
    return app

web.run_app(app_factory())
```

Gunicorn worker supports a factory as well. For Gunicorn the factory should accept zero parameters:

```
async def my_web_app():
    app = web.Application()
    app.router.add_get(...)
    return app
```

Start gunicorn:

```
$ gunicorn my_app_module:my_web_app --bind localhost:8080 --worker-class aiohttp.
↪GunicornWebWorker
```

New in version 3.1.

Custom Routing Criteria

Sometimes you need to register *handlers* on more complex criteria than simply a *HTTP method* and *path* pair.

Although *UrlDispatcher* does not support any extra criteria, routing based on custom conditions can be accomplished by implementing a second layer of routing in your application.

The following example shows custom routing based on the *HTTP Accept* header:

```
class AcceptChooser:

    def __init__(self):
        self._accepts = {}

    async def do_route(self, request):
        for accept in request.headers.getall('ACCEPT', []):
            acceptor = self._accepts.get(accept)
            if acceptor is not None:
                return (await acceptor(request))
        raise HTTPNotAcceptable()

    def reg_acceptor(self, accept, handler):
        self._accepts[accept] = handler


async def handle_json(request):
    # do json handling

async def handle_xml(request):
    # do xml handling

chooser = AcceptChooser()
app.add_routes([web.get('/', chooser.do_route)])

chooser.reg_acceptor('application/json', handle_json)
chooser.reg_acceptor('application/xml', handle_xml)
```

Static file handling

The best way to handle static files (images, JavaScripts, CSS files etc.) is using Reverse Proxy like nginx or CDN services.

But for development it's very convenient to handle static files by aiohttp server itself.

To do it just register a new static route by *RouteTableDef.static()* or *static()* calls:

```
app.add_routes([web.static('/prefix', path_to_static_folder)])

routes.static('/prefix', path_to_static_folder)
```

When a directory is accessed within a static route then the server responses to client with `HTTP/403 Forbidden` by default. Displaying folder index instead could be enabled with `show_index` parameter set to `True`:

```
web.static('/prefix', path_to_static_folder, show_index=True)
```

When a symlink from the static directory is accessed, the server responses to client with `HTTP/404 Not Found` by default. To allow the server to follow symlinks, parameter `follow_symlinks` should be set to `True`:

```
web.static('/prefix', path_to_static_folder, follow_symlinks=True)
```

When you want to enable cache busting, parameter `append_version` can be set to `True`

Cache busting is the process of appending some form of file version hash to the filename of resources like JavaScript and CSS files. The performance advantage of doing this is that we can tell the browser to cache these files indefinitely without worrying about the client not getting the latest version when the file changes:

```
web.static('/prefix', path_to_static_folder, append_version=True)
```

Template Rendering

aiohttp.web does not support template rendering out-of-the-box.

However, there is a third-party library, `aiohttp_jinja2`, which is supported by the *aiohttp* authors.

Using it is rather simple. First, setup a *jinja2 environment* with a call to `aiohttp_jinja2.setup()`:

```
app = web.Application()
aiohttp_jinja2.setup(app,
    loader=jinja2.FileSystemLoader('/path/to/templates/folder'))
```

After that you may use the template engine in your *handlers*. The most convenient way is to simply wrap your handlers with the `aiohttp_jinja2.template()` decorator:

```
@aiohttp_jinja2.template('tmpl.jinja2')
async def handler(request):
    return {'name': 'Andrew', 'surname': 'Svetlov'}
```

If you prefer the Mako template engine, please take a look at the aiohttp_mako library.

Warning: `aiohttp_jinja2.template()` should be applied **before** *RouteTableDef.get()* decorator and family, e.g. it must be the *first* (most *down* decorator in the chain):

```
@routes.get('/path')
@aiohttp_jinja2.template('tmpl.jinja2')
async def handler(request):
    return {'name': 'Andrew', 'surname': 'Svetlov'}
```

Reading from the same task in WebSockets

Reading from the *WebSocket* (`await ws.receive()`) **must only** be done inside the request handler *task*; however, writing (`ws.send_str(...)`) to the *WebSocket*, closing (`await ws.close()`) and canceling the handler task may be delegated to other tasks. See also *FAQ section*.

aiohttp.web creates an implicit `asyncio.Task` for handling every incoming request.

Note: While *aiohttp.web* itself only supports *WebSockets* without downgrading to *LONG-POLLING*, etc., our team supports SockJS, an aiohttp-based library for implementing SockJS-compatible server code.

Warning: Parallel reads from websocket are forbidden, there is no possibility to call *WebSocketResponse.receive()* from two tasks.

See *FAQ section* for instructions how to solve the problem.

Data Sharing aka No Singletons Please

aiohttp.web discourages the use of *global variables*, aka *singletons*. Every variable should have its own context that is *not global*.

So, *Application* and *Request* support a `collections.abc.MutableMapping` interface (i.e. they are dict-like objects), allowing them to be used as data stores.

Application's config

For storing *global-like* variables, feel free to save them in an *Application* instance:

```
app['my_private_key'] = data
```

and get it back in the *web-handler*:

```
async def handler(request):
    data = request.app['my_private_key']
```

In case of *nested applications* the desired lookup strategy could be the following:

1. Search the key in the current nested application.
2. If the key is not found continue searching in the parent application(s).

For this please use *Request.config_dict* read-only property:

```
async def handler(request):
    data = request.config_dict['my_private_key']
```

Request's storage

Variables that are only needed for the lifetime of a *Request*, can be stored in a *Request*:

```
async def handler(request):
  request['my_private_key'] = "data"
  ...
```

This is mostly useful for *Middlewares* and *Signals* handlers to store data for further processing by the next handlers in the chain.

Response's storage

StreamResponse and *Response* objects also support `collections.abc.MutableMapping` interface. This is useful when you want to share data with signals and middlewares once all the work in the handler is done:

```
async def handler(request):
  [ do all the work ]
  response['my_metric'] = 123
  return response
```

Naming hint

To avoid clashing with other *aiohttp* users and third-party libraries, please choose a unique key name for storing data.

If your code is published on PyPI, then the project name is most likely unique and safe to use as the key. Otherwise, something based on your company name/url would be satisfactory (i.e. `org.company.app`).

ContextVars support

Starting from Python 3.7 asyncio has `Context Variables` as a context-local storage (a generalization of thread-local concept that works with asyncio tasks also).

aiohttp server supports it in the following way:

- A server inherits the current task's context used when creating it. *aiohttp.web.run_app()* runs a task for handling all underlying jobs running the app, but alternatively *Application runners* can be used.
- Application initialization / finalization events (*Application.cleanup_ctx*, *Application.on_startup* and *Application.on_shutdown*, *Application.on_cleanup*) are executed inside the same context.

  E.g. all context modifications made on application startup are visible on teardown.
- On every request handling *aiohttp* creates a context copy. *web-handler* has all variables installed on initialization stage. But the context modification made by a handler or middleware is invisible to another HTTP request handling call.

An example of context vars usage:

```
from contextvars import ContextVar

from aiohttp import web

VAR = ContextVar('VAR', default='default')
```

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```
async def coro():
    return VAR.get()


async def handler(request):
    var = VAR.get()
    VAR.set('handler')
    ret = await coro()
    return web.Response(text='\n'.join([var,
                                        ret]))


async def on_startup(app):
    print('on_startup', VAR.get())
    VAR.set('on_startup')


async def on_cleanup(app):
    print('on_cleanup', VAR.get())
    VAR.set('on_cleanup')


async def init():
    print('init', VAR.get())
    VAR.set('init')
    app = web.Application()
    app.router.add_get('/', handler)

    app.on_startup.append(on_startup)
    app.on_cleanup.append(on_cleanup)
    return app


web.run_app(init())
print('done', VAR.get())
```

New in version 3.5.

Middlewares

aiohttp.web provides a powerful mechanism for customizing *request handlers* via *middlewares*.

A *middleware* is a coroutine that can modify either the request or response. For example, here's a simple *middleware* which appends `' wink'` to the response:

```
from aiohttp.web import middleware

@middleware
async def middleware(request, handler):
    resp = await handler(request)
    resp.text = resp.text + ' wink'
    return resp
```

Note: The example won't work with streamed responses or websockets

Every *middleware* should accept two parameters, a *request* instance and a *handler*, and return the response or raise an exception. If the exception is not an instance of *HTTPException* it is converted to `500 HTTPInternalServerError` after processing the middlewares chain.

Warning: Second argument should be named *handler* exactly.

When creating an *Application*, these *middlewares* are passed to the keyword-only `middlewares` parameter:

```
app = web.Application(middlewares=[middleware_1,
                                   middleware_2])
```

Internally, a single *request handler* is constructed by applying the middleware chain to the original handler in reverse order, and is called by the `RequestHandler` as a regular *handler*.

Since *middlewares* are themselves coroutines, they may perform extra `await` calls when creating a new handler, e.g. call database etc.

Middlewares usually call the handler, but they may choose to ignore it, e.g. displaying *403 Forbidden page* or raising `HTTPForbidden` exception if the user does not have permissions to access the underlying resource. They may also render errors raised by the handler, perform some pre- or post-processing like handling *CORS* and so on.

The following code demonstrates middlewares execution order:

```
from aiohttp import web

async def test(request):
    print('Handler function called')
    return web.Response(text="Hello")

@web.middleware
async def middleware1(request, handler):
    print('Middleware 1 called')
    response = await handler(request)
    print('Middleware 1 finished')
    return response

@web.middleware
async def middleware2(request, handler):
    print('Middleware 2 called')
    response = await handler(request)
    print('Middleware 2 finished')
    return response


app = web.Application(middlewares=[middleware1, middleware2])
app.router.add_get('/', test)
web.run_app(app)
```

Produced output:

```
Middleware 1 called
Middleware 2 called
Handler function called
```

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```
Middleware 2 finished
Middleware 1 finished
```

Example

A common use of middlewares is to implement custom error pages. The following example will render 404 errors using a JSON response, as might be appropriate a JSON REST service:

```
from aiohttp import web

@web.middleware
async def error_middleware(request, handler):
    try:
        response = await handler(request)
        if response.status != 404:
            return response
        message = response.message
    except web.HTTPException as ex:
        if ex.status != 404:
            raise
        message = ex.reason
    return web.json_response({'error': message})

app = web.Application(middlewares=[error_middleware])
```

Middleware Factory

A *middleware factory* is a function that creates a middleware with passed arguments. For example, here's a trivial *middleware factory*:

```
def middleware_factory(text):
    @middleware
    async def sample_middleware(request, handler):
        resp = await handler(request)
        resp.text = resp.text + text
        return resp
    return sample_middleware
```

Remember that contrary to regular middlewares you need the result of a middleware factory not the function itself. So when passing a middleware factory to an app you actually need to call it:

```
app = web.Application(middlewares=[middleware_factory(' wink')])
```

Signals

Although *middlewares* can customize *request handlers* before or after a `Response` has been prepared, they can't customize a `Response` **while** it's being prepared. For this `aiohttp.web` provides *signals*.

For example, a middleware can only change HTTP headers for *unprepared* responses (see `StreamResponse.prepare()`), but sometimes we need a hook for changing HTTP headers for streamed responses and WebSockets. This can be accomplished by subscribing to the `Application.on_response_prepare` signal, which is called after default headers have been computed and directly before headers are sent:

```
async def on_prepare(request, response):
    response.headers['My-Header'] = 'value'

app.on_response_prepare.append(on_prepare)
```

Additionally, the `Application.on_startup` and `Application.on_cleanup` signals can be subscribed to for application component setup and tear down accordingly.

The following example will properly initialize and dispose an aiopg connection engine:

```
from aiopg.sa import create_engine

async def create_aiopg(app):
    app['pg_engine'] = await create_engine(
        user='postgre',
        database='postgre',
        host='localhost',
        port=5432,
        password=''
    )

async def dispose_aiopg(app):
    app['pg_engine'].close()
    await app['pg_engine'].wait_closed()

app.on_startup.append(create_aiopg)
app.on_cleanup.append(dispose_aiopg)
```

Signal handlers should not return a value but may modify incoming mutable parameters.

Signal handlers will be run sequentially, in order they were added. All handlers must be asynchronous since *aiohttp* 3.0.

Cleanup Context

Bare `Application.on_startup` / `Application.on_cleanup` pair still has a pitfall: signals handlers are independent on each other.

E.g. we have `[create_pg, create_redis]` in *startup* signal and `[dispose_pg, dispose_redis]` in *cleanup*.

If, for example, `create_pg(app)` call fails `create_redis(app)` is not called. But on application cleanup both `dispose_pg(app)` and `dispose_redis(app)` are still called: *cleanup signal* has no knowledge about startup/cleanup pairs and their execution state.

The solution is `Application.cleanup_ctx` usage:

```
async def pg_engine(app):
    app['pg_engine'] = await create_engine(
        user='postgre',
        database='postgre',
        host='localhost',
        port=5432,
        password=''
    )
    yield
    app['pg_engine'].close()
    await app['pg_engine'].wait_closed()

app.cleanup_ctx.append(pg_engine)
```

The attribute is a list of *asynchronous generators*, a code *before* `yield` is an initialization stage (called on *startup*), a code *after* `yield` is executed on *cleanup*. The generator must have only one `yield`.

aiohttp guarantees that *cleanup code* is called if and only if *startup code* was successfully finished.

Asynchronous generators are supported by Python 3.6+, on Python 3.5 please use async_generator library.

New in version 3.1.

Nested applications

Sub applications are designed for solving the problem of the big monolithic code base. Let's assume we have a project with own business logic and tools like administration panel and debug toolbar.

Administration panel is a separate application by its own nature but all toolbar URLs are served by prefix like `/admin`.

Thus we'll create a totally separate application named `admin` and connect it to main app with prefix by *Application.add_subapp()*:

```
admin = web.Application()
# setup admin routes, signals and middlewares

app.add_subapp('/admin/', admin)
```

Middlewares and signals from `app` and `admin` are chained.

It means that if URL is `'/admin/something'` middlewares from `app` are applied first and `admin.middlewares` are the next in the call chain.

The same is going for *Application.on_response_prepare* signal – the signal is delivered to both top level `app` and `admin` if processing URL is routed to `admin` sub-application.

Common signals like *Application.on_startup*, *Application.on_shutdown* and *Application.on_cleanup* are delivered to all registered sub-applications. The passed parameter is sub-application instance, not top-level application.

Third level sub-applications can be nested into second level ones – there are no limitation for nesting level.

Url reversing for sub-applications should generate urls with proper prefix.

But for getting URL sub-application's router should be used:

```
admin = web.Application()
admin.add_routes([web.get('/resource', handler, name='name')])
```

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```
app.add_subapp('/admin/', admin)

url = admin.router['name'].url_for()
```

The generated `url` from example will have a value `URL('/admin/resource')`.

If main application should do URL reversing for sub-application it could use the following explicit technique:

```
admin = web.Application()
admin.add_routes([web.get('/resource', handler, name='name')])

app.add_subapp('/admin/', admin)
app['admin'] = admin

async def handler(request):  # main application's handler
    admin = request.app['admin']
    url = admin.router['name'].url_for()
```

Expect Header

aiohttp.web supports *Expect* header. By default it sends `HTTP/1.1 100 Continue` line to client, or raises `HTTPExpectationFailed` if header value is not equal to "100-continue". It is possible to specify custom *Expect* header handler on per route basis. This handler gets called if *Expect* header exist in request after receiving all headers and before processing application's *Middlewares* and route handler. Handler can return *None*, in that case the request processing continues as usual. If handler returns an instance of class *StreamResponse*, *request handler* uses it as response. Also handler can raise a subclass of *HTTPException*. In this case all further processing will not happen and client will receive appropriate http response.

Note: A server that does not understand or is unable to comply with any of the expectation values in the Expect field of a request MUST respond with appropriate error status. The server MUST respond with a 417 (Expectation Failed) status if any of the expectations cannot be met or, if there are other problems with the request, some other 4xx status.

http://www.w3.org/Protocols/rfc2616/rfc2616-sec14.html#sec14.20

If all checks pass, the custom handler *must* write a *HTTP/1.1 100 Continue* status code before returning.

The following example shows how to setup a custom handler for the *Expect* header:

```
async def check_auth(request):
    if request.version != aiohttp.HttpVersion11:
        return

    if request.headers.get('EXPECT') != '100-continue':
        raise HTTPExpectationFailed(text="Unknown Expect: %s" % expect)

    if request.headers.get('AUTHORIZATION') is None:
        raise HTTPForbidden()

    request.transport.write(b"HTTP/1.1 100 Continue\r\n\r\n")

async def hello(request):
    return web.Response(body=b"Hello, world")
```

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```
app = web.Application()
app.add_routes([web.add_get('/', hello, expect_handler=check_auth)])
```

Custom resource implementation

To register custom resource use `UrlDispatcher.register_resource()`. Resource instance must implement *AbstractResource* interface.

Application runners

run_app() provides a simple *blocking* API for running an *Application*.

For starting the application *asynchronously* or serving on multiple HOST/PORT *AppRunner* exists.

The simple startup code for serving HTTP site on `'localhost'`, port `8080` looks like:

```
runner = web.AppRunner(app)
await runner.setup()
site = web.TCPSite(runner, 'localhost', 8080)
await site.start()

while True:
    await asyncio.sleep(3600)  # sleep forever
```

To stop serving call *AppRunner.cleanup()*:

```
await runner.cleanup()
```

New in version 3.0.

Graceful shutdown

Stopping *aiohttp web server* by just closing all connections is not always satisfactory.

The problem is: if application supports *websocket*s or *data streaming* it most likely has open connections at server shutdown time.

The *library* has no knowledge how to close them gracefully but developer can help by registering *Application.on_shutdown* signal handler and call the signal on *web server* closing.

Developer should keep a list of opened connections (*Application* is a good candidate).

The following *websocket* snippet shows an example for websocket handler:

```
from aiohttp import web
import weakref

app = web.Application()
app['websockets'] = weakref.WeakSet()

async def websocket_handler(request):
    ws = web.WebSocketResponse()
    await ws.prepare(request)

    request.app['websockets'].add(ws)
```

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```
    try:
        async for msg in ws:
            ...
    finally:
        request.app['websockets'].discard(ws)

    return ws
```

Signal handler may look like:

```
from aiohttp import WSCloseCode

async def on_shutdown(app):
    for ws in set(app['websockets']):
        await ws.close(code=WSCloseCode.GOING_AWAY,
                       message='Server shutdown')

app.on_shutdown.append(on_shutdown)
```

Both *run_app()* and *AppRunner.cleanup()* call shutdown signal handlers.

Background tasks

Sometimes there's a need to perform some asynchronous operations just after application start-up.

Even more, in some sophisticated systems there could be a need to run some background tasks in the event loop along with the application's request handler. Such as listening to message queue or other network message/event sources (e.g. ZeroMQ, Redis Pub/Sub, AMQP, etc.) to react to received messages within the application.

For example the background task could listen to ZeroMQ on `zmq.SUB` socket, process and forward retrieved messages to clients connected via WebSocket that are stored somewhere in the application (e.g. in the `application['websockets']` list).

To run such short and long running background tasks aiohttp provides an ability to register *Application.on_startup* signal handler(s) that will run along with the application's request handler.

For example there's a need to run one quick task and two long running tasks that will live till the application is alive. The appropriate background tasks could be registered as an *Application.on_startup* signal handlers as shown in the example below:

```
async def listen_to_redis(app):
    try:
        sub = await aioredis.create_redis(('localhost', 6379))
        ch, *_ = await sub.subscribe('news')
        async for msg in ch.iter(encoding='utf-8'):
            # Forward message to all connected websockets:
            for ws in app['websockets']:
                ws.send_str('{}: {}'.format(ch.name, msg))
    except asyncio.CancelledError:
        pass
    finally:
        await sub.unsubscribe(ch.name)
        await sub.quit()


async def start_background_tasks(app):
```

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```
    app['redis_listener'] = asyncio.create_task(listen_to_redis(app))


async def cleanup_background_tasks(app):
    app['redis_listener'].cancel()
    await app['redis_listener']


app = web.Application()
app.on_startup.append(start_background_tasks)
app.on_cleanup.append(cleanup_background_tasks)
web.run_app(app)
```

The task `listen_to_redis()` will run forever. To shut it down correctly *`Application.on_cleanup`* signal handler may be used to send a cancellation to it.

Handling error pages

Pages like *404 Not Found* and *500 Internal Error* could be handled by custom middleware, see polls demo for example.

Deploying behind a Proxy

As discussed in *Server Deployment* the preferable way is deploying *aiohttp* web server behind a *Reverse Proxy Server* like *nginx* for production usage.

In this way properties like *`BaseRequest.scheme`* *`BaseRequest.host`* and *`BaseRequest.remote`* are incorrect.

Real values should be given from proxy server, usually either `Forwarded` or old-fashion `X-Forwarded-For`, `X-Forwarded-Host`, `X-Forwarded-Proto` HTTP headers are used.

aiohttp does not take *forwarded* headers into account by default because it produces *security issue*: HTTP client might add these headers too, pushing non-trusted data values.

That's why *aiohttp server* should setup *forwarded* headers in custom middleware in tight conjunction with *reverse proxy configuration*.

For changing *`BaseRequest.scheme`* *`BaseRequest.host`* and *`BaseRequest.remote`* the middleware might use *`BaseRequest.clone()`*.

See also:

https://github.com/aio-libs/aiohttp-remotes provides secure helpers for modifying *scheme*, *host* and *remote* attributes according to `Forwarded` and `X-Forwarded-*` HTTP headers.

Swagger support

aiohttp-swagger is a library that allow to add Swagger documentation and embed the Swagger-UI into your *`aiohttp.web`* project.

CORS support

aiohttp.web itself does not support Cross-Origin Resource Sharing, but there is an aiohttp plugin for it: aiohttp_cors.

Debug Toolbar

aiohttp-debugtoolbar is a very useful library that provides a debugging toolbar while you're developing an *aiohttp.web* application.

Install it with `pip`:

```
$ pip install aiohttp_debugtoolbar
```

Just call `aiohttp_debugtoolbar.setup()`:

```
import aiohttp_debugtoolbar
from aiohttp_debugtoolbar import toolbar_middleware_factory

app = web.Application()
aiohttp_debugtoolbar.setup(app)
```

The toolbar is ready to use. Enjoy!!!

Dev Tools

aiohttp-devtools provides a couple of tools to simplify development of *aiohttp.web* applications.

Install with `pip`:

```
$ pip install aiohttp-devtools
```

- `runserver` provides a development server with auto-reload, live-reload, static file serving and aiohttp-debugtoolbar integration.
- `start` is a *cookiecutter command which does the donkey work of creating new :mod:`aiohttp.web` Applications.*

Documentation and a complete tutorial of creating and running an app locally are available at aiohttp-devtools.

12.2.3 Low Level Server

This topic describes *aiohttp.web* based *low level* API.

Abstract

Sometimes user don't need high-level concepts introduced in *Server*: applications, routers, middlewares and signals.

All what is needed is supporting asynchronous callable which accepts a request and returns a response object.

This is done by introducing *aiohttp.web.Server* class which serves a *protocol factory* role for `asyncio.AbstractEventLoop.create_server()` and bridges data stream to *web handler* and sends result back.

Low level *web handler* should accept the single *BaseRequest* parameter and performs one of the following actions:

1. Return a *Response* with the whole HTTP body stored in memory.

2. Create a *StreamResponse*, send headers by *StreamResponse.prepare()* call, send data chunks by *StreamResponse.write()* and return finished response.
3. Raise *HTTPException* derived exception (see *Exceptions* section).

   All other exceptions not derived from *HTTPException* leads to *500 Internal Server Error* response.
4. Initiate and process Web-Socket connection by *WebSocketResponse* using (see *WebSockets*).

Run a Basic Low-Level Server

The following code demonstrates very trivial usage example:

```
import asyncio
from aiohttp import web


async def handler(request):
    return web.Response(text="OK")


async def main():
    server = web.Server(handler)
    runner = web.ServerRunner(server)
    await runner.setup()
    site = web.TCPSite(runner, 'localhost', 8080)
    await site.start()

    print("======= Serving on http://127.0.0.1:8080/ ======")

    # pause here for very long time by serving HTTP requests and
    # waiting for keyboard interruption
    await asyncio.sleep(100*3600)


loop = asyncio.get_event_loop()

try:
    loop.run_until_complete(main())
except KeyboardInterrupt:
    pass
loop.close()
```

In the snippet we have `handler` which returns a regular *Response* with `"OK"` in BODY.

This *handler* is processed by `server` (*Server* which acts as *protocol factory*). Network communication is created by *runners API* to serve `http://127.0.0.1:8080/`.

The handler should process every request for every *path*, e.g. `GET`, `POST`, Web-Socket.

The example is very basic: it always return `200 OK` response, real life code is much more complex usually.

12.2.4 Server Reference

Request and Base Request

The Request object contains all the information about an incoming HTTP request.

BaseRequest is used for *Low-Level Servers* (which have no applications, routers, signals and middlewares). *Request* has an *Request.app* and *Request.match_info* attributes.

A *BaseRequest* / *Request* are dict like objects, allowing them to be used for *sharing data* among *Middlewares* and *Signals* handlers.

class aiohttp.web.**BaseRequest**

version
HTTP version of request, Read-only property.

Returns aiohttp.protocol.HttpVersion instance.

method
HTTP method, read-only property.

The value is upper-cased str like "GET", "POST", "PUT" etc.

url
A URL instance with absolute URL to resource (*scheme*, *host* and *port* are included).

Note: In case of malformed request (e.g. without "HOST" HTTP header) the absolute url may be unavailable.

---

rel_url
A URL instance with relative URL to resource (contains *path*, *query* and *fragment* parts only, *scheme*, *host* and *port* are excluded).

The property is equal to .url.relative() but is always present.

See also:

A note from *url*.

scheme
A string representing the scheme of the request.

The scheme is 'https' if transport for request handling is *SSL*, 'http' otherwise.

The value could be overridden by *clone()*.

Read-only str property.

Changed in version 2.3: *Forwarded* and *X-Forwarded-Proto* are not used anymore.

Call .clone(scheme=new_scheme) for setting up the value explicitly.

See also:

Deploying behind a Proxy

secure
Shorthand for request.url.scheme == 'https'

Read-only bool property.

See also:

scheme

forwarded

A tuple containing all parsed Forwarded header(s).

Makes an effort to parse Forwarded headers as specified by RFC 7239:

- It adds one (immutable) dictionary per Forwarded `field-value`, i.e. per proxy. The element corresponds to the data in the Forwarded `field-value` added by the first proxy encountered by the client. Each subsequent item corresponds to those added by later proxies.
- It checks that every value has valid syntax in general as specified in RFC 7239#section-4: either a `token` or a `quoted-string`.
- It un-escapes `quoted-pairs`.
- It does NOT validate 'by' and 'for' contents as specified in RFC 7239#section-6.
- It does NOT validate `host` contents (Host ABNF).
- It does NOT validate `proto` contents for valid URI scheme names.

Returns a tuple containing one or more `MappingProxy` objects

See also:

scheme

See also:

host

host

Host name of the request, resolved in this order:

- Overridden value by *clone()* call.
- *Host* HTTP header
- `socket.gtfqdn()`

Read-only `str` property.

Changed in version 2.3: *Forwarded* and *X-Forwarded-Host* are not used anymore.

Call `.clone(host=new_host)` for setting up the value explicitly.

See also:

Deploying behind a Proxy

remote

Originating IP address of a client initiated HTTP request.

The IP is resolved through the following headers, in this order:

- Overridden value by *clone()* call.
- Peer name of opened socket.

Read-only `str` property.

Call `.clone(remote=new_remote)` for setting up the value explicitly.

New in version 2.3.

See also:

Deploying behind a Proxy

path_qs

The URL including PATH_INFO and the query string. e.g., `/app/blog?id=10`

Read-only `str` property.

path

The URL including *PATH INFO* without the host or scheme. e.g., `/app/blog`. The path is URL-decoded. For raw path info see *raw_path*.

Read-only `str` property.

raw_path
The URL including raw *PATH INFO* without the host or scheme. Warning, the path may be URL-encoded and may contain invalid URL characters, e.g. `/my%2Fpath%7Cwith%21some%25strange%24characters`.

For URL-decoded version please take a look on *path*.

Read-only `str` property.

query
A multidict with all the variables in the query string.

Read-only `MultiDictProxy` lazy property.

query_string
The query string in the URL, e.g., `id=10`

Read-only `str` property.

headers
A case-insensitive multidict proxy with all headers.

Read-only `CIMultiDictProxy` property.

raw_headers
HTTP headers of response as unconverted bytes, a sequence of `(key, value)` pairs.

keep_alive
`True` if keep-alive connection enabled by HTTP client and protocol version supports it, otherwise `False`.

Read-only `bool` property.

transport
A transport used to process request. Read-only property.

The property can be used, for example, for getting IP address of client's peer:

```
peername = request.transport.get_extra_info('peername')
if peername is not None:
    host, port = peername
```

loop
An event loop instance used by HTTP request handling.

Read-only `asyncio.AbstractEventLoop` property.

Deprecated since version 3.5.

cookies
A multidict of all request's cookies.

Read-only `MultiDictProxy` lazy property.

content
A *StreamReader* instance, input stream for reading request's *BODY*.

Read-only property.

body_exists
Return `True` if request has *HTTP BODY*, `False` otherwise.

Read-only `bool` property.

New in version 2.3.

can_read_body
Return `True` if request's *HTTP BODY* can be read, `False` otherwise.

Read-only `bool` property.

New in version 2.3.

has_body
Return `True` if request's *HTTP BODY* can be read, `False` otherwise.

Read-only `bool` property.

Deprecated since version 2.3: Use *`can_read_body()`* instead.

content_type
Read-only property with *content* part of *Content-Type* header.

Returns `str` like `'text/html'`

Note: Returns value is `'application/octet-stream'` if no Content-Type header present in HTTP headers according to **RFC 2616**

---

charset
Read-only property that specifies the *encoding* for the request's BODY.

The value is parsed from the *Content-Type* HTTP header.

Returns `str` like `'utf-8'` or `None` if *Content-Type* has no charset information.

content_length
Read-only property that returns length of the request's BODY.

The value is parsed from the *Content-Length* HTTP header.

Returns `int` or `None` if *Content-Length* is absent.

http_range
Read-only property that returns information about *Range* HTTP header.

Returns a `slice` where `.start` is *left inclusive bound*, `.stop` is *right exclusive bound* and `.step` is `1`.

The property might be used in two manners:

1. Attribute-access style (example assumes that both left and right borders are set, the real logic for case of open bounds is more complex):

```
rng = request.http_range
with open(filename, 'rb') as f:
    f.seek(rng.start)
    return f.read(rng.stop-rng.start)
```

2. Slice-style:

```
return buffer[request.http_range]
```

if_modified_since
Read-only property that returns the date specified in the *If-Modified-Since* header.

Returns `datetime.datetime` or `None` if *If-Modified-Since* header is absent or is not a valid HTTP date.

if_unmodified_since
Read-only property that returns the date specified in the *If-Unmodified-Since* header.

Returns `datetime.datetime` or `None` if *If-Unmodified-Since* header is absent or is not a valid HTTP date.

New in version 3.1.

if_range
Read-only property that returns the date specified in the *If-Range* header.

Returns `datetime.datetime` or `None` if *If-Range* header is absent or is not a valid HTTP date.

New in version 3.1.

clone(*, *method=...*, *rel_url=...*, *headers=...*)
Clone itself with replacement some attributes.

Creates and returns a new instance of Request object. If no parameters are given, an exact copy is returned. If a parameter is not passed, it will reuse the one from the current request object.

Parameters

- **method** (*str*) – http method
- **rel_url** – url to use, `str` or `URL`
- **headers** – `CIMultiDict` or compatible headers container.

Returns a cloned *Request* instance.

get_extra_info(*name*, *default=None*)
Reads extra information from the protocol's transport. If no value associated with `name` is found, `default` is returned.

Parameters

- **name** (*str*) – The key to look up in the transport extra information.
- **default** – Default value to be used when no value for `name` is found (default is `None`).

New in version 3.7.

coroutine read()
Read request body, returns `bytes` object with body content.

Note: The method **does** store read data internally, subsequent `read()` call will return the same value.

coroutine text()
Read request body, decode it using *charset* encoding or `UTF-8` if no encoding was specified in *MIME-type*.

Returns `str` with body content.

Note: The method **does** store read data internally, subsequent `text()` call will return the same value.

coroutine json(*, *loads=json.loads*)
Read request body decoded as *json*.

The method is just a boilerplate coroutine implemented as:

```
async def json(self, *, loads=json.loads):
    body = await self.text()
    return loads(body)
```

Parameters **loads** (*callable*) – any *callable* that accepts `str` and returns `dict` with parsed JSON (`json.loads()` by default).

Note: The method **does** store read data internally, subsequent `json()` call will return the same value.

coroutine multipart()

Returns `aiohttp.multipart.MultipartReader` which processes incoming *multipart* request.

The method is just a boilerplate coroutine implemented as:

```
async def multipart(self, *, reader=aiohttp.multipart.MultipartReader):
    return reader(self.headers, self._payload)
```

This method is a coroutine for consistency with the else reader methods.

Warning: The method **does not** store read data internally. That means once you exhausts multipart reader, you cannot get the request payload one more time.

See also:

Working with Multipart

Changed in version 3.4: Dropped *reader* parameter.

coroutine post()

A coroutine that reads POST parameters from request body.

Returns `MultiDictProxy` instance filled with parsed data.

If *method* is not *POST*, *PUT*, *PATCH*, *TRACE* or *DELETE* or *content_type* is not empty or *application/x-www-form-urlencoded* or *multipart/form-data* returns empty multidict.

Note: The method **does** store read data internally, subsequent `post()` call will return the same value.

coroutine release()

Release request.

Eat unread part of HTTP BODY if present.

Note: User code may never call `release()`, all required work will be processed by *aiohttp.web* internal machinery.

class aiohttp.web.**Request**

A request used for receiving request's information by *web handler*.

Every *handler* accepts a request instance as the first positional parameter.

The class in derived from *BaseRequest*, shares all parent's attributes and methods but has a couple of additional properties:

match_info
Read-only property with `AbstractMatchInfo` instance for result of route resolving.

Note: Exact type of property depends on used router. If `app.router` is *`UrlDispatcher`* the property contains *`UrlMappingMatchInfo`* instance.

app
An *`Application`* instance used to call *request handler*, Read-only property.

config_dict
A *`aiohttp.ChainMapProxy`* instance for mapping all properties from the current application returned by *`app`* property and all its parents.

See also:

Application's config

New in version 3.2.

Note: You should never create the *`Request`* instance manually – *`aiohttp.web`* does it for you. But *`clone()`* may be used for cloning *modified* request copy with changed *path*, *method* etc.

Response classes

For now, *`aiohttp.web`* has three classes for the *HTTP response*: *`StreamResponse`*, *`Response`* and `FileResponse`.

Usually you need to use the second one. *`StreamResponse`* is intended for streaming data, while *`Response`* contains *HTTP BODY* as an attribute and sends own content as single piece with the correct *Content-Length HTTP header*.

For sake of design decisions *`Response`* is derived from *`StreamResponse`* parent class.

The response supports *keep-alive* handling out-of-the-box if *request* supports it.

You can disable *keep-alive* by *`force_close()`* though.

The common case for sending an answer from *web-handler* is returning a *`Response`* instance:

```
async def handler(request):
    return Response(text="All right!")
```

Response classes are `dict` like objects, allowing them to be used for *sharing data* among *Middlewares* and *Signals* handlers:

```
resp['key'] = value
```

New in version 3.0: Dict-like interface support.

StreamResponse

class aiohttp.web.**StreamResponse**(*, *status=200*, *reason=None*)

The base class for the *HTTP response* handling.

Contains methods for setting *HTTP response headers*, *cookies*, *response status code*, writing *HTTP response BODY* and so on.

The most important thing you should know about *response* — it is *Finite State Machine*.

That means you can do any manipulations with *headers*, *cookies* and *status code* only before *prepare()* coroutine is called.

Once you call *prepare()* any change of the *HTTP header* part will raise RuntimeError exception.

Any *write()* call after *write_eof()* is also forbidden.

Parameters

- **status** (*int*) – HTTP status code, 200 by default.
- **reason** (*str*) – HTTP reason. If param is None reason will be calculated basing on *status* parameter. Otherwise pass str with arbitrary *status* explanation..

prepared

Read-only bool property, True if *prepare()* has been called, False otherwise.

task

A task that serves HTTP request handling.

May be useful for graceful shutdown of long-running requests (streaming, long polling or web-socket).

status

Read-only property for *HTTP response status code*, int.

200 (OK) by default.

reason

Read-only property for *HTTP response reason*, str.

set_status(*status*, *reason=None*)

Set *status* and *reason*.

reason value is auto calculated if not specified (None).

keep_alive

Read-only property, copy of Request.keep_alive by default.

Can be switched to False by *force_close()* call.

force_close()

Disable *keep_alive* for connection. There are no ways to enable it back.

compression

Read-only bool property, True if compression is enabled.

False by default.

See also:

enable_compression()

enable_compression(*force=None*)

Enable compression.

When *force* is unset compression encoding is selected based on the request's *Accept-Encoding* header.

Accept-Encoding is not checked if *force* is set to a *ContentCoding*.

See also:

compression

chunked
Read-only property, indicates if chunked encoding is on.

Can be enabled by *enable_chunked_encoding()* call.

See also:

enable_chunked_encoding

enable_chunked_encoding()
Enables *chunked* encoding for response. There are no ways to disable it back. With enabled *chunked* encoding each *write()* operation encoded in separate chunk.

> **Warning:** chunked encoding can be enabled for `HTTP/1.1` only.
>
> Setting up both *content_length* and chunked encoding is mutually exclusive.

See also:

chunked

headers
`CIMultiDict` instance for *outgoing HTTP headers*.

cookies
An instance of `http.cookies.SimpleCookie` for *outgoing* cookies.

> **Warning:** Direct setting up *Set-Cookie* header may be overwritten by explicit calls to cookie manipulation.
>
> We are encourage using of *cookies* and *set_cookie()*, *del_cookie()* for cookie manipulations.

set_cookie(*name*, *value*, ***, *path='/'*, *expires=None*, *domain=None*, *max_age=None*, *secure=None*, *httponly=None*, *version=None*, *samesite=None*)
Convenient way for setting *cookies*, allows to specify some additional properties like *max_age* in a single call.

Parameters

- **name** (*str*) – cookie name
- **value** (*str*) – cookie value (will be converted to `str` if value has another type).
- **expires** – expiration date (optional)
- **domain** (*str*) – cookie domain (optional)
- **max_age** (*int*) – defines the lifetime of the cookie, in seconds. The delta-seconds value is a decimal non- negative integer. After delta-seconds seconds elapse, the client should discard the cookie. A value of zero means the cookie should be discarded immediately. (optional)
- **path** (*str*) – specifies the subset of URLs to which this cookie applies. (optional, `'/'` by default)

- **secure** (*bool*) – attribute (with no value) directs the user agent to use only (unspecified) secure means to contact the origin server whenever it sends back this cookie. The user agent (possibly under the user's control) may determine what level of security it considers appropriate for "secure" cookies. The *secure* should be considered security advice from the server to the user agent, indicating that it is in the session's interest to protect the cookie contents. (optional)
- **httponly** (*bool*) – `True` if the cookie HTTP only (optional)
- **version** (*int*) – a decimal integer, identifies to which version of the state management specification the cookie conforms. (Optional, *version=1* by default)
- **samesite** (*str*) – Asserts that a cookie must not be sent with cross-origin requests, providing some protection against cross-site request forgery attacks. Generally the value should be one of: `None`, `Lax` or `Strict`. (optional)

  New in version 3.7.

Warning: In HTTP version 1.1, `expires` was deprecated and replaced with the easier-to-use `max-age`, but Internet Explorer (IE6, IE7, and IE8) **does not** support `max-age`.

del_cookie(*name*, *, *path='/'*, *domain=None*)

Deletes cookie.

Parameters

- **name** (*str*) – cookie name
- **domain** (*str*) – optional cookie domain
- **path** (*str*) – optional cookie path, `'/'` by default

content_length

Content-Length for outgoing response.

content_type

Content part of *Content-Type* for outgoing response.

charset

Charset aka *encoding* part of *Content-Type* for outgoing response.

The value converted to lower-case on attribute assigning.

last_modified

Last-Modified header for outgoing response.

This property accepts raw `str` values, `datetime.datetime` objects, Unix timestamps specified as an `int` or a `float` object, and the value `None` to unset the header.

coroutine prepare(*request*)

Parameters **request** (`aiohttp.web.Request`) – HTTP request object, that the response answers.

Send *HTTP header*. You should not change any header data after calling this method.

The coroutine calls *on_response_prepare* signal handlers after default headers have been computed and directly before headers are sent.

coroutine write(*data*)

Send byte-ish data as the part of *response BODY*:

```
await resp.write(data)
```

prepare() must be invoked before the call.

Raises TypeError if data is not bytes, bytearray or memoryview instance.

Raises RuntimeError if *prepare()* has not been called.

Raises RuntimeError if *write_eof()* has been called.

coroutine write_eof()

A coroutine *may* be called as a mark of the *HTTP response* processing finish.

Internal machinery will call this method at the end of the request processing if needed.

After *write_eof()* call any manipulations with the *response* object are forbidden.

Response

class aiohttp.web.**Response**(*, *body=None*, *status=200*, *reason=None*, *text=None*, *headers=None*, *content_type=None*, *charset=None*, *zlib_executor_size=sentinel*, *zlib_executor=None*)

The most usable response class, inherited from *StreamResponse*.

Accepts *body* argument for setting the *HTTP response BODY*.

The actual *body* sending happens in overridden *write_eof()*.

Parameters

- **body** (*bytes*) – response's BODY
- **status** (*int*) – HTTP status code, 200 OK by default.
- **headers** (*collections.abc.Mapping*) – HTTP headers that should be added to response's ones.
- **text** (*str*) – response's BODY
- **content_type** (*str*) – response's content type. 'text/plain' if *text* is passed also, 'application/octet-stream' otherwise.
- **charset** (*str*) – response's charset. 'utf-8' if *text* is passed also, None otherwise.
- **zlib_executor_size** (*int*) –

  length in bytes which will trigger zlib compression of body to happen in an executor

  New in version 3.5.

- **zlib_executor** (*int*) – executor to use for zlib compression

  New in version 3.5.

body

Read-write attribute for storing response's content aka BODY, bytes.

Setting *body* also recalculates *content_length* value.

Assigning str to *body* will make the *body* type of aiohttp.payload.StringPayload, which tries to encode the given data based on *Content-Type* HTTP header, while defaulting to UTF-8.

Resetting *body* (assigning None) sets *content_length* to None too, dropping *Content-Length* HTTP header.

text

Read-write attribute for storing response's content, represented as string, `str`.

Setting *text* also recalculates *content_length* value and `body` value

Resetting *text* (assigning `None`) sets *content_length* to `None` too, dropping *Content-Length* HTTP header.

WebSocketResponse

class aiohttp.web.**WebSocketResponse**(*, *timeout=10.0*, *receive_timeout=None*, *autoclose=True*, *autoping=True*, *heartbeat=None*, *protocols=()*, *compress=True*, *max_msg_size=4194304*)

Class for handling server-side websockets, inherited from *StreamResponse*.

After starting (by *prepare()* call) the response you cannot use *write()* method but should to communicate with websocket client by *send_str()*, *receive()* and others.

To enable back-pressure from slow websocket clients treat methods *ping()*, *pong()*, *send_str()*, *send_bytes()*, *send_json()* as coroutines. By default write buffer size is set to 64k.

Parameters

- **autoping** (*bool*) – Automatically send *PONG* on *PING* message from client, and handle *PONG* responses from client. Note that server does not send *PING* requests, you need to do this explicitly using *ping()* method.
- **heartbeat** (*float*) – Send *ping* message every *heartbeat* seconds and wait *pong* response, close connection if *pong* response is not received. The timer is reset on any data reception.
- **receive_timeout** (*float*) – Timeout value for *receive* operations. Default value is None (no timeout for receive operation)
- **compress** (*bool*) – Enable per-message deflate extension support. False for disabled, default value is True.
- **max_msg_size** (*int*) –

  maximum size of read websocket message, 4 MB by default. To disable the size limit use `0`.

  New in version 3.3.

The class supports `async for` statement for iterating over incoming messages:

```
ws = web.WebSocketResponse()
await ws.prepare(request)

    async for msg in ws:
        print(msg.data)
```

coroutine prepare(*request*)

Starts websocket. After the call you can use websocket methods.

Parameters **request** (`aiohttp.web.Request`) – HTTP request object, that the response answers.

Raises ***HTTPException*** – if websocket handshake has failed.

can_prepare(*request*)

Performs checks for *request* data to figure out if websocket can be started on the request.

If *can_prepare()* call is success then *prepare()* will success too.

Parameters **request** (*aiohttp.web.Request*) – HTTP request object, that the response answers.

Returns

WebSocketReady instance.

WebSocketReady.ok is `True` on success, *WebSocketReady.protocol* is websocket subprotocol which is passed by client and accepted by server (one of *protocols* sequence from *WebSocketResponse* ctor). *WebSocketReady.protocol* may be `None` if client and server subprotocols are not overlapping.

Note: The method never raises exception.

---

closed
Read-only property, `True` if connection has been closed or in process of closing. *CLOSE* message has been received from peer.

close_code
Read-only property, close code from peer. It is set to `None` on opened connection.

ws_protocol
Websocket *subprotocol* chosen after `start()` call.

May be `None` if server and client protocols are not overlapping.

exception()
Returns last occurred exception or None.

coroutine ping(*message=b''*)
Send *PING* to peer.

Parameters **message** – optional payload of *ping* message, `str` (converted to *UTF-8* encoded bytes) or `bytes`.

Raises **RuntimeError** – if connections is not started or closing.

Changed in version 3.0: The method is converted into coroutine

coroutine pong(*message=b''*)
Send *unsolicited* *PONG* to peer.

Parameters **message** – optional payload of *pong* message, `str` (converted to *UTF-8* encoded bytes) or `bytes`.

Raises **RuntimeError** – if connections is not started or closing.

Changed in version 3.0: The method is converted into coroutine

coroutine send_str(*data*, *compress=None*)
Send *data* to peer as *TEXT* message.

Parameters

- **data** (*str*) – data to send.
- **compress** (*int*) – sets specific level of compression for single message, `None` for not overriding per-socket setting.

Raises

- **RuntimeError** – if connection is not started or closing
- **TypeError** – if data is not `str`

Changed in version 3.0: The method is converted into coroutine, *compress* parameter added.

coroutine send_bytes(*data*, *compress=None*)
Send *data* to peer as *BINARY* message.

Parameters

- **data** – data to send.
- **compress** (*int*) – sets specific level of compression for single message, None for not overriding per-socket setting.

Raises

- **RuntimeError** – if connection is not started or closing
- **TypeError** – if data is not bytes, bytearray or memoryview.

Changed in version 3.0: The method is converted into coroutine, *compress* parameter added.

coroutine send_json(*data*, *compress=None*, *, *dumps=json.dumps*)
Send *data* to peer as JSON string.

Parameters

- **data** – data to send.
- **compress** (*int*) – sets specific level of compression for single message, None for not overriding per-socket setting.
- **dumps** (*callable*) – any *callable* that accepts an object and returns a JSON string (json.dumps() by default).

Raises

- **RuntimeError** – if connection is not started or closing
- **ValueError** – if data is not serializable object
- **TypeError** – if value returned by dumps param is not str

Changed in version 3.0: The method is converted into coroutine, *compress* parameter added.

coroutine close(*, *code=1000*, *message=b''*)
A coroutine that initiates closing handshake by sending *CLOSE* message.

It is safe to call *close()* from different task.

Parameters

- **code** (*int*) – closing code
- **message** – optional payload of *close* message, str (converted to *UTF-8* encoded bytes) or bytes.

Raises **RuntimeError** – if connection is not started

coroutine receive(*timeout=None*)
A coroutine that waits upcoming *data* message from peer and returns it.

The coroutine implicitly handles *PING*, *PONG* and *CLOSE* without returning the message.

It process *ping-pong game* and performs *closing handshake* internally.

Note: Can only be called by the request handling task.

Parameters **timeout** – timeout for *receive* operation.

timeout value overrides response`s receive_timeout attribute.

Returns *WSMessage*

Raises **RuntimeError** – if connection is not started

coroutine receive_str(*, *timeout=None*)

A coroutine that calls *receive()* but also asserts the message type is *TEXT*.

Note: Can only be called by the request handling task.

Parameters **timeout** – timeout for *receive* operation.

timeout value overrides response`s receive_timeout attribute.

Return str peer's message content.

Raises **TypeError** – if message is *BINARY*.

coroutine receive_bytes(*, *timeout=None*)

A coroutine that calls *receive()* but also asserts the message type is *BINARY*.

Note: Can only be called by the request handling task.

Parameters **timeout** – timeout for *receive* operation.

timeout value overrides response`s receive_timeout attribute.

Return bytes peer's message content.

Raises **TypeError** – if message is *TEXT*.

coroutine receive_json(*, *loads=json.loads*, *timeout=None*)

A coroutine that calls *receive_str()* and loads the JSON string to a Python dict.

Note: Can only be called by the request handling task.

Parameters

- **loads** (*callable*) – any *callable* that accepts `str` and returns `dict` with parsed JSON (`json.loads()` by default).
- **timeout** – timeout for *receive* operation.

  timeout value overrides response`s receive_timeout attribute.

Return dict loaded JSON content

Raises

- **TypeError** – if message is *BINARY*.
- **ValueError** – if message is not valid JSON.

See also:

WebSockets handling

WebSocketReady

class aiohttp.web.**WebSocketReady**
A named tuple for returning result from *WebSocketResponse.can_prepare()*.

Has `bool` check implemented, e.g.:

```
if not await ws.can_prepare(...):
    cannot_start_websocket()
```

ok
`True` if websocket connection can be established, `False` otherwise.

protocol
`str` represented selected websocket sub-protocol.

See also:

WebSocketResponse.can_prepare()

json_response

aiohttp.web.**json_response**([*data*], *, *text=None*, *body=None*, *status=200*, *reason=None*, *headers=None*, *content_type='application/json'*, *dumps=json.dumps*)

Return *Response* with predefined `'application/json'` content type and *data* encoded by `dumps` parameter (`json.dumps()` by default).

HTTP Exceptions

Errors can also be returned by raising a HTTP exception instance from within the handler.

class aiohttp.web.**HTTPException**(*, *headers=None*, *reason=None*, *text=None*, *content_type=None*)
Low-level HTTP failure.

Parameters

- **headers** (*dict or multidict.CIMultiDict*) – headers for the response
- **reason** (*str*) – reason included in the response
- **text** (*str*) – response's body
- **content_type** (*str*) – response's content type. This is passed through to the *Response* initializer.

Sub-classes of `HTTPException` exist for the standard HTTP response codes as described in *Exceptions* and the expected usage is to simply raise the appropriate exception type to respond with a specific HTTP response code.

Since `HTTPException` is a sub-class of *Response*, it contains the methods and properties that allow you to directly manipulate details of the response.

status_code
HTTP status code for this exception class. This attribute is usually defined at the class level. `self.status_code` is passed to the *Response* initializer.

Application and Router

Application

Application is a synonym for web-server.

To get fully working example, you have to make *application*, register supported urls in *router* and pass it to *aiohttp.web.run_app()* or *aiohttp.web.AppRunner*.

Application contains a *router* instance and a list of callbacks that will be called during application finishing.

Application is a `dict`-like object, so you can use it for *sharing data* globally by storing arbitrary properties for later access from a *handler* via the *Request.app* property:

```
app = Application()
app['database'] = await aiopg.create_engine(**db_config)

async def handler(request):
    with (await request.app['database']) as conn:
        conn.execute("DELETE * FROM table")
```

Although *Application* is a `dict`-like object, it can't be duplicated like one using `Application.copy()`.

class aiohttp.web.**Application**(*, *logger=<default>*, *router=None*, *middlewares=()*, *handler_args=None*, *client_max_size=1024**2*, *loop=None*, *debug=...*)

The class inherits `dict`.

Parameters

- **logger** – `logging.Logger` instance for storing application logs.

  By default the value is `logging.getLogger("aiohttp.web")`

- **router** –

  aiohttp.abc.AbstractRouter instance, the system creates *UrlDispatcher* by default if *router* is `None`.

  Deprecated since version 3.3: The custom routers support is deprecated, the parameter will be removed in 4.0.

- **middlewares** – `list` of middleware factories, see *Middlewares* for details.

- **handler_args** – dict-like object that overrides keyword arguments of *Application.make_handler()*

- **client_max_size** – client's maximum size in a request, in bytes. If a POST request exceeds this value, it raises an *HTTPRequestEntityTooLarge* exception.

- **loop** – event loop

  Deprecated since version 2.0: The parameter is deprecated. Loop is get set during freeze stage.

- **debug** – Switches debug mode.

  Deprecated since version 3.5: Use asyncio Debug Mode instead.

router

Read-only property that returns *router instance*.

logger

`logging.Logger` instance for storing application logs.

loop
event loop used for processing HTTP requests.

Deprecated since version 3.5.

debug
Boolean value indicating whether the debug mode is turned on or off.

Deprecated since version 3.5: Use asyncio Debug Mode instead.

on_response_prepare
A *Signal* that is fired near the end of *StreamResponse.prepare()* with parameters *request* and *response*. It can be used, for example, to add custom headers to each response, or to modify the default headers computed by the application, directly before sending the headers to the client.

Signal handlers should have the following signature:

```
async def on_prepare(request, response):
    pass
```

on_startup
A *Signal* that is fired on application start-up.

Subscribers may use the signal to run background tasks in the event loop along with the application's request handler just after the application start-up.

Signal handlers should have the following signature:

```
async def on_startup(app):
    pass
```

See also:

Signals.

on_shutdown
A *Signal* that is fired on application shutdown.

Subscribers may use the signal for gracefully closing long running connections, e.g. websockets and data streaming.

Signal handlers should have the following signature:

```
async def on_shutdown(app):
    pass
```

It's up to end user to figure out which *web-handler*s are still alive and how to finish them properly.

We suggest keeping a list of long running handlers in *Application* dictionary.

See also:

Graceful shutdown and *on_cleanup*.

on_cleanup
A *Signal* that is fired on application cleanup.

Subscribers may use the signal for gracefully closing connections to database server etc.

Signal handlers should have the following signature:

```
async def on_cleanup(app):
    pass
```

See also:

Signals and *on_shutdown*.

cleanup_ctx
A list of *context generators* for *startup/cleanup* handling.

Signal handlers should have the following signature:

```
async def context(app):
    # do startup stuff
    yield
    # do cleanup
```

New in version 3.1.

See also:

Cleanup Context.

add_subapp(*prefix*, *subapp*)
Register nested sub-application under given path *prefix*.

In resolving process if request's path starts with *prefix* then further resolving is passed to *subapp*.

Parameters

- **prefix** (*str*) – path's prefix for the resource.
- **subapp** (Application) – nested application attached under *prefix*.

Returns a *PrefixedSubAppResource* instance.

add_domain(*domain*, *subapp*)
Register nested sub-application that serves the domain name or domain name mask.

In resolving process if request.headers['host'] matches the pattern *domain* then further resolving is passed to *subapp*.

Parameters

- **domain** (*str*) – domain or mask of domain for the resource.
- **subapp** (Application) – nested application.

Returns a MatchedSubAppResource instance.

add_routes(*routes_table*)
Register route definitions from *routes_table*.

The table is a list of *RouteDef* items or *RouteTableDef*.

Returns list of registered *AbstractRoute* instances.

The method is a shortcut for app.router.add_routes(routes_table), see also *UrlDispatcher.add_routes()*.

New in version 3.1.

Changed in version 3.7: Return value updated from None to list of *AbstractRoute* instances.

make_handler(*loop=None*, ***kwargs*)
Creates HTTP protocol factory for handling requests.

Parameters

- **loop** – event loop used for processing HTTP requests.

  If param is None asyncio.get_event_loop() used for getting default event loop.

Deprecated since version 2.0.

- **tcp_keepalive** (*bool*) – Enable TCP Keep-Alive. Default: `True`.
- **keepalive_timeout** (*int*) – Number of seconds before closing Keep-Alive connection. Default: `75` seconds (NGINX's default value).
- **logger** – Custom logger object. Default: `aiohttp.log.server_logger`.
- **access_log** – Custom logging object. Default: `aiohttp.log.access_logger`.
- **access_log_class** – Class for *access_logger*. Default: `aiohttp.helpers.AccessLogger`. Must to be a subclass of `aiohttp.abc.AbstractAccessLogger`.
- **access_log_format** (*str*) – Access log format string. Default: `helpers.AccessLogger.LOG_FORMAT`.
- **max_line_size** (*int*) – Optional maximum header line size. Default: `8190`.
- **max_headers** (*int*) – Optional maximum header size. Default: `32768`.
- **max_field_size** (*int*) – Optional maximum header field size. Default: `8190`.
- **lingering_time** (*float*) – Maximum time during which the server reads and ignores additional data coming from the client when lingering close is on. Use `0` to disable lingering on server channel closing.

You should pass result of the method as *protocol_factory* to `create_server()`, e.g.:

```
loop = asyncio.get_event_loop()

app = Application()

# setup route table
# app.router.add_route(...)

await loop.create_server(app.make_handler(),
                         '0.0.0.0', 8080)
```

Deprecated since version 3.2: The method is deprecated and will be removed in future aiohttp versions. Please use *Application runners* instead.

coroutine startup()

A coroutine that will be called along with the application's request handler.

The purpose of the method is calling *on_startup* signal handlers.

coroutine shutdown()

A coroutine that should be called on server stopping but before *cleanup()*.

The purpose of the method is calling *on_shutdown* signal handlers.

coroutine cleanup()

A coroutine that should be called on server stopping but after *shutdown()*.

The purpose of the method is calling *on_cleanup* signal handlers.

Note: Application object has *router* attribute but has no `add_route()` method. The reason is: we want to support different router implementations (even maybe not url-matching based but traversal ones).

For sake of that fact we have very trivial ABC for `AbstractRouter`: it should have only `AbstractRouter.resolve()` coroutine.

No methods for adding routes or route reversing (getting URL by route name). All those are router implementation details (but, sure, you need to deal with that methods after choosing the router for your application).

Server

A protocol factory compatible with `create_server()`.

class aiohttp.web.**Server**

The class is responsible for creating HTTP protocol objects that can handle HTTP connections.

connections

List of all currently opened connections.

requests_count

Amount of processed requests.

coroutine shutdown(*timeout*)

A coroutine that should be called to close all opened connections.

Router

For dispatching URLs to *handlers* *aiohttp.web* uses *routers*.

Router is any object that implements `AbstractRouter` interface.

aiohttp.web provides an implementation called *UrlDispatcher*.

Application uses *UrlDispatcher* as `router()` by default.

class aiohttp.web.**UrlDispatcher**

Straightforward url-matching router, implements `collections.abc.Mapping` for access to *named routes*.

Before running *Application* you should fill *route table* first by calling *add_route()* and *add_static()*.

Handler lookup is performed by iterating on added *routes* in FIFO order. The first matching *route* will be used to call corresponding *handler*.

If on route creation you specify *name* parameter the result is *named route*.

Named route can be retrieved by `app.router[name]` call, checked for existence by `name in app.router` etc.

See also:

Route classes

add_resource(*path*, *, *name=None*)

Append a *resource* to the end of route table.

path may be either *constant* string like `'/a/b/c'` or *variable rule* like `'/a/{var}'` (see *handling variable paths*)

Parameters

- **path** (*str*) – resource path spec.
- **name** (*str*) – optional resource name.

Returns created resource instance (*PlainResource* or *DynamicResource*).

add_route(*method*, *path*, *handler*, ***, *name=None*, *expect_handler=None*)

Append *handler* to the end of route table.

***path* may be either *constant* string like `'/a/b/c'` or** *variable rule* like `'/a/{var}'` (see *handling variable paths*)

Pay attention please: *handler* is converted to coroutine internally when it is a regular function.

Parameters

- **method** (*str*) – HTTP method for route. Should be one of `'GET'`, `'POST'`, `'PUT'`, `'DELETE'`, `'PATCH'`, `'HEAD'`, `'OPTIONS'` or `'*'` for any method.

  The parameter is case-insensitive, e.g. you can push `'get'` as well as `'GET'`.
- **path** (*str*) – route path. Should be started with slash (`'/'`).
- **handler** (*callable*) – route handler.
- **name** (*str*) – optional route name.
- **expect_handler** (*coroutine*) – optional *expect* header handler.

Returns new `PlainRoute` or `DynamicRoute` instance.

add_routes(*routes_table*)

Register route definitions from *routes_table*.

The table is a `list` of *RouteDef* items or *RouteTableDef*.

Returns `list` of registered *AbstractRoute* instances.

New in version 2.3.

Changed in version 3.7: Return value updated from `None` to `list` of *AbstractRoute* instances.

add_get(*path*, *handler*, ***, *name=None*, *allow_head=True*, ***kwargs*)

Shortcut for adding a GET handler. Calls the *add_route()* with `method` equals to `'GET'`.

If *allow_head* is `True` (default) the route for method HEAD is added with the same handler as for GET.

If *name* is provided the name for HEAD route is suffixed with `'-head'`. For example `router.add_get(path, handler, name='route')` call adds two routes: first for GET with name `'route'` and second for HEAD with name `'route-head'`.

add_post(*path*, *handler*, ***kwargs*)

Shortcut for adding a POST handler. Calls the *add_route()* with

`method` equals to `'POST'`.

add_head(*path*, *handler*, ***kwargs*)

Shortcut for adding a HEAD handler. Calls the *add_route()* with `method` equals to `'HEAD'`.

add_put(*path*, *handler*, ***kwargs*)

Shortcut for adding a PUT handler. Calls the *add_route()* with `method` equals to `'PUT'`.

add_patch(*path*, *handler*, ***kwargs*)

Shortcut for adding a PATCH handler. Calls the *add_route()* with `method` equals to `'PATCH'`.

add_delete(*path*, *handler*, ***kwargs*)

Shortcut for adding a DELETE handler. Calls the *add_route()* with `method` equals to `'DELETE'`.

add_view(*path*, *handler*, ***kwargs*)

Shortcut for adding a class-based view handler. Calls the *add_route()* with `method` equals to `'*'`.

New in version 3.0.

add_static(*prefix*, *path*, ***, *name=None*, *expect_handler=None*, *chunk_size=256 * 1024*, *response_factory=StreamResponse*, *show_index=False*, *follow_symlinks=False*, *append_version=False*)

Adds a router and a handler for returning static files.

Useful for serving static content like images, javascript and css files.

On platforms that support it, the handler will transfer files more efficiently using the `sendfile` system call.

In some situations it might be necessary to avoid using the `sendfile` system call even if the platform supports it. This can be accomplished by by setting environment variable `AIOHTTP_NOSENDFILE=1`.

If a gzip version of the static content exists at file path + `.gz`, it will be used for the response.

> **Warning:** Use *add_static()* for development only. In production, static content should be processed by web servers like *nginx* or *apache*.

Parameters

- **prefix** (*str*) – URL path prefix for handled static files
- **path** – path to the folder in file system that contains handled static files, `str` or `pathlib.Path`.
- **name** (*str*) – optional route name.
- **expect_handler** (*coroutine*) – optional *expect* header handler.
- **chunk_size** (*int*) – size of single chunk for file downloading, 256Kb by default.

  Increasing *chunk_size* parameter to, say, 1Mb may increase file downloading speed but consumes more memory.
- **show_index** (*bool*) – flag for allowing to show indexes of a directory, by default it's not allowed and HTTP/403 will be returned on directory access.
- **follow_symlinks** (*bool*) – flag for allowing to follow symlinks from a directory, by default it's not allowed and HTTP/404 will be returned on access.
- **append_version** (*bool*) – flag for adding file version (hash) to the url query string, this value will be used as default when you call to `StaticRoute.url()` and `StaticRoute.url_for()` methods.

Returns new `StaticRoute` instance.

coroutine resolve(*request*)

A coroutine that returns `AbstractMatchInfo` for *request*.

The method never raises exception, but returns `AbstractMatchInfo` instance with:

1. `http_exception` assigned to *HTTPException* instance.
2. `handler` which raises `HTTPNotFound` or `HTTPMethodNotAllowed` on handler's execution if there is no registered route for *request*.

Middlewares can process that exceptions to render pretty-looking error page for example.

Used by internal machinery, end user unlikely need to call the method.

> **Note:** The method uses `Request.raw_path` for pattern matching against registered routes.

resources()
The method returns a *view* for *all* registered resources.

The view is an object that allows to:

1. Get size of the router table:

```
len(app.router.resources())
```

2. Iterate over registered resources:

```
for resource in app.router.resources():
    print(resource)
```

3. Make a check if the resources is registered in the router table:

```
route in app.router.resources()
```

routes()
The method returns a *view* for *all* registered routes.

named_resources()
Returns a `dict`-like `types.MappingProxyType` *view* over *all* named **resources**.

The view maps every named resource's **name** to the `BaseResource` instance. It supports the usual `dict`-like operations, except for any mutable operations (i.e. it's **read-only**):

```
len(app.router.named_resources())

for name, resource in app.router.named_resources().items():
    print(name, resource)

"name" in app.router.named_resources()

app.router.named_resources()["name"]
```

Resource

Default router *UrlDispatcher* operates with *resource*s.

Resource is an item in *routing table* which has a *path*, an optional unique *name* and at least one *route*.

web-handler lookup is performed in the following way:

1. Router iterates over *resources* one-by-one.
2. If *resource* matches to requested URL the resource iterates over own *routes*.
3. If route matches to requested HTTP method (or `'*'` wildcard) the route's handler is used as found *web-handler*. The lookup is finished.
4. Otherwise router tries next resource from the *routing table*.
5. If the end of *routing table* is reached and no *resource* / *route* pair found the *router* returns special `AbstractMatchInfo` instance with `AbstractMatchInfo.http_exception` is not `None` but *HTTPException* with either *HTTP 404 Not Found* or *HTTP 405 Method Not Allowed* status code. Registered `AbstractMatchInfo.handler` raises this exception on call.

User should never instantiate resource classes but give it by *UrlDispatcher.add_resource()* call.

After that he may add a *route* by calling *Resource.add_route()*.

UrlDispatcher.add_route() is just shortcut for:

```
router.add_resource(path).add_route(method, handler)
```

Resource with a *name* is called *named resource*. The main purpose of *named resource* is constructing URL by route name for passing it into *template engine* for example:

```
url = app.router['resource_name'].url_for().with_query({'a': 1, 'b': 2})
```

Resource classes hierarchy:

```
AbstractResource
  Resource
    PlainResource
    DynamicResource
    StaticResource
```

class aiohttp.web.**AbstractResource**

A base class for all resources.

Inherited from `collections.abc.Sized` and `collections.abc.Iterable`.

`len(resource)` returns amount of *route*s belongs to the resource, `for route in resource` allows to iterate over these routes.

name

Read-only *name* of resource or `None`.

canonical

Read-only *canonical path* associate with the resource. For example `/path/to` or `/path/{to}`

New in version 3.3.

coroutine resolve(*request*)

Resolve resource by finding appropriate *web-handler* for `(method, path)` combination.

Returns

(*match_info*, *allowed_methods*) pair.

allowed_methods is a `set` or HTTP methods accepted by resource.

match_info is either *UrlMappingMatchInfo* if request is resolved or `None` if no *route* is found.

get_info()

A resource description, e.g. `{'path': '/path/to'}` or `{'formatter': '/path/{to}', 'pattern': re.compile(r'^/path/(?P<to>[a-zA-Z][_a-zA-Z0-9]+)$`

url_for(**args*, ***kwargs*)

Construct an URL for route with additional params.

args and **kwargs** depend on a parameters list accepted by inherited resource class.

Returns `URL` – resulting URL instance.

class aiohttp.web.**Resource**

A base class for new-style resources, inherits *AbstractResource*.

add_route(*method*, *handler*, *, *expect_handler=None*)

Add a *web-handler* to resource.

Parameters

- **method** (*str*) – HTTP method for route. Should be one of `'GET'`, `'POST'`, `'PUT'`, `'DELETE'`, `'PATCH'`, `'HEAD'`, `'OPTIONS'` or `'*'` for any method.

The parameter is case-insensitive, e.g. you can push `'get'` as well as `'GET'`.

The method should be unique for resource.

- **handler** (*callable*) – route handler.
- **expect_handler** (*coroutine*) – optional *expect* header handler.

Returns new *ResourceRoute* instance.

class aiohttp.web.**PlainResource**

A resource, inherited from *Resource*.

The class corresponds to resources with plain-text matching, `'/path/to'` for example.

canonical

Read-only *canonical path* associate with the resource. Returns the path used to create the PlainResource. For example `/path/to`

New in version 3.3.

url_for()

Returns a URL for the resource.

class aiohttp.web.**DynamicResource**

A resource, inherited from *Resource*.

The class corresponds to resources with *variable* matching, e.g. `'/path/{to}/{param}'` etc.

canonical

Read-only *canonical path* associate with the resource. Returns the formatter obtained from the path used to create the DynamicResource. For example, from a path `/get/{num:^\d+}`, it returns `/get/{num}`

New in version 3.3.

url_for(***params*)

Returns a URL for the resource.

Parameters **params** – – a variable substitutions for dynamic resource.

E.g. for `'/path/{to}/{param}'` pattern the method should be called as `resource.url_for(to='val1', param='val2')`

class aiohttp.web.**StaticResource**

A resource, inherited from *Resource*.

The class corresponds to resources for *static file serving*.

canonical

Read-only *canonical path* associate with the resource. Returns the prefix used to create the StaticResource. For example `/prefix`

New in version 3.3.

url_for(*filename*, *append_version=None*)

Returns a URL for file path under resource prefix.

Parameters

- **filename** – – a file name substitution for static file handler.

  Accepts both `str` and `pathlib.Path`.

  E.g. an URL for `'/prefix/dir/file.txt'` should be generated as `resource.url_for(filename='dir/file.txt')`

- **append_version** (*bool*) –

– a flag for adding file version (hash) to the url query string for cache boosting

By default has value from a constructor (`False` by default) When set to `True` - `v=FILE_HASH` query string param will be added When set to `False` has no impact

if file not found has no impact

class aiohttp.web.**PrefixedSubAppResource**

A resource for serving nested applications. The class instance is returned by *add_subapp* call.

canonical

Read-only *canonical path* associate with the resource. Returns the prefix used to create the PrefixedSubAppResource. For example `/prefix`

New in version 3.3.

url_for(***kwargs*)

The call is not allowed, it raises `RuntimeError`.

Route

Route has *HTTP method* (wildcard `'*'` is an option), *web-handler* and optional *expect handler*.

Every route belong to some resource.

Route classes hierarchy:

```
AbstractRoute
  ResourceRoute
  SystemRoute
```

ResourceRoute is the route used for resources, *SystemRoute* serves URL resolving errors like *404 Not Found* and *405 Method Not Allowed*.

class aiohttp.web.**AbstractRoute**

Base class for routes served by *UrlDispatcher*.

method

HTTP method handled by the route, e.g. *GET*, *POST* etc.

handler

handler that processes the route.

name

Name of the route, always equals to name of resource which owns the route.

resource

Resource instance which holds the route, `None` for *SystemRoute*.

url_for(**args*, ***kwargs*)

Abstract method for constructing url handled by the route.

Actually it's a shortcut for `route.resource.url_for(...)`.

coroutine handle_expect_header(*request*)

`100-continue` handler.

class aiohttp.web.**ResourceRoute**

The route class for handling different HTTP methods for *Resource*.

class aiohttp.web.**SystemRoute**
The route class for handling URL resolution errors like like *404 Not Found* and *405 Method Not Allowed*.

status
HTTP status code

reason
HTTP status reason

RouteDef and StaticDef

Route definition, a description for not registered yet route.

Could be used for filing route table by providing a list of route definitions (Django style).

The definition is created by functions like *get()* or *post()*, list of definitions could be added to router by *UrlDispatcher.add_routes()* call:

```
from aiohttp import web

async def handle_get(request):
    ...


async def handle_post(request):
    ...

app.router.add_routes([web.get('/get', handle_get),
                       web.post('/post', handle_post),
```

class aiohttp.web.**AbstractRouteDef**
A base class for route definitions.

Inherited from abc.ABC.

New in version 3.1.

register(*router*)
Register itself into *UrlDispatcher*.

Abstract method, should be overridden by subclasses.
Returns list of registered *AbstractRoute* objects.
Changed in version 3.7: Return value updated from None to list of *AbstractRoute* instances.

class aiohttp.web.**RouteDef**
A definition of not registered yet route.

Implements *AbstractRouteDef*.

New in version 2.3.

Changed in version 3.1: The class implements *AbstractRouteDef* interface.

method
HTTP method (GET, POST etc.) (str).

path
Path to resource, e.g. /path/to. Could contain {} brackets for *variable resources* (str).

handler
An async function to handle HTTP request.

kwargs
A dict of additional arguments.

class aiohttp.web.**StaticDef**
A definition of static file resource.

Implements *AbstractRouteDef*.

New in version 3.1.

prefix
A prefix used for static file handling, e.g. /static.

path
File system directory to serve, str or pathlib.Path (e.g. '/home/web-service/path/to/static'.

kwargs
A dict of additional arguments, see *UrlDispatcher.add_static()* for a list of supported options.

aiohttp.web.**get**(*path*, *handler*, *, *name=None*, *allow_head=True*, *expect_handler=None*)
Return *RouteDef* for processing GET requests. See *UrlDispatcher.add_get()* for information about parameters.

New in version 2.3.

aiohttp.web.**post**(*path*, *handler*, *, *name=None*, *expect_handler=None*)
Return *RouteDef* for processing POST requests. See *UrlDispatcher.add_post()* for information about parameters.

New in version 2.3.

aiohttp.web.**head**(*path*, *handler*, *, *name=None*, *expect_handler=None*)
Return *RouteDef* for processing HEAD requests. See *UrlDispatcher.add_head()* for information about parameters.

New in version 2.3.

aiohttp.web.**put**(*path*, *handler*, *, *name=None*, *expect_handler=None*)
Return *RouteDef* for processing PUT requests. See *UrlDispatcher.add_put()* for information about parameters.

New in version 2.3.

aiohttp.web.**patch**(*path*, *handler*, *, *name=None*, *expect_handler=None*)
Return *RouteDef* for processing PATCH requests. See *UrlDispatcher.add_patch()* for information about parameters.

New in version 2.3.

aiohttp.web.**delete**(*path*, *handler*, *, *name=None*, *expect_handler=None*)
Return *RouteDef* for processing DELETE requests. See *UrlDispatcher.add_delete()* for information about parameters.

New in version 2.3.

aiohttp.web.**view**(*path*, *handler*, *, *name=None*, *expect_handler=None*)
Return *RouteDef* for processing ANY requests. See *UrlDispatcher.add_view()* for information about parameters.

New in version 3.0.

aiohttp.web.**static**(*prefix*, *path*, ***, *name=None*, *expect_handler=None*, *chunk_size=256 * 1024*, *show_index=False*, *follow_symlinks=False*, *append_version=False*)

Return *StaticDef* for processing static files.

See *UrlDispatcher.add_static()* for information about supported parameters.

New in version 3.1.

aiohttp.web.**route**(*method*, *path*, *handler*, ***, *name=None*, *expect_handler=None*)

Return *RouteDef* for processing requests that decided by `method`. See *UrlDispatcher.add_route()* for information about parameters.

New in version 2.3.

RouteTableDef

A routes table definition used for describing routes by decorators (Flask style):

```
from aiohttp import web

routes = web.RouteTableDef()

@routes.get('/get')
async def handle_get(request):
    ...


@routes.post('/post')
async def handle_post(request):
    ...

app.router.add_routes(routes)


@routes.view("/view")
class MyView(web.View):
    async def get(self):
        ...

    async def post(self):
        ...
```

class aiohttp.web.**RouteTableDef**

A sequence of *RouteDef* instances (implements `abc.collections.Sequence` protocol).

In addition to all standard `list` methods the class provides also methods like `get()` and `post()` for adding new route definition.

New in version 2.3.

@**get**(*path*, ***, *allow_head=True*, *name=None*, *expect_handler=None*)

Add a new *RouteDef* item for registering `GET` web-handler.

See *UrlDispatcher.add_get()* for information about parameters.

@**post**(*path*, ***, *name=None*, *expect_handler=None*)

Add a new *RouteDef* item for registering `POST` web-handler.

See *UrlDispatcher.add_post()* for information about parameters.

@**head**(*path*, *, *name=None*, *expect_handler=None*)
Add a new *RouteDef* item for registering HEAD web-handler.

See *UrlDispatcher.add_head()* for information about parameters.

@**put**(*path*, *, *name=None*, *expect_handler=None*)
Add a new *RouteDef* item for registering PUT web-handler.

See *UrlDispatcher.add_put()* for information about parameters.

@**patch**(*path*, *, *name=None*, *expect_handler=None*)
Add a new *RouteDef* item for registering PATCH web-handler.

See *UrlDispatcher.add_patch()* for information about parameters.

@**delete**(*path*, *, *name=None*, *expect_handler=None*)
Add a new *RouteDef* item for registering DELETE web-handler.

See *UrlDispatcher.add_delete()* for information about parameters.

@**view**(*path*, *, *name=None*, *expect_handler=None*)
Add a new *RouteDef* item for registering ANY methods against a class-based view.

See *UrlDispatcher.add_view()* for information about parameters.

New in version 3.0.

static(*prefix*, *path*, *, *name=None*, *expect_handler=None*, *chunk_size=256 * 1024*, *show_index=False*, *follow_symlinks=False*, *append_version=False*)
Add a new *StaticDef* item for registering static files processor.

See *UrlDispatcher.add_static()* for information about supported parameters.

New in version 3.1.

@**route**(*method*, *path*, *, *name=None*, *expect_handler=None*)
Add a new *RouteDef* item for registering a web-handler for arbitrary HTTP method.

See *UrlDispatcher.add_route()* for information about parameters.

MatchInfo

After route matching web application calls found handler if any.

Matching result can be accessible from handler as *Request.match_info* attribute.

In general the result may be any object derived from AbstractMatchInfo (*UrlMappingMatchInfo* for default *UrlDispatcher* router).

class aiohttp.web.**UrlMappingMatchInfo**
Inherited from dict and AbstractMatchInfo. Dict items are filled by matching info and is *resource*-specific.

expect_handler
A coroutine for handling 100-continue.

handler
A coroutine for handling request.

route
Route instance for url matching.

View

class aiohttp.web.**View**(*request*)

Inherited from AbstractView.

Base class for class based views. Implementations should derive from *View* and override methods for handling HTTP verbs like get() or post():

```
class MyView(View):

    async def get(self):
        resp = await get_response(self.request)
        return resp

    async def post(self):
        resp = await post_response(self.request)
        return resp

app.router.add_view('/view', MyView)
```

The view raises *405 Method Not allowed* (HTTPMethodNotAllowed) if requested web verb is not supported.

Parameters **request** – instance of *Request* that has initiated a view processing.

request

Request sent to view's constructor, read-only property.

Overridable coroutine methods: connect(), delete(), get(), head(), options(), patch(), post(), put(), trace().

See also:

Class Based Views

Running Applications

To start web application there is AppRunner and site classes.

Runner is a storage for running application, sites are for running application on specific TCP or Unix socket, e.g.:

```
runner = web.AppRunner(app)
await runner.setup()
site = web.TCPSite(runner, 'localhost', 8080)
await site.start()
# wait for finish signal
await runner.cleanup()
```

New in version 3.0: *AppRunner* / *ServerRunner* and *TCPSite* / *UnixSite* / *SockSite* are added in aiohttp 3.0

class aiohttp.web.**BaseRunner**

A base class for runners. Use *AppRunner* for serving *Application*, *ServerRunner* for low-level *Server*.

server

Low-level web *Server* for handling HTTP requests, read-only attribute.

addresses

A list of served sockets addresses.

See socket.getsockname() for items type.

New in version 3.3.

sites
A read-only `set` of served sites (*TCPSite* / *UnixSite* / *NamedPipeSite* / *SockSite* instances).

coroutine setup()
Initialize the server. Should be called before adding sites.

coroutine cleanup()
Stop handling all registered sites and cleanup used resources.

class aiohttp.web.**AppRunner**(*app*, *, *handle_signals=False*, ***kwargs*)
A runner for *Application*. Used with conjunction with sites to serve on specific port.

Inherited from *BaseRunner*.

Parameters

- **app** (Application) – web application instance to serve.
- **handle_signals** (*bool*) – add signal handlers for `signal.SIGINT` and `signal.SIGTERM` (`False` by default).
- **kwargs** – named parameters to pass into web protocol.

Supported *kwargs*:

Parameters

- **tcp_keepalive** (*bool*) – Enable TCP Keep-Alive. Default: `True`.
- **keepalive_timeout** (*int*) – Number of seconds before closing Keep-Alive connection. Default: `75` seconds (NGINX's default value).
- **logger** – Custom logger object. Default: `aiohttp.log.server_logger`.
- **access_log** – Custom logging object. Default: `aiohttp.log.access_logger`.
- **access_log_class** – Class for *access_logger*. Default: `aiohttp.helpers.AccessLogger`. Must to be a subclass of `aiohttp.abc.AbstractAccessLogger`.
- **access_log_format** (*str*) – Access log format string. Default: `helpers.AccessLogger.LOG_FORMAT`.
- **max_line_size** (*int*) – Optional maximum header line size. Default: `8190`.
- **max_headers** (*int*) – Optional maximum header size. Default: `32768`.
- **max_field_size** (*int*) – Optional maximum header field size. Default: `8190`.
- **lingering_time** (*float*) – Maximum time during which the server reads and ignores additional data coming from the client when lingering close is on. Use `0` to disable lingering on server channel closing.
- **read_bufsize** (*int*) –

  Size of the read buffer (*BaseRequest.content*). `None` by default, it means that the session global value is used.

  New in version 3.7.

app
Read-only attribute for accessing to *Application* served instance.

coroutine setup()
Initialize application. Should be called before adding sites.

The method calls *Application.on_startup* registered signals.

coroutine cleanup()
Stop handling all registered sites and cleanup used resources.

Application.on_shutdown and *Application.on_cleanup* signals are called internally.

class aiohttp.web.**ServerRunner**(*web_server*, ***, *handle_signals=False*, ***kwargs*)
A runner for low-level *Server*. Used with conjunction with sites to serve on specific port.

Inherited from *BaseRunner*.

Parameters

- **web_server** (Server) – low-level web server instance to serve.
- **handle_signals** (*bool*) – add signal handlers for signal.SIGINT and signal.SIGTERM (False by default).
- **kwargs** – named parameters to pass into web protocol.

See also:

Low Level Server demonstrates low-level server usage

class aiohttp.web.**BaseSite**
An abstract class for handled sites.

name
An identifier for site, read-only str property. Could be a handled URL or UNIX socket path.

coroutine start()
Start handling a site.

coroutine stop()
Stop handling a site.

class aiohttp.web.**TCPSite**(*runner*, *host=None*, *port=None*, ***, *shutdown_timeout=60.0*, *ssl_context=None*, *backlog=128*, *reuse_address=None*, *reuse_port=None*)
Serve a runner on TCP socket.

Parameters

- **runner** – a runner to serve.
- **host** (*str*) – HOST to listen on, all interfaces if None (default).
- **port** (*int*) – PORT to listed on, 8080 if None (default).
- **shutdown_timeout** (*float*) – a timeout for closing opened connections on *BaseSite.stop()* call.
- **ssl_context** – a ssl.SSLContext instance for serving SSL/TLS secure server, None for plain HTTP server (default).
- **backlog** (*int*) – a number of unaccepted connections that the system will allow before refusing new connections, see socket.listen() for details.

  128 by default.
- **reuse_address** (*bool*) – tells the kernel to reuse a local socket in TIME_WAIT state, without waiting for its natural timeout to expire. If not specified will automatically be set to True on UNIX.
- **reuse_port** (*bool*) – tells the kernel to allow this endpoint to be bound to the same port as other existing endpoints are bound to, so long as they all set this flag when being created. This option is not supported on Windows.

class aiohttp.web.**UnixSite**(*runner*, *path*, ***, *shutdown_timeout=60.0*, *ssl_context=None*, *backlog=128*)

Serve a runner on UNIX socket.

Parameters

- **runner** – a runner to serve.
- **path** (*str*) – PATH to UNIX socket to listen.
- **shutdown_timeout** (*float*) – a timeout for closing opened connections on *BaseSite.stop()* call.
- **ssl_context** – a ssl.SSLContext instance for serving SSL/TLS secure server, None for plain HTTP server (default).
- **backlog** (*int*) – a number of unaccepted connections that the system will allow before refusing new connections, see socket.listen() for details.

  128 by default.

class aiohttp.web.**NamedPipeSite**(*runner*, *path*, ***, *shutdown_timeout=60.0*)

Serve a runner on Named Pipe in Windows.

Parameters

- **runner** – a runner to serve.
- **path** (*str*) – PATH of named pipe to listen.
- **shutdown_timeout** (*float*) – a timeout for closing opened connections on *BaseSite.stop()* call.

class aiohttp.web.**SockSite**(*runner*, *sock*, ***, *shutdown_timeout=60.0*, *ssl_context=None*, *backlog=128*)

Serve a runner on UNIX socket.

Parameters

- **runner** – a runner to serve.
- **sock** – socket.socket to listen.
- **shutdown_timeout** (*float*) – a timeout for closing opened connections on *BaseSite.stop()* call.
- **ssl_context** – a ssl.SSLContext instance for serving SSL/TLS secure server, None for plain HTTP server (default).
- **backlog** (*int*) – a number of unaccepted connections that the system will allow before refusing new connections, see socket.listen() for details.

  128 by default.

Utilities

class aiohttp.web.**FileField**

A namedtuple instance that is returned as multidict value by Request.POST() if field is uploaded file.

name
Field name

filename
File name as specified by uploading (client) side.

file
An io.IOBase instance with content of uploaded file.

content_type
MIME type of uploaded file, `'text/plain'` by default.

See also:

File Uploads

aiohttp.web.**run_app**(*app*, ***, *host=None*, *port=None*, *path=None*, *sock=None*, *shutdown_timeout=60.0*, *ssl_context=None*, *print=print*, *backlog=128*, *access_log_class=aiohttp.helpers.AccessLogger*, *access_log_format=aiohttp.helpers.AccessLogger.LOG_FORMAT*, *access_log=aiohttp.log.access_logger*, *handle_signals=True*, *reuse_address=None*, *reuse_port=None*)

A utility function for running an application, serving it until keyboard interrupt and performing a *Graceful shutdown*.

Suitable as handy tool for scaffolding aiohttp based projects. Perhaps production config will use more sophisticated runner but it good enough at least at very beginning stage.

The server will listen on any host or Unix domain socket path you supply. If no hosts or paths are supplied, or only a port is supplied, a TCP server listening on 0.0.0.0 (all hosts) will be launched.

Distributing HTTP traffic to multiple hosts or paths on the same application process provides no performance benefit as the requests are handled on the same event loop. See *Server Deployment* for ways of distributing work for increased performance.

Parameters

- **app** – `Application` instance to run or a *coroutine* that returns an application.
- **host** (*str*) – TCP/IP host or a sequence of hosts for HTTP server. Default is `'0.0.0.0'` if *port* has been specified or if *path* is not supplied.
- **port** (*int*) – TCP/IP port for HTTP server. Default is `8080` for plain text HTTP and `8443` for HTTP via SSL (when *ssl_context* parameter is specified).
- **path** (*str*) – file system path for HTTP server Unix domain socket. A sequence of file system paths can be used to bind multiple domain sockets. Listening on Unix domain sockets is not supported by all operating systems.
- **sock** (*socket*) – a preexisting socket object to accept connections on. A sequence of socket objects can be passed.
- **shutdown_timeout** (*int*) – a delay to wait for graceful server shutdown before disconnecting all open client sockets hard way.

  A system with properly *Graceful shutdown* implemented never waits for this timeout but closes a server in a few milliseconds.
- **ssl_context** – `ssl.SSLContext` for HTTPS server, `None` for HTTP connection.
- **print** – a callable compatible with `print()`. May be used to override STDOUT output or suppress it. Passing *None* disables output.
- **backlog** (*int*) – the number of unaccepted connections that the system will allow before refusing new connections (`128` by default).
- **access_log_class** – class for *access_logger*. Default: `aiohttp.helpers.AccessLogger`. Must to be a subclass of `aiohttp.abc.AbstractAccessLogger`.
- **access_log** – `logging.Logger` instance used for saving access logs. Use `None` for disabling logs for sake of speedup.

- **access_log_format** – access log format, see *Format specification* for details.
- **handle_signals** (*bool*) – override signal TERM handling to gracefully exit the application.
- **reuse_address** (*bool*) – tells the kernel to reuse a local socket in TIME_WAIT state, without waiting for its natural timeout to expire. If not specified will automatically be set to True on UNIX.
- **reuse_port** (*bool*) – tells the kernel to allow this endpoint to be bound to the same port as other existing endpoints are bound to, so long as they all set this flag when being created. This option is not supported on Windows.

New in version 3.0: Support *access_log_class* parameter.

Support *reuse_address*, *reuse_port* parameter.

New in version 3.1: Accept a coroutine as *app* parameter.

Constants

class aiohttp.web.**ContentCoding**

An enum.Enum class of available Content Codings.

deflate
DEFLATE compression

gzip
GZIP compression

identity
no compression

Middlewares

Normalize path middleware

aiohttp.web.**normalize_path_middleware**(*, *append_slash=True*, *remove_slash=False*, *merge_slashes=True*, *redirect_class=HTTPPermanentRedirect*)

Middleware factory which produces a middleware that normalizes the path of a request. By normalizing it means:

- Add or remove a trailing slash to the path.
- Double slashes are replaced by one.

The middleware returns as soon as it finds a path that resolves correctly. The order if both merge and append/remove are enabled is:

1. *merge_slashes*
2. *append_slash* or *remove_slash*
3. both *merge_slashes* and *append_slash* or *remove_slash*

If the path resolves with at least one of those conditions, it will redirect to the new path.

Only one of *append_slash* and *remove_slash* can be enabled. If both are `True` the factory will raise an `AssertionError`

If *append_slash* is `True` the middleware will append a slash when needed. If a resource is defined with trailing slash and the request comes without it, it will append it automatically.

If *remove_slash* is `True`, *append_slash* must be `False`. When enabled the middleware will remove trailing slashes and redirect if the resource is defined.

If *merge_slashes* is `True`, merge multiple consecutive slashes in the path into one.

New in version 3.4: Support for *remove_slash*

12.2.5 Logging

aiohttp uses standard `logging` for tracking the library activity.

We have the following loggers enumerated by names:

- `'aiohttp.access'`
- `'aiohttp.client'`
- `'aiohttp.internal'`
- `'aiohttp.server'`
- `'aiohttp.web'`
- `'aiohttp.websocket'`

You may subscribe to these loggers for getting logging messages. The page does not provide instructions for logging subscribing while the most friendly method is `logging.config.dictConfig()` for configuring whole loggers in your application.

Logging does not work out of the box. It requires at least minimal `'logging'` configuration. Example of minimal working logger setup:

```
import logging
from aiohttp import web

app = web.Application()
logging.basicConfig(level=logging.DEBUG)
web.run_app(app, port=5000)
```

New in version 4.0.0.

Access logs

Access logs are enabled by default. If the *debug* flag is set, and the default logger `'aiohttp.access'` is used, access logs will be output to `stderr` if no handlers are attached. Furthermore, if the default logger has no log level set, the log level will be set to `logging.DEBUG`.

This logging may be controlled by *aiohttp.web.AppRunner()* and *aiohttp.web.run_app()*.

To override the default logger, pass an instance of `logging.Logger` to override the default logger.

Note: Use `web.run_app(app, access_log=None)` to disable access logs.

In addition, *access_log_format* may be used to specify the log format.

Format specification

The library provides custom micro-language to specifying info about request and response:

Option	Meaning
`%%`	The percent sign
`%a`	Remote IP-address (IP-address of proxy if using reverse proxy)
`%t`	Time when the request was started to process
`%P`	The process ID of the child that serviced the request
`%r`	First line of request
`%s`	Response status code
`%b`	Size of response in bytes, including HTTP headers
`%T`	The time taken to serve the request, in seconds
`%Tf`	The time taken to serve the request, in seconds with fraction in %.06f format
`%D`	The time taken to serve the request, in microseconds
`%{FOO}i`	`request.headers['FOO']`
`%{FOO}o`	`response.headers['FOO']`

The default access log format is:

```
'%a %t "%r" %s %b "%{Referer}i" "%{User-Agent}i"'
```

New in version 2.3.0.

access_log_class introduced.

Example of a drop-in replacement for the default access logger:

```
from aiohttp.abc import AbstractAccessLogger

class AccessLogger(AbstractAccessLogger):

    def log(self, request, response, time):
        self.logger.info(f'{request.remote} '
                         f'"{request.method} {request.path} '
                         f'done in {time}s: {response.status}')
```

Gunicorn access logs

When Gunicorn is used for *deployment*, its default access log format will be automatically replaced with the default aiohttp's access log format.

If Gunicorn's option access_logformat is specified explicitly, it should use aiohttp's format specification.

Gunicorn's access log works only if accesslog is specified explicitly in your config or as a command line option. This configuration can be either a path or `'-'`. If the application uses a custom logging setup intercepting the `'gunicorn.access'` logger, accesslog should be set to `'-'` to prevent Gunicorn to create an empty access log file upon every startup.

Error logs

aiohttp.web uses a logger named `'aiohttp.server'` to store errors given on web requests handling.

This log is enabled by default.

To use a different logger name, pass *logger* (`logging.Logger` instance) to the *aiohttp.web.AppRunner()* constructor.

12.2.6 Testing

Testing aiohttp web servers

aiohttp provides plugin for *pytest* making writing web server tests extremely easy, it also provides *test framework agnostic utilities* for testing with other frameworks such as *unittest*.

Before starting to write your tests, you may also be interested on reading *how to write testable services* that interact with the loop.

For using pytest plugin please install pytest-aiohttp library:

```
$ pip install pytest-aiohttp
```

If you don't want to install *pytest-aiohttp* for some reason you may insert `pytest_plugins = 'aiohttp.pytest_plugin'` line into `conftest.py` instead for the same functionality.

Provisional Status

The module is a **provisional**.

aiohttp has a year and half period for removing deprecated API (*Policy for Backward Incompatible Changes*).

But for `aiohttp.test_tools` the deprecation period could be reduced.

Moreover we may break *backward compatibility* without *deprecation period* for some very strong reason.

The Test Client and Servers

aiohttp test utils provides a scaffolding for testing aiohttp-based web servers.

They are consist of two parts: running test server and making HTTP requests to this server.

TestServer runs *aiohttp.web.Application* based server, *RawTestServer* starts `aiohttp.web.WebServer` low level server.

For performing HTTP requests to these servers you have to create a test client: *TestClient* instance.

The client incapsulates *aiohttp.ClientSession* by providing proxy methods to the client for common operations such as *ws_connect*, *get*, *post*, etc.

Pytest

The *aiohttp_client* fixture available from pytest-aiohttp plugin allows you to create a client to make requests to test your app.

A simple would be:

```
from aiohttp import web

async def hello(request):
    return web.Response(text='Hello, world')

async def test_hello(aiohttp_client, loop):
    app = web.Application()
    app.router.add_get('/', hello)
    client = await aiohttp_client(app)
    resp = await client.get('/')
    assert resp.status == 200
    text = await resp.text()
    assert 'Hello, world' in text
```

It also provides access to the app instance allowing tests to check the state of the app. Tests can be made even more succinct with a fixture to create an app test client:

```
import pytest
from aiohttp import web


async def previous(request):
    if request.method == 'POST':
        request.app['value'] = (await request.post())['value']
        return web.Response(body=b'thanks for the data')
    return web.Response(
        body='value: {}'.format(request.app['value']).encode('utf-8'))

@pytest.fixture
def cli(loop, aiohttp_client):
    app = web.Application()
    app.router.add_get('/', previous)
    app.router.add_post('/', previous)
    return loop.run_until_complete(aiohttp_client(app))

async def test_set_value(cli):
    resp = await cli.post('/', data={'value': 'foo'})
    assert resp.status == 200
    assert await resp.text() == 'thanks for the data'
    assert cli.server.app['value'] == 'foo'

async def test_get_value(cli):
    cli.server.app['value'] = 'bar'
    resp = await cli.get('/')
    assert resp.status == 200
    assert await resp.text() == 'value: bar'
```

Pytest tooling has the following fixtures:

pytest_aiohttp.**aiohttp_server**(*app*, *, *port=None*, ***kwargs*)
A fixture factory that creates *TestServer*:

```
async def test_f(aiohttp_server):
    app = web.Application()
    # fill route table

    server = await aiohttp_server(app)
```

The server will be destroyed on exit from test function.
***app* is the *aiohttp.web.Application* used** to start server.
port optional, port the server is run at, if not provided a random unused port is used.

New in version 3.0.
kwargs* are parameters passed to *aiohttp.web.Application.make_handler()
Changed in version 3.0.

Deprecated since version 3.2: The fixture was renamed from `test_server` to `aiohttp_server`.

pytest_aiohttp.**aiohttp_client**(*app*, *server_kwargs=None*, ***kwargs*)
pytest_aiohttp.**aiohttp_client**(*server*, ***kwargs*)
pytest_aiohttp.**aiohttp_client**(*raw_server*, ***kwargs*)

A fixture factory that creates *TestClient* for access to tested server:

```
async def test_f(aiohttp_client):
    app = web.Application()
    # fill route table

    client = await aiohttp_client(app)
    resp = await client.get('/')
```

client and responses are cleaned up after test function finishing.

The fixture accepts *aiohttp.web.Application*, *aiohttp.test_utils.TestServer* or *aiohttp.test_utils.RawTestServer* instance.

server_kwargs are parameters passed to the test server if an app is passed, else ignored.

kwargs are parameters passed to *aiohttp.test_utils.TestClient* constructor.

Changed in version 3.0: The fixture was renamed from `test_client` to `aiohttp_client`.

pytest_aiohttp.**aiohttp_raw_server**(*handler*, *, *port=None*, ***kwargs*)

A fixture factory that creates *RawTestServer* instance from given web handler.:

```
async def test_f(aiohttp_raw_server, aiohttp_client):

    async def handler(request):
        return web.Response(text="OK")

    raw_server = await aiohttp_raw_server(handler)
    client = await aiohttp_client(raw_server)
    resp = await client.get('/')
```

handler should be a coroutine which accepts a request and returns response, e.g.

port optional, port the server is run at, if not provided a random unused port is used.

New in version 3.0.

pytest_aiohttp.**aiohttp_unused_port**

Function to return an unused port number for IPv4 TCP protocol:

```
async def test_f(aiohttp_client, aiohttp_unused_port):
    port = aiohttp_unused_port()
    app = web.Application()
    # fill route table

    client = await aiohttp_client(app, server_kwargs={'port': port})
    ...
```

Changed in version 3.0: The fixture was renamed from `unused_port` to `aiohttp_unused_port`.

Unittest

To test applications with the standard library's unittest or unittest-based functionality, the AioHTTPTestCase is provided:

```
from aiohttp.test_utils import AioHTTPTestCase, unittest_run_loop
from aiohttp import web

class MyAppTestCase(AioHTTPTestCase):

    async def get_application(self):
        """
        Override the get_app method to return your application.
        """
        async def hello(request):
            return web.Response(text='Hello, world')

        app = web.Application()
        app.router.add_get('/', hello)
        return app

    # the unittest_run_loop decorator can be used in tandem with
    # the AioHTTPTestCase to simplify running
    # tests that are asynchronous
    @unittest_run_loop
    async def test_example(self):
        resp = await self.client.request("GET", "/")
        assert resp.status == 200
        text = await resp.text()
        assert "Hello, world" in text

    # a vanilla example
    def test_example_vanilla(self):
        async def test_get_route():
            url = "/"
            resp = await self.client.request("GET", url)
            assert resp.status == 200
            text = await resp.text()
            assert "Hello, world" in text

        self.loop.run_until_complete(test_get_route())
```

class aiohttp.test_utils.**AioHTTPTestCase**

A base class to allow for unittest web applications using aiohttp.

Derived from `unittest.TestCase`

Provides the following:

client
an aiohttp test client, *TestClient* instance.

server
an aiohttp test server, *TestServer* instance.

New in version 2.3.

loop
The event loop in which the application and server are running.

Deprecated since version 3.5.

app
The application returned by `get_app()` (*aiohttp.web.Application* instance).

coroutine get_client()
This async method can be overridden to return the *TestClient* object used in the test.

Returns *TestClient* instance.

New in version 2.3.

coroutine get_server()
This async method can be overridden to return the *TestServer* object used in the test.

Returns *TestServer* instance.

New in version 2.3.

coroutine get_application()
This async method should be overridden to return the *aiohttp.web.Application* object to test.

Returns *aiohttp.web.Application* instance.

coroutine setUpAsync()
This async method do nothing by default and can be overridden to execute asynchronous code during the `setUp` stage of the `TestCase`.

New in version 2.3.

coroutine tearDownAsync()
This async method do nothing by default and can be overridden to execute asynchronous code during the `tearDown` stage of the `TestCase`.

New in version 2.3.

setUp()
Standard test initialization method.

tearDown()
Standard test finalization method.

Note: The `TestClient`'s methods are asynchronous: you have to execute function on the test client using asynchronous methods.

A basic test class wraps every test method by `unittest_run_loop()` decorator:

```
class TestA(AioHTTPTestCase):

    @unittest_run_loop
```

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```
    async def test_f(self):
        resp = await self.client.get('/')
```

unittest_run_loop:

A decorator dedicated to use with asynchronous methods of an *AioHTTPTestCase*.

Handles executing an asynchronous function, using the *AioHTTPTestCase.loop* of the *AioHTTPTestCase*.

Faking request object

aiohttp provides test utility for creating fake *aiohttp.web.Request* objects: *aiohttp.test_utils.make_mocked_request()*, it could be useful in case of simple unit tests, like handler tests, or simulate error conditions that hard to reproduce on real server:

```
from aiohttp import web
from aiohttp.test_utils import make_mocked_request

def handler(request):
    assert request.headers.get('token') == 'x'
    return web.Response(body=b'data')

def test_handler():
    req = make_mocked_request('GET', '/', headers={'token': 'x'})
    resp = handler(req)
    assert resp.body == b'data'
```

Warning: We don't recommend to apply *make_mocked_request()* everywhere for testing web-handler's business object – please use test client and real networking via 'localhost' as shown in examples before.

make_mocked_request() exists only for testing complex cases (e.g. emulating network errors) which are extremely hard or even impossible to test by conventional way.

aiohttp.test_utils.**make_mocked_request**(*method*, *path*, *headers=None*, ***, *version=HttpVersion(1, 1)*, *closing=False*, *app=None*, *match_info=sentinel*, *reader=sentinel*, *writer=sentinel*, *transport=sentinel*, *payload=sentinel*, *sslcontext=None*, *loop=...*)

Creates mocked web.Request testing purposes.

Useful in unit tests, when spinning full web server is overkill or specific conditions and errors are hard to trigger.

Parameters

- **method** (*str*) – str, that represents HTTP method, like; GET, POST.
- **path** (*str*) – str, The URL including *PATH INFO* without the host or scheme
- **headers** (*dict, multidict.CIMultiDict, list of pairs*) – mapping containing the headers. Can be anything accepted by the multidict.CIMultiDict constructor.
- **match_info** (*dict*) – mapping containing the info to match with url parameters.
- **version** (*aiohttp.protocol.HttpVersion*) – namedtuple with encoded HTTP version

- **closing** (*bool*) – flag indicates that connection should be closed after response.
- **app** (aiohttp.web.Application) – the aiohttp.web application attached for fake request
- **writer** (*aiohttp.StreamWriter*) – object for managing outcoming data
- **transport** (*asyncio.transports.Transport*) – asyncio transport instance
- **payload** (aiohttp.StreamReader) – raw payload reader object
- **sslcontext** (*ssl.SSLContext*) – ssl.SSLContext object, for HTTPS connection
- **loop** (asyncio.AbstractEventLoop) – An event loop instance, mocked loop by default.

Returns *aiohttp.web.Request* object.

New in version 2.3: *match_info* parameter.

Framework Agnostic Utilities

High level test creation:

```
from aiohttp.test_utils import TestClient, TestServer, loop_context
from aiohttp import request

# loop_context is provided as a utility. You can use any
# asyncio.BaseEventLoop class in its place.
with loop_context() as loop:
    app = _create_example_app()
    with TestClient(TestServer(app), loop=loop) as client:

        async def test_get_route():
            nonlocal client
            resp = await client.get("/")
            assert resp.status == 200
            text = await resp.text()
            assert "Hello, world" in text

        loop.run_until_complete(test_get_route())
```

If it's preferred to handle the creation / teardown on a more granular basis, the TestClient object can be used directly:

```
from aiohttp.test_utils import TestClient, TestServer

with loop_context() as loop:
    app = _create_example_app()
    client = TestClient(TestServer(app), loop=loop)
    loop.run_until_complete(client.start_server())
    root = "http://127.0.0.1:{}".format(port)

    async def test_get_route():
        resp = await client.get("/")
        assert resp.status == 200
        text = await resp.text()
        assert "Hello, world" in text

    loop.run_until_complete(test_get_route())
    loop.run_until_complete(client.close())
```

A full list of the utilities provided can be found at the `api reference`

Testing API Reference

Test server

Runs given *aiohttp.web.Application* instance on random TCP port.

After creation the server is not started yet, use `start_server()` for actual server starting and `close()` for stopping/cleanup.

Test server usually works in conjunction with *aiohttp.test_utils.TestClient* which provides handy client methods for accessing to the server.

class aiohttp.test_utils.**BaseTestServer**(*, *scheme='http'*, *host='127.0.0.1'*, *port=None*)

Base class for test servers.

Parameters

- **scheme** (*str*) – HTTP scheme, non-protected `"http"` by default.
- **host** (*str*) – a host for TCP socket, IPv4 *local host* (`'127.0.0.1'`) by default.
- **port** (*int*) – optional port for TCP socket, if not provided a random unused port is used.

  New in version 3.0.

scheme

A *scheme* for tested application, `'http'` for non-protected run and `'https'` for TLS encrypted server.

host

host used to start a test server.

port

port used to start the test server.

handler

`aiohttp.web.WebServer` used for HTTP requests serving.

server

`asyncio.AbstractServer` used for managing accepted connections.

coroutine start_server(*loop=None*, ***kwargs*)

Parameters **loop** (*asyncio.AbstractEventLoop*) – the event_loop to use

Start a test server.

coroutine close()

Stop and finish executed test server.

make_url(*path*)

Return an *absolute* `URL` for given *path*.

class aiohttp.test_utils.**RawTestServer**(*handler*, *, *scheme='http'*, *host='127.0.0.1'*)

Low-level test server (derived from *BaseTestServer*).

Parameters

- **handler** – a coroutine for handling web requests. The handler should accept *aiohttp.web.BaseRequest* and return a response instance, e.g. *StreamResponse* or *Response*.

  The handler could raise *HTTPException* as a signal for non-200 HTTP response.

- **scheme** (*str*) – HTTP scheme, non-protected `"http"` by default.

- **host** (*str*) – a host for TCP socket, IPv4 *local host* (`'127.0.0.1'`) by default.
- **port** (*int*) – optional port for TCP socket, if not provided a random unused port is used.

  New in version 3.0.

class aiohttp.test_utils.**TestServer**(*app*, *, *scheme='http'*, *host='127.0.0.1'*)

Test server (derived from *BaseTestServer*) for starting *Application*.

Parameters

- **app** – *aiohttp.web.Application* instance to run.
- **scheme** (*str*) – HTTP scheme, non-protected `"http"` by default.
- **host** (*str*) – a host for TCP socket, IPv4 *local host* (`'127.0.0.1'`) by default.
- **port** (*int*) – optional port for TCP socket, if not provided a random unused port is used.

  New in version 3.0.

app

aiohttp.web.Application instance to run.

Test Client

class aiohttp.test_utils.**TestClient**(*app_or_server*, *, *loop=None*, *scheme='http'*, *host='127.0.0.1'*, *cookie_jar=None*, ***kwargs*)

A test client used for making calls to tested server.

Parameters

- **app_or_server** – *BaseTestServer* instance for making client requests to it.

  In order to pass a *aiohttp.web.Application* you need to convert it first to *TestServer* first with `TestServer(app)`.
- **cookie_jar** – an optional *aiohttp.CookieJar* instance, may be useful with `CookieJar(unsafe=True)` option.
- **scheme** (*str*) – HTTP scheme, non-protected `"http"` by default.
- **loop** (*asyncio.AbstractEventLoop*) – the event_loop to use
- **host** (*str*) – a host for TCP socket, IPv4 *local host* (`'127.0.0.1'`) by default.

scheme

A *scheme* for tested application, `'http'` for non-protected run and `'https'` for TLS encrypted server.

host

host used to start a test server.

port

port used to start the server

server

BaseTestServer test server instance used in conjunction with client.

app

An alias for `self.server.app`. return `None` if `self.server` is not *TestServer* instance(e.g. *RawTestServer* instance for test low-level server).

session

An internal *aiohttp.ClientSession*.

Unlike the methods on the *TestClient*, client session requests do not automatically include the host in the url queried, and will require an absolute path to the resource.

coroutine start_server(**kwargs)
Start a test server.

coroutine close()
Stop and finish executed test server.

make_url(*path*)
Return an *absolute* URL for given *path*.

coroutine request(*method*, *path*, *args*, **kwargs*)
Routes a request to tested http server.

The interface is identical to `aiohttp.ClientSession.request()`, except the loop kwarg is overridden by the instance used by the test server.

coroutine get(*path*, *args*, **kwargs*)
Perform an HTTP GET request.

coroutine post(*path*, *args*, **kwargs*)
Perform an HTTP POST request.

coroutine options(*path*, *args*, **kwargs*)
Perform an HTTP OPTIONS request.

coroutine head(*path*, *args*, **kwargs*)
Perform an HTTP HEAD request.

coroutine put(*path*, *args*, **kwargs*)
Perform an HTTP PUT request.

coroutine patch(*path*, *args*, **kwargs*)
Perform an HTTP PATCH request.

coroutine delete(*path*, *args*, **kwargs*)
Perform an HTTP DELETE request.

coroutine ws_connect(*path*, *args*, **kwargs*)
Initiate websocket connection.

The api corresponds to *aiohttp.ClientSession.ws_connect()*.

Utilities

aiohttp.test_utils.**make_mocked_coro**(*return_value*)
Creates a coroutine mock.

Behaves like a coroutine which returns *return_value*. But it is also a mock object, you might test it as usual Mock:

```
mocked = make_mocked_coro(1)
assert 1 == await mocked(1, 2)
mocked.assert_called_with(1, 2)
```

Parameters **return_value** – A value that the the mock object will return when called.
Returns A mock object that behaves as a coroutine which returns *return_value* when called.

aiohttp.test_utils.**unused_port**()
Return an unused port number for IPv4 TCP protocol.

Return int ephemeral port number which could be reused by test server.

aiohttp.test_utils.**loop_context**(*loop_factory=<function asyncio.new_event_loop>*)
A contextmanager that creates an event_loop, for test purposes.

Handles the creation and cleanup of a test loop.

aiohttp.test_utils.**setup_test_loop**(*loop_factory=<function asyncio.new_event_loop>*)
Create and return an asyncio.AbstractEventLoop instance.

The caller should also call teardown_test_loop, once they are done with the loop.

Note: As side effect the function changes asyncio *default loop* by asyncio.set_event_loop() call.

Previous default loop is not restored.

It should not be a problem for test suite: every test expects a new test loop instance anyway.

Changed in version 3.1: The function installs a created event loop as *default*.

aiohttp.test_utils.**teardown_test_loop**(*loop*)
Teardown and cleanup an event_loop created by setup_test_loop.
Parameters **loop** (*asyncio.AbstractEventLoop*) – the loop to teardown

12.2.7 Server Deployment

There are several options for aiohttp server deployment:

- Standalone server
- Running a pool of backend servers behind of *nginx*, HAProxy or other *reverse proxy server*
- Using *gunicorn* behind of *reverse proxy*

Every method has own benefits and disadvantages.

Standalone

Just call *aiohttp.web.run_app()* function passing *aiohttp.web.Application* instance.

The method is very simple and could be the best solution in some trivial cases. But it does not utilize all CPU cores.

For running multiple aiohttp server instances use *reverse proxies*.

Nginx+supervisord

Running aiohttp servers behind *nginx* makes several advantages.

At first, nginx is the perfect frontend server. It may prevent many attacks based on malformed http protocol etc.

Second, running several aiohttp instances behind nginx allows to utilize all CPU cores.

Third, nginx serves static files much faster than built-in aiohttp static file support.

But this way requires more complex configuration.

Nginx configuration

Here is short extraction about writing Nginx configuration file. It does not cover all available Nginx options.

For full reference read Nginx tutorial and official Nginx documentation.

First configure HTTP server itself:

```
http {
  server {
    listen 80;
    client_max_body_size 4G;

    server_name example.com;

    location / {
      proxy_set_header Host $http_host;
      proxy_set_header X-Forwarded-For $proxy_add_x_forwarded_for;
      proxy_redirect off;
      proxy_buffering off;
      proxy_pass http://aiohttp;
    }

    location /static {
      # path for static files
      root /path/to/app/static;
    }

  }
}
```

This config listens on port `80` for server named `example.com` and redirects everything to `aiohttp` backend group.

Also it serves static files from `/path/to/app/static` path as `example.com/static`.

Next we need to configure *aiohttp upstream group*:

```
http {
  upstream aiohttp {
    # fail_timeout=0 means we always retry an upstream even if it failed
    # to return a good HTTP response

    # Unix domain servers
    server unix:/tmp/example_1.sock fail_timeout=0;
    server unix:/tmp/example_2.sock fail_timeout=0;
    server unix:/tmp/example_3.sock fail_timeout=0;
    server unix:/tmp/example_4.sock fail_timeout=0;

    # Unix domain sockets are used in this example due to their high performance,
    # but TCP/IP sockets could be used instead:
    # server 127.0.0.1:8081 fail_timeout=0;
    # server 127.0.0.1:8082 fail_timeout=0;
    # server 127.0.0.1:8083 fail_timeout=0;
    # server 127.0.0.1:8084 fail_timeout=0;
  }
}
```

All HTTP requests for `http://example.com` except ones for `http://example.com/static` will be redirected to `example1.sock`, `example2.sock`, `example3.sock` or `example4.sock` backend servers. By

default, Nginx uses round-robin algorithm for backend selection.

Note: Nginx is not the only existing *reverse proxy server* but the most popular one. Alternatives like HAProxy may be used as well.

Supervisord

After configuring Nginx we need to start our aiohttp backends. Better to use some tool for starting them automatically after system reboot or backend crash.

There are very many ways to do it: Supervisord, Upstart, Systemd, Gaffer, Circus, Runit etc.

Here we'll use Supervisord for example:

```
[program:aiohttp]
numprocs = 4
numprocs_start = 1
process_name = example_%(process_num)s

; Unix socket paths are specified by command line.
command=/path/to/aiohttp_example.py --path=/tmp/example_%(process_num)s.sock

; We can just as easily pass TCP port numbers:
; command=/path/to/aiohttp_example.py --port=808%(process_num)s

user=nobody
autostart=true
autorestart=true
```

aiohttp server

The last step is preparing aiohttp server for working with supervisord.

Assuming we have properly configured *aiohttp.web.Application* and port is specified by command line, the task is trivial:

```
# aiohttp_example.py
import argparse
from aiohttp import web

parser = argparse.ArgumentParser(description="aiohttp server example")
parser.add_argument('--path')
parser.add_argument('--port')


if __name__ == '__main__':
    app = web.Application()
    # configure app

    args = parser.parse_args()
    web.run_app(app, path=args.path, port=args.port)
```

For real use cases we perhaps need to configure other things like logging etc., but it's out of scope of the topic.

Nginx+Gunicorn

aiohttp can be deployed using Gunicorn, which is based on a pre-fork worker model. Gunicorn launches your app as worker processes for handling incoming requests.

In opposite to deployment with *bare Nginx* the solution does not need to manually run several aiohttp processes and use tool like supervisord for monitoring it. But nothing is for free: running aiohttp application under gunicorn is slightly slower.

Prepare environment

You firstly need to setup your deployment environment. This example is based on Ubuntu 16.04.

Create a directory for your application:

```
>> mkdir myapp
>> cd myapp
```

Create Python virtual environment:

```
>> python3 -m venv venv
>> source venv/bin/activate
```

Now that the virtual environment is ready, we'll proceed to install aiohttp and gunicorn:

```
>> pip install gunicorn
>> pip install aiohttp
```

Application

Lets write a simple application, which we will save to file. We'll name this file *my_app_module.py*:

```
from aiohttp import web

async def index(request):
    return web.Response(text="Welcome home!")


my_web_app = web.Application()
my_web_app.router.add_get('/', index)
```

Application factory

As an option an entry point could be a coroutine that accepts no parameters and returns an application instance:

```
from aiohttp import web

async def index(request):
    return web.Response(text="Welcome home!")


async def my_web_app():
    app = web.Application()
```

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```
    app.router.add_get('/', index)
    return app
```

Start Gunicorn

When Running Gunicorn, you provide the name of the module, i.e. *my_app_module*, and the name of the app or application factory, i.e. *my_web_app*, along with other Gunicorn Settings provided as command line flags or in your config file.

In this case, we will use:

- the `--bind` flag to set the server's socket address;
- the `--worker-class` flag to tell Gunicorn that we want to use a custom worker subclass instead of one of the Gunicorn default worker types;
- you may also want to use the `--workers` flag to tell Gunicorn how many worker processes to use for handling requests. (See the documentation for recommendations on How Many Workers?)
- you may also want to use the `--accesslog` flag to enable the access log to be populated. (See *logging* for more information.)

The custom worker subclass is defined in `aiohttp.GunicornWebWorker`:

```
>> gunicorn my_app_module:my_web_app --bind localhost:8080 --worker-class aiohttp.
↪GunicornWebWorker
[2017-03-11 18:27:21 +0000] [1249] [INFO] Starting gunicorn 19.7.1
[2017-03-11 18:27:21 +0000] [1249] [INFO] Listening at: http://127.0.0.1:8080 (1249)
[2017-03-11 18:27:21 +0000] [1249] [INFO] Using worker: aiohttp.worker.
↪GunicornWebWorker
[2015-03-11 18:27:21 +0000] [1253] [INFO] Booting worker with pid: 1253
```

Gunicorn is now running and ready to serve requests to your app's worker processes.

Note: If you want to use an alternative asyncio event loop uvloop, you can use the `aiohttp.GunicornUVLoopWebWorker` worker class.

Proxy through NGINX

We can proxy our gunicorn workers through NGINX with a configuration like this:

```
worker_processes 1;
user nobody nogroup;
events {
    worker_connections 1024;
}
http {
    ## Main Server Block
    server {
        ## Open by default.
        listen                80 default_server;
        server_name           main;
        client_max_body_size  200M;
```

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```
        ## Main site location.
        location / {
            proxy_pass                          http://127.0.0.1:8080;
            proxy_set_header                    Host $host;
            proxy_set_header X-Forwarded-Host   $server_name;
            proxy_set_header X-Real-IP          $remote_addr;
        }
    }
}
```

Since gunicorn listens for requests at our localhost address on port 8080, we can use the proxy_pass directive to send web traffic to our workers. If everything is configured correctly, we should reach our application at the ip address of our web server.

Proxy through NGINX + SSL

Here is an example NGINX configuration setup to accept SSL connections:

```
worker_processes 1;
user nobody nogroup;
events {
    worker_connections 1024;
}
http {
    ## SSL Redirect
    server {
        listen 80       default;
        return 301      https://$host$request_uri;
    }

    ## Main Server Block
    server {
        # Open by default.
        listen                443 ssl default_server;
        listen                [::]:443 ssl default_server;
        server_name           main;
        client_max_body_size  200M;

        ssl_certificate       /etc/secrets/cert.pem;
        ssl_certificate_key   /etc/secrets/key.pem;

        ## Main site location.
        location / {
            proxy_pass                          http://127.0.0.1:8080;
            proxy_set_header                    Host $host;
            proxy_set_header X-Forwarded-Host   $server_name;
            proxy_set_header X-Real-IP          $remote_addr;
        }
    }
}
```

The first server block accepts regular http connections on port 80 and redirects them to our secure SSL connection. The second block matches our previous example except we need to change our open port to https and specify where our SSL certificates are being stored with the `ssl_certificate` and `ssl_certificate_key` directives.

During development, you may want to create your own self-signed certificates for testing purposes and use another service like Let's Encrypt when you are ready to move to production.

More information

See the official documentation for more information about suggested nginx configuration. You can also find out more about configuring for secure https connections as well.

Logging configuration

`aiohttp` and `gunicorn` use different format for specifying access log.

By default aiohttp uses own defaults:

```
'%a %t "%r" %s %b "%{Referer}i" "%{User-Agent}i"'
```

For more information please read *Format Specification for Access Log*.

Proxy through Apache at your own risk

Issues have been reported using Apache2 in front of aiohttp server: *#2687 Intermittent 502 proxy errors when running behind Apache <https://github.com/aio-libs/aiohttp/issues/2687>*.

12.3 Utilities

Miscellaneous API Shared between Client And Server.

12.3.1 Abstract Base Classes

Abstract routing

aiohttp has abstract classes for managing web interfaces.

The most part of *aiohttp.web* is not intended to be inherited but few of them are.

aiohttp.web is built on top of few concepts: *application*, *router*, *request* and *response*.

router is a *plugable* part: a library user may build a *router* from scratch, all other parts should work with new router seamlessly.

`AbstractRouter` has the only mandatory method: `AbstractRouter.resolve()` coroutine. It must return an `AbstractMatchInfo` instance.

If the requested URL handler is found `AbstractMatchInfo.handler()` is a *web-handler* for requested URL and `AbstractMatchInfo.http_exception` is `None`.

Otherwise `AbstractMatchInfo.http_exception` is an instance of *HTTPException* like *404: NotFound* or *405: Method Not Allowed*. `AbstractMatchInfo.handler()` raises `http_exception` on call.

class aiohttp.abc.**AbstractRouter**

Abstract router, *aiohttp.web.Application* accepts it as *router* parameter and returns as *aiohttp.web.Application.router*.

coroutine resolve(*request*)
Performs URL resolving. It's an abstract method, should be overridden in *router* implementation.
Parameters **request** – *aiohttp.web.Request* instance for resolving, the request has *aiohttp.web.Request.match_info* equals to `None` at resolving stage.
Returns `AbstractMatchInfo` instance.

class aiohttp.abc.**AbstractMatchInfo**
Abstract *match info*, returned by `AbstractRouter.resolve()` call.

http_exception
aiohttp.web.HTTPException if no match was found, `None` otherwise.

coroutine handler(*request*)
Abstract method performing *web-handler* processing.
Parameters **request** – *aiohttp.web.Request* instance for resolving, the request has *aiohttp.web.Request.match_info* equals to `None` at resolving stage.
Returns *aiohttp.web.StreamResponse* or descendants.
Raise *aiohttp.web.HTTPException* on error

coroutine expect_handler(*request*)
Abstract method for handling *100-continue* processing.

Abstract Class Based Views

For *class based view* support aiohttp has abstract *AbstractView* class which is *awaitable* (may be uses like `await Cls()` or `yield from Cls()` and has a *request* as an attribute.

class aiohttp.abc.**AbstractView**
An abstract class, base for all *class based views* implementations.

Methods `__iter__` and `__await__` should be overridden.

request
aiohttp.web.Request instance for performing the request.

Abstract Cookie Jar

class aiohttp.abc.**AbstractCookieJar**
The cookie jar instance is available as `ClientSession.cookie_jar`.

The jar contains `Morsel` items for storing internal cookie data.

API provides a count of saved cookies:

```
len(session.cookie_jar)
```

These cookies may be iterated over:

```
for cookie in session.cookie_jar:
    print(cookie.key)
    print(cookie["domain"])
```

An abstract class for cookie storage. Implements `collections.abc.Iterable` and `collections.abc.Sized`.

update_cookies(*cookies*, *response_url=None*)
Update cookies returned by server in `Set-Cookie` header.

Parameters

- **cookies** – a collections.abc.Mapping (e.g. dict, SimpleCookie) or *iterable* of *pairs* with cookies returned by server's response.
- **response_url** (*str*) – URL of response, None for *shared cookies*. Regular cookies are coupled with server's URL and are sent only to this server, shared ones are sent in every client request.

filter_cookies(*request_url*)

Return jar's cookies acceptable for URL and available in Cookie header for sending client requests for given URL.

Parameters **response_url** (*str*) – request's URL for which cookies are asked.

Returns http.cookies.SimpleCookie with filtered cookies for given URL.

Abstract Abstract Access Logger

class aiohttp.abc.**AbstractAccessLogger**

An abstract class, base for all RequestHandler access_logger implementations

Method log should be overridden.

log(*request*, *response*, *time*)

Parameters

- **request** – *aiohttp.web.Request* object.
- **response** – *aiohttp.web.Response* object.
- **time** (*float*) – Time taken to serve the request.

12.3.2 Working with Multipart

aiohttp supports a full featured multipart reader and writer. Both are designed with streaming processing in mind to avoid unwanted footprint which may be significant if you're dealing with large payloads, but this also means that most I/O operation are only possible to be executed a single time.

Reading Multipart Responses

Assume you made a request, as usual, and want to process the response multipart data:

```
async with aiohttp.request(...) as resp:
    pass
```

First, you need to wrap the response with a *MultipartReader.from_response()*. This needs to keep the implementation of *MultipartReader* separated from the response and the connection routines which makes it more portable:

```
reader = aiohttp.MultipartReader.from_response(resp)
```

Let's assume with this response you'd received some JSON document and multiple files for it, but you don't need all of them, just a specific one.

So first you need to enter into a loop where the multipart body will be processed:

```
metadata = None
filedata = None
while True:
    part = await reader.next()
```

The returned type depends on what the next part is: if it's a simple body part then you'll get *BodyPartReader* instance here, otherwise, it will be another *MultipartReader* instance for the nested multipart. Remember, that multipart format is recursive and supports multiple levels of nested body parts. When there are no more parts left to fetch, `None` value will be returned - that's the signal to break the loop:

```
if part is None:
    break
```

Both *BodyPartReader* and *MultipartReader* provides access to body part headers: this allows you to filter parts by their attributes:

```
if part.headers[aiohttp.hdrs.CONTENT_TYPE] == 'application/json':
    metadata = await part.json()
    continue
```

Nor *BodyPartReader* or *MultipartReader* instances does not read the whole body part data without explicitly asking for. *BodyPartReader* provides a set of helpers methods to fetch popular content types in friendly way:

- *BodyPartReader.text()* for plain text data;
- *BodyPartReader.json()* for JSON;
- *BodyPartReader.form()* for *application/www-urlform-encode*

Each of these methods automatically recognizes if content is compressed by using *gzip* and *deflate* encoding (while it respects *identity* one), or if transfer encoding is base64 or *quoted-printable* - in each case the result will get automatically decoded. But in case you need to access to raw binary data as it is, there are *BodyPartReader.read()* and *BodyPartReader.read_chunk()* coroutine methods as well to read raw binary data as it is all-in-single-shot or by chunks respectively.

When you have to deal with multipart files, the *BodyPartReader.filename* property comes to help. It's a very smart helper which handles *Content-Disposition* handler right and extracts the right filename attribute from it:

```
if part.filename != 'secret.txt':
    continue
```

If current body part does not matches your expectation and you want to skip it - just continue a loop to start a next iteration of it. Here is where magic happens. Before fetching the next body part `await reader.next()` it ensures that the previous one was read completely. If it was not, all its content sends to the void in term to fetch the next part. So you don't have to care about cleanup routines while you're within a loop.

Once you'd found a part for the file you'd searched for, just read it. Let's handle it as it is without applying any decoding magic:

```
filedata = await part.read(decode=False)
```

Later you may decide to decode the data. It's still simple and possible to do:

```
filedata = part.decode(filedata)
```

Once you are done with multipart processing, just break a loop:

```
break
```

Sending Multipart Requests

MultipartWriter provides an interface to build multipart payload from the Python data and serialize it into chunked binary stream. Since multipart format is recursive and supports deeply nesting, you can use `with` statement to design your multipart data closer to how it will be:

```
with aiohttp.MultipartWriter('mixed') as mpwriter:
    ...
    with aiohttp.MultipartWriter('related') as subwriter:
        ...
    mpwriter.append(subwriter)

    with aiohttp.MultipartWriter('related') as subwriter:
        ...
        with aiohttp.MultipartWriter('related') as subsubwriter:
            ...
        subwriter.append(subsubwriter)
    mpwriter.append(subwriter)

    with aiohttp.MultipartWriter('related') as subwriter:
        ...
    mpwriter.append(subwriter)
```

The *MultipartWriter.append()* is used to join new body parts into a single stream. It accepts various inputs and determines what default headers should be used for.

For text data default *Content-Type* is *text/plain; charset=utf-8*:

```
mpwriter.append('hello')
```

For binary data *application/octet-stream* is used:

```
mpwriter.append(b'aiohttp')
```

You can always override these default by passing your own headers with the second argument:

```
mpwriter.append(io.BytesIO(b'GIF89a...'),
                {'CONTENT-TYPE': 'image/gif'})
```

For file objects *Content-Type* will be determined by using Python's mod:*mimetypes* module and additionally *Content-Disposition* header will include the file's basename:

```
part = root.append(open(__file__, 'rb'))
```

If you want to send a file with a different name, just handle the `Payload` instance which *MultipartWriter.append()* will always return and set *Content-Disposition* explicitly by using the `Payload.set_content_disposition()` helper:

```
part.set_content_disposition('attachment', filename='secret.txt')
```

Additionally, you may want to set other headers here:

```
part.headers[aiohttp.hdrs.CONTENT_ID] = 'X-12345'
```

If you'd set *Content-Encoding*, it will be automatically applied to the data on serialization (see below):

```
part.headers[aiohttp.hdrs.CONTENT_ENCODING] = 'gzip'
```

There are also *MultipartWriter.append_json()* and *MultipartWriter.append_form()* helpers which are useful to work with JSON and form urlencoded data, so you don't have to encode it every time manually:

```
mpwriter.append_json({'test': 'passed'})
mpwriter.append_form([('key', 'value')])
```

When it's done, to make a request just pass a root *MultipartWriter* instance as `aiohttp.ClientSession.request()` `data` argument:

```
await session.post('http://example.com', data=mpwriter)
```

Behind the scenes *MultipartWriter.write()* will yield chunks of every part and if body part has *Content-Encoding* or *Content-Transfer-Encoding* they will be applied on streaming content.

Please note, that on *MultipartWriter.write()* all the file objects will be read until the end and there is no way to repeat a request without rewinding their pointers to the start.

Example MJPEG Streaming `multipart/x-mixed-replace`. By default *MultipartWriter.write()* appends closing `--boundary--` and breaks your content. Providing *close_boundary* = *False* prevents this.:

```
my_boundary = 'some-boundary'
response = web.StreamResponse(
    status=200,
    reason='OK',
    headers={
        'Content-Type': 'multipart/x-mixed-replace;boundary={}'.format(my_boundary)
    }
)
while True:
    frame = get_jpeg_frame()
    with MultipartWriter('image/jpeg', boundary=my_boundary) as mpwriter:
        mpwriter.append(frame, {
            'Content-Type': 'image/jpeg'
        })
        await mpwriter.write(response, close_boundary=False)
    await response.drain()
```

Hacking Multipart

The Internet is full of terror and sometimes you may find a server which implements multipart support in strange ways when an oblivious solution does not work.

For instance, is server used `cgi.FieldStorage` then you have to ensure that no body part contains a *Content-Length* header:

```
for part in mpwriter:
    part.headers.pop(aiohttp.hdrs.CONTENT_LENGTH, None)
```

On the other hand, some server may require to specify *Content-Length* for the whole multipart request. *aiohttp* does not do that since it sends multipart using chunked transfer encoding by default. To overcome this issue, you have to serialize a *MultipartWriter* by our own in the way to calculate its size:

```
class Writer:
    def __init__(self):
        self.buffer = bytearray()
```

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```
    async def write(self, data):
        self.buffer.extend(data)

writer = Writer()
await mpwriter.write(writer)
await aiohttp.post('http://example.com',
                   data=writer.buffer, headers=mpwriter.headers)
```

Sometimes the server response may not be well formed: it may or may not contains nested parts. For instance, we request a resource which returns JSON documents with the files attached to it. If the document has any attachments, they are returned as a nested multipart. If it has not it responds as plain body parts:

```
CONTENT-TYPE: multipart/mixed; boundary=--:

--:
CONTENT-TYPE: application/json

{"_id": "foo"}
--:
CONTENT-TYPE: multipart/related; boundary=----:

----:
CONTENT-TYPE: application/json

{"_id": "bar"}
----:
CONTENT-TYPE: text/plain
CONTENT-DISPOSITION: attachment; filename=bar.txt

bar! bar! bar!
----:--
--:
CONTENT-TYPE: application/json

{"_id": "boo"}
--:
CONTENT-TYPE: multipart/related; boundary=----:

----:
CONTENT-TYPE: application/json

{"_id": "baz"}
----:
CONTENT-TYPE: text/plain
CONTENT-DISPOSITION: attachment; filename=baz.txt

baz! baz! baz!
----:--
--:--
```

Reading such kind of data in single stream is possible, but is not clean at all:

```
result = []
while True:
    part = await reader.next()
```

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```
    if part is None:
        break

    if isinstance(part, aiohttp.MultipartReader):
        # Fetching files
        while True:
            filepart = await part.next()
            if filepart is None:
                break
            result[-1].append((await filepart.read()))

    else:
        # Fetching document
        result.append([(await part.json())])
```

Let's hack a reader in the way to return pairs of document and reader of the related files on each iteration:

```
class PairsMultipartReader(aiohttp.MultipartReader):

    # keep reference on the original reader
    multipart_reader_cls = aiohttp.MultipartReader

    async def next(self):
        """Emits a tuple of document object (:class:`dict`) and multipart
        reader of the followed attachments (if any).

        :rtype: tuple
        """
        reader = await super().next()

        if self._at_eof:
            return None, None

        if isinstance(reader, self.multipart_reader_cls):
            part = await reader.next()
            doc = await part.json()
        else:
            doc = await reader.json()

        return doc, reader
```

And this gives us a more cleaner solution:

```
reader = PairsMultipartReader.from_response(resp)
result = []
while True:
    doc, files_reader = await reader.next()

    if doc is None:
        break

    files = []
    while True:
        filepart = await files_reader.next()
        if file.part is None:
            break
```

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```
        files.append((await filepart.read()))

    result.append((doc, files))
```

See also:

Multipart reference

12.3.3 Multipart reference

class aiohttp.**MultipartResponseWrapper**(*resp*, *stream*)

Wrapper around the `MultipartBodyReader` to take care about underlying connection and close it when it needs in.

at_eof()

Returns `True` when all response data had been read.

Return type bool

coroutine next()

Emits next multipart reader object.

coroutine release()

Releases the connection gracefully, reading all the content to the void.

class aiohttp.**BodyPartReader**(*boundary*, *headers*, *content*)

Multipart reader for single body part.

coroutine read(*, *decode=False*)

Reads body part data.

Parameters **decode** (*bool*) – Decodes data following by encoding method from `Content-Encoding` header. If it missed data remains untouched

Return type bytearray

coroutine read_chunk(*size=chunk_size*)

Reads body part content chunk of the specified size.

Parameters **size** (*int*) – chunk size

Return type bytearray

coroutine readline()

Reads body part by line by line.

Return type bytearray

coroutine release()

Like *read()*, but reads all the data to the void.

Return type None

coroutine text(*, *encoding=None*)

Like *read()*, but assumes that body part contains text data.

Parameters **encoding** (*str*) – Custom text encoding. Overrides specified in charset param of `Content-Type` header

Return type str

coroutine json(*, *encoding=None*)

Like *read()*, but assumes that body parts contains JSON data.

Parameters **encoding** (*str*) – Custom JSON encoding. Overrides specified in charset param of `Content-Type` header

coroutine form(*, *encoding=None*)
Like *read()*, but assumes that body parts contains form urlencoded data.
Parameters **encoding** (*str*) – Custom form encoding. Overrides specified in charset param of `Content-Type` header

at_eof()
Returns `True` if the boundary was reached or `False` otherwise.
Return type bool

decode(*data*)
Decodes data according the specified `Content-Encoding` or `Content-Transfer-Encoding` headers value.

Supports `gzip`, `deflate` and `identity` encodings for `Content-Encoding` header.

Supports `base64`, `quoted-printable`, `binary` encodings for `Content-Transfer-Encoding` header.
Parameters **data** (*bytearray*) – Data to decode.

Raises `RuntimeError` - if encoding is unknown.

Return type bytes

get_charset(*default=None*)
Returns charset parameter from `Content-Type` header or default.

name
A field *name* specified in `Content-Disposition` header or `None` if missed or header is malformed.

Readonly `str` property.

filename
A field *filename* specified in `Content-Disposition` header or `None` if missed or header is malformed.

Readonly `str` property.

class aiohttp.**MultipartReader**(*headers*, *content*)
Multipart body reader.

classmethod from_response(*cls*, *response*)
Constructs reader instance from HTTP response.
Parameters **response** – `ClientResponse` instance

at_eof()
Returns `True` if the final boundary was reached or `False` otherwise.
Return type bool

coroutine next()
Emits the next multipart body part.

coroutine release()
Reads all the body parts to the void till the final boundary.

coroutine fetch_next_part()
Returns the next body part reader.

class aiohttp.**MultipartWriter**(*subtype='mixed'*, *boundary=None*, *close_boundary=True*)
Multipart body writer.

`boundary` may be an ASCII-only string.

boundary
The string (`str`) representation of the boundary.

Changed in version 3.0: Property type was changed from `bytes` to `str`.

append(*obj*, *headers=None*)
Append an object to writer.

append_payload(*payload*)
Adds a new body part to multipart writer.

append_json(*obj*, *headers=None*)
Helper to append JSON part.

append_form(*obj*, *headers=None*)
Helper to append form urlencoded part.

size
Size of the payload.

coroutine write(*writer*, *close_boundary=True*)
Write body.
Parameters **close_boundary** (*bool*) – The (`bool`) that will emit boundary closing.
You may want to disable when streaming (`multipart/x-mixed-replace`)
New in version 3.4: Support `close_boundary` argument.

12.3.4 Streaming API

`aiohttp` uses streams for retrieving *BODIES*: `aiohttp.web.Request.content` and *aiohttp.ClientResponse.content* are properties with stream API.

class aiohttp.**StreamReader**
The reader from incoming stream.

User should never instantiate streams manually but use existing `aiohttp.web.Request.content` and *aiohttp.ClientResponse.content* properties for accessing raw BODY data.

Reading Methods

coroutine StreamReader.**read**(*n=-1*)
Read up to *n* bytes. If *n* is not provided, or set to `-1`, read until EOF and return all read bytes.

If the EOF was received and the internal buffer is empty, return an empty bytes object.
Parameters **n** (*int*) – how many bytes to read, `-1` for the whole stream.
Return bytes the given data

coroutine StreamReader.**readany**()
Read next data portion for the stream.

Returns immediately if internal buffer has a data.
Return bytes the given data

coroutine StreamReader.**readexactly**(*n*)
Read exactly *n* bytes.

Raise an `asyncio.IncompleteReadError` if the end of the stream is reached before *n* can be read, the `asyncio.IncompleteReadError.partial` attribute of the exception contains the partial read bytes.
Parameters **n** (*int*) – how many bytes to read.
Return bytes the given data

coroutine StreamReader.**readline**()
Read one line, where "line" is a sequence of bytes ending with `\n`.

If EOF is received, and `\n` was not found, the method will return the partial read bytes.

If the EOF was received and the internal buffer is empty, return an empty bytes object.

Return bytes the given line

coroutine `StreamReader.`**readchunk**`()`

Read a chunk of data as it was received by the server.

Returns a tuple of (data, end_of_HTTP_chunk).

When chunked transfer encoding is used, end_of_HTTP_chunk is a `bool` indicating if the end of the data corresponds to the end of a HTTP chunk, otherwise it is always `False`.

Return tuple[bytes, bool] a chunk of data and a `bool` that is `True` when the end of the returned chunk corresponds to the end of a HTTP chunk.

Asynchronous Iteration Support

Stream reader supports asynchronous iteration over BODY.

By default it iterates over lines:

```
async for line in response.content:
    print(line)
```

Also there are methods for iterating over data chunks with maximum size limit and over any available data.

async-for `StreamReader.`**iter_chunked**`(`*n*`)`

Iterates over data chunks with maximum size limit:

```
async for data in response.content.iter_chunked(1024):
    print(data)
```

async-for `StreamReader.`**iter_any**`()`

Iterates over data chunks in order of intaking them into the stream:

```
async for data in response.content.iter_any():
    print(data)
```

async-for `StreamReader.`**iter_chunks**`()`

Iterates over data chunks as received from the server:

```
async for data, _ in response.content.iter_chunks():
    print(data)
```

If chunked transfer encoding is used, the original http chunks formatting can be retrieved by reading the second element of returned tuples:

```
buffer = b""

async for data, end_of_http_chunk in response.content.iter_chunks():
    buffer += data
    if end_of_http_chunk:
        print(buffer)
        buffer = b""
```

Helpers

StreamReader.**exception**()
Get the exception occurred on data reading.

aiohttp.**is_eof**()
Return True if EOF was reached.

Internal buffer may be not empty at the moment.

See also:

StreamReader.at_eof()

StreamReader.**at_eof**()
Return True if the buffer is empty and EOF was reached.

StreamReader.**read_nowait**(*n=None*)
Returns data from internal buffer if any, empty bytes object otherwise.

Raises RuntimeError if other coroutine is waiting for stream.
Parameters **n** (*int*) – how many bytes to read, -1 for the whole internal buffer.
Return bytes the given data

StreamReader.**unread_data**(*data*)
Rollback reading some data from stream, inserting it to buffer head.
Parameters **data** (*bytes*) – data to push back into the stream.

> **Warning:** The method does not wake up waiters.
>
> E.g. *read()* will not be resumed.

coroutine aiohttp.**wait_eof**()
Wait for EOF. The given data may be accessible by upcoming read calls.

12.3.5 Signals

Signal is a list of registered asynchronous callbacks.

The signal's life-cycle has two stages: after creation its content could be filled by using standard list operations: sig.append() etc.

After sig.freeze() call the signal is *frozen*: adding, removing and dropping callbacks are forbidden.

The only available operation is calling previously registered callbacks by await sig.send(data).

For concrete usage examples see *signals in aiohttp.web* chapter.

Changed in version 3.0: sig.send() call is forbidden for non-frozen signal.

Support for regular (non-async) callbacks is dropped. All callbacks should be async functions.

class aiohttp.**Signal**
The signal, implements collections.abc.MutableSequence interface.

coroutine **send**(**args*, ***kwargs*)
Call all registered callbacks one by one starting from the begin of list.

frozen
True if *freeze()* was called, read-only property.

freeze()
Freeze the list. After the call any content modification is forbidden.

12.3.6 Common data structures

Common data structures used by *aiohttp* internally.

FrozenList

A list-like structure which implements `collections.abc.MutableSequence`.

The list is *mutable* unless *`FrozenList.freeze()`* is called, after that the list modification raises `RuntimeError`.

class aiohttp.**FrozenList**(*items*)
Construct a new *non-frozen* list from *items* iterable.

The list implements all `collections.abc.MutableSequence` methods plus two additional APIs.

frozen
A read-only property, `True` is the list is *frozen* (modifications are forbidden).

freeze()
Freeze the list. There is no way to *thaw* it back.

ChainMapProxy

An *immutable* version of `collections.ChainMap`. Internally the proxy is a list of mappings (dictionaries), if the requested key is not present in the first mapping the second is looked up and so on.

The class supports `collections.abc.Mapping` interface.

class aiohttp.**ChainMapProxy**(*maps*)
Create a new chained mapping proxy from a list of mappings (*maps*).

New in version 3.2.

12.3.7 WebSocket utilities

class aiohttp.**WSCloseCode**
An `IntEnum` for keeping close message code.

OK
A normal closure, meaning that the purpose for which the connection was established has been fulfilled.

GOING_AWAY
An endpoint is "going away", such as a server going down or a browser having navigated away from a page.

PROTOCOL_ERROR
An endpoint is terminating the connection due to a protocol error.

UNSUPPORTED_DATA
An endpoint is terminating the connection because it has received a type of data it cannot accept (e.g., an endpoint that understands only text data MAY send this if it receives a binary message).

INVALID_TEXT
An endpoint is terminating the connection because it has received data within a message that was not consistent with the type of the message (e.g., non-UTF-8 **RFC 3629** data within a text message).

POLICY_VIOLATION
An endpoint is terminating the connection because it has received a message that violates its policy. This is a generic status code that can be returned when there is no other more suitable status code (e.g., `unsupported_data` or `message_too_big`) or if there is a need to hide specific details about the policy.

MESSAGE_TOO_BIG
An endpoint is terminating the connection because it has received a message that is too big for it to process.

MANDATORY_EXTENSION
An endpoint (client) is terminating the connection because it has expected the server to negotiate one or more extension, but the server did not return them in the response message of the WebSocket handshake. The list of extensions that are needed should appear in the /reason/ part of the Close frame. Note that this status code is not used by the server, because it can fail the WebSocket handshake instead.

INTERNAL_ERROR
A server is terminating the connection because it encountered an unexpected condition that prevented it from fulfilling the request.

SERVICE_RESTART
The service is restarted. a client may reconnect, and if it chooses to do, should reconnect using a randomized delay of 5-30s.

TRY_AGAIN_LATER
The service is experiencing overload. A client should only connect to a different IP (when there are multiple for the target) or reconnect to the same IP upon user action.

class aiohttp.**WSMsgType**
An `IntEnum` for describing *`WSMessage`* type.

CONTINUATION
A mark for continuation frame, user will never get the message with this type.

TEXT
Text message, the value has `str` type.

BINARY
Binary message, the value has `bytes` type.

PING
Ping frame (sent by client peer).

PONG
Pong frame, answer on ping. Sent by server peer.

CLOSE
Close frame.

CLOSED FRAME
Actually not frame but a flag indicating that websocket was closed.

ERROR
Actually not frame but a flag indicating that websocket was received an error.

class aiohttp.**WSMessage**
Websocket message, returned by `.receive()` calls.

type
Message type, *WSMsgType* instance.

data
Message payload.

1. `str` for *WSMsgType.TEXT* messages.
2. `bytes` for *WSMsgType.BINARY* messages.
3. *WSCloseCode* for *WSMsgType.CLOSE* messages.
4. `bytes` for *WSMsgType.PING* messages.
5. `bytes` for *WSMsgType.PONG* messages.

extra
Additional info, `str`.

Makes sense only for *WSMsgType.CLOSE* messages, contains optional message description.

json(*, *loads=json.loads*)
Returns parsed JSON data.

Parameters **loads** – optional JSON decoder function.

12.4 FAQ

12.4.1 Are there plans for an @app.route decorator like in Flask?

As of aiohttp 2.3, *RouteTableDef* provides an API similar to Flask's `@app.route`. See *Alternative ways for registering routes*.

Unlike Flask's `@app.route`, *RouteTableDef* does not require an `app` in the module namespace (which often leads to circular imports).

Instead, a *RouteTableDef* is decoupled from an application instance:

```
routes = web.RouteTableDef()

@routes.get('/get')
async def handle_get(request):
    ...


@routes.post('/post')
async def handle_post(request):
    ...

app.router.add_routes(routes)
```

12.4.2 Does aiohttp have a concept like Flask's "blueprint" or Django's "app"?

If you're writing a large application, you may want to consider using *nested applications*, which are similar to Flask's "blueprints" or Django's "apps".

See: *Nested applications*.

12.4.3 How do I create a route that matches urls with a given prefix?

You can do something like the following:

```
app.router.add_route('*', '/path/to/{tail:.+}', sink_handler)
```

The first argument, `*`, matches any HTTP method (*GET, POST, OPTIONS*, etc). The second argument matches URLS with the desired prefix. The third argument is the handler function.

12.4.4 Where do I put my database connection so handlers can access it?

aiohttp.web.Application object supports the `dict` interface and provides a place to store your database connections or any other resource you want to share between handlers.

```
async def go(request):
    db = request.app['db']
    cursor = await db.cursor()
    await cursor.execute('SELECT 42')
    # ...
    return web.Response(status=200, text='ok')


async def init_app(loop):
    app = Application(loop=loop)
```

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```
    db = await create_connection(user='user', password='123')
    app['db'] = db
    app.router.add_get('/', go)
    return app
```

12.4.5 How can middleware store data for web handlers to use?

Both *aiohttp.web.Request* and *aiohttp.web.Application* support the `dict` interface.

Therefore, data may be stored inside a request object.

```
async def handler(request):
    request['unique_key'] = data
```

See https://github.com/aio-libs/aiohttp_session code for an example. The `aiohttp_session.get_session(request)` method uses `SESSION_KEY` for saving request-specific session information.

As of aiohttp 3.0, all response objects are dict-like structures as well.

12.4.6 Can a handler receive incoming events from different sources in parallel?

Yes.

As an example, we may have two event sources:

1. WebSocket for events from an end user
2. Redis PubSub for events from other parts of the application

The most native way to handle this is to create a separate task for PubSub handling.

Parallel *aiohttp.web.WebSocketResponse.receive()* calls are forbidden; a single task should perform WebSocket reading. However, other tasks may use the same WebSocket object for sending data to peers.

```
async def handler(request):

    ws = web.WebSocketResponse()
    await ws.prepare(request)
    task = request.app.loop.create_task(
        read_subscription(ws,
                          request.app['redis']))
    try:
        async for msg in ws:
            # handle incoming messages
            # use ws.send_str() to send data back
            ...

    finally:
        task.cancel()

async def read_subscription(ws, redis):
    channel, = await redis.subscribe('channel:1')

    try:
        async for msg in channel.iter():
            answer = process_the_message(msg)  # your function here
```

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```
            await ws.send_str(answer)
    finally:
        await redis.unsubscribe('channel:1')
```

12.4.7 How do I programmatically close a WebSocket server-side?

Let's say we have an application with two endpoints:

1. `/echo` a WebSocket echo server that authenticates the user
2. `/logout_user` that, when invoked, closes all open WebSockets for that user.

One simple solution is to keep a shared registry of WebSocket responses for a user in the *aiohttp.web.Application* instance and call *aiohttp.web.WebSocketResponse.close()* on all of them in `/logout_user` handler:

```
async def echo_handler(request):

    ws = web.WebSocketResponse()
    user_id = authenticate_user(request)
    await ws.prepare(request)
    request.app['websockets'][user_id].add(ws)
    try:
        async for msg in ws:
            ws.send_str(msg.data)
    finally:
        request.app['websockets'][user_id].remove(ws)

    return ws


async def logout_handler(request):

    user_id = authenticate_user(request)

    ws_closers = [ws.close()
                  for ws in request.app['websockets'][user_id]
                  if not ws.closed]

    # Watch out, this will keep us from returing the response
    # until all are closed
    ws_closers and await asyncio.gather(*ws_closers)

    return web.Response(text='OK')


def main():
    loop = asyncio.get_event_loop()
    app = web.Application(loop=loop)
    app.router.add_route('GET', '/echo', echo_handler)
    app.router.add_route('POST', '/logout', logout_handler)
    app['websockets'] = defaultdict(set)
    web.run_app(app, host='localhost', port=8080)
```

12.4.8 How do I make a request from a specific IP address?

If your system has several IP interfaces, you may choose one which will be used used to bind a socket locally:

```
conn = aiohttp.TCPConnector(local_addr=('127.0.0.1', 0), loop=loop)
async with aiohttp.ClientSession(connector=conn) as session:
    ...
```

See also:

aiohttp.TCPConnector and `local_addr` parameter.

12.4.9 What is the API stability and deprecation policy?

aiohttp follows strong Semantic Versioning (SemVer).

Obsolete attributes and methods are marked as *deprecated* in the documentation and raise `DeprecationWarning` upon usage.

Assume aiohttp `X.Y.Z` where `X` is major version, `Y` is minor version and `Z` is bugfix number.

For example, if the latest released version is `aiohttp==3.0.6`:

`3.0.7` fixes some bugs but have no new features.

`3.1.0` introduces new features and can deprecate some API but never remove it, also all bug fixes from previous release are merged.

`4.0.0` removes all deprecations collected from `3.Y` versions **except** deprecations from the **last** `3.Y` release. These deprecations will be removed by `5.0.0`.

Unfortunately we may have to break these rules when a **security vulnerability** is found. If a security problem cannot be fixed without breaking backward compatibility, a bugfix release may break compatibility. This is unlikely, but possible.

All backward incompatible changes are explicitly marked in *the changelog*.

12.4.10 How do I enable gzip compression globally for my entire application?

It's impossible. Choosing what to compress and what not to compress is is a tricky matter.

If you need global compression, write a custom middleware. Or enable compression in NGINX (you are deploying aiohttp behind reverse proxy, right?).

12.4.11 How do I manage a ClientSession within a web server?

aiohttp.ClientSession should be created once for the lifetime of the server in order to benefit from connection pooling.

Sessions save cookies internally. If you don't need cookie processing, use *aiohttp.DummyCookieJar*. If you need separate cookies for different http calls but process them in logical chains, use a single *aiohttp.TCPConnector* with separate client sessions and `connector_owner=False`.

12.4.12 How do I access database connections from a subapplication?

Restricting access from subapplication to main (or outer) app is a deliberate choice.

A subapplication is an isolated unit by design. If you need to share a database object, do it explicitly:

```
subapp['db'] = mainapp['db']
mainapp.add_subapp('/prefix', subapp)
```

12.4.13 How do I perform operations in a request handler after sending the response?

Middlewares can be written to handle post-response operations, but they run after every request. You can explicitly send the response by calling `aiohttp.web.Response.write_eof()`, which starts sending before the handler returns, giving you a chance to execute follow-up operations:

```
def ping_handler(request):
    """Send PONG and increase DB counter."""

    # explicitly send the response
    resp = web.json_response({'message': 'PONG'})
    await resp.prepare(request)
    await resp.write_eof()

    # increase the pong count
    APP['db'].inc_pong()

    return resp
```

A *aiohttp.web.Response* object must be returned. This is required by aiohttp web contracts, even though the response already been sent.

12.4.14 How do I make sure my custom middleware response will behave correctly?

Sometimes your middleware handlers might need to send a custom response. This is just fine as long as you always create a new *aiohttp.web.Response* object when required.

The response object is a Finite State Machine. Once it has been dispatched by the server, it will reach its final state and cannot be used again.

The following middleware will make the server hang, once it serves the second response:

```
from aiohttp import web

def misbehaved_middleware():
    # don't do this!
    cached = web.Response(status=200, text='Hi, I am cached!')

    @web.middleware
    async def middleware(request, handler):
        # ignoring response for the sake of this example
        _res = handler(request)
        return cached
```

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```
    return middleware
```

The rule of thumb is *one request, one response*.

12.4.15 Why is creating a ClientSession outside of an event loop dangerous?

Short answer is: life-cycle of all asyncio objects should be shorter than life-cycle of event loop.

Full explanation is longer. All asyncio object should be correctly finished/disconnected/closed before event loop shutdown. Otherwise user can get unexpected behavior. In the best case it is a warning about unclosed resource, in the worst case the program just hangs, awaiting for coroutine is never resumed etc.

Consider the following code from `mod.py`:

```
import aiohttp

session = aiohttp.ClientSession()

async def fetch(url):
    async with session.get(url) as resp:
        return await resp.text()
```

The session grabs current event loop instance and stores it in a private variable.

The main module imports the module and installs `uvloop` (an alternative fast event loop implementation).

`main.py`:

```
import asyncio
import uvloop
import mod

asyncio.set_event_loop_policy(uvloop.EventLoopPolicy())
asyncio.run(main())
```

The code is broken: `session` is bound to default `asyncio` loop on import time but the loop is changed **after the import** by `set_event_loop()`. As result `fetch()` call hangs.

To avoid import dependency hell *aiohttp* encourages creation of `ClientSession` from async function. The same policy works for `web.Application` too.

Another use case is unit test writing. Very many test libraries (*aiohttp test tools* first) creates a new loop instance for every test function execution. It's done for sake of tests isolation. Otherwise pending activity (timers, network packets etc.) from previous test may interfere with current one producing very cryptic and unstable test failure.

Note: *class variables* are hidden globals actually. The following code has the same problem as `mod.py` example, `session` variable is the hidden global object:

```
class A:
    session = aiohttp.ClientSession()

    async def fetch(self, url):
        async with session.get(url) as resp:
            return await resp.text()
```

12.5 Miscellaneous

Helpful pages.

12.5.1 Essays

Router refactoring in 0.21

Rationale

First generation (v1) of router has mapped `(method, path)` pair to *web-handler*. Mapping is named **route**. Routes used to have unique names if any.

The main mistake with the design is coupling the **route** to `(method, path)` pair while really URL construction operates with **resources** (**location** is a synonym). HTTP method is not part of URI but applied on sending HTTP request only.

Having different **route names** for the same path is confusing. Moreover **named routes** constructed for the same path should have unique non overlapping names which is cumbersome is certain situations.

From other side sometimes it's desirable to bind several HTTP methods to the same web handler. For *v1* router it can be solved by passing '*' as HTTP method. Class based views require '*' method also usually.

Implementation

The change introduces **resource** as first class citizen:

```
resource = router.add_resource('/path/{to}', name='name')
```

Resource has a **path** (dynamic or constant) and optional **name**.

The name is **unique** in router context.

Resource has **routes**.

Route corresponds to *HTTP method* and *web-handler* for the method:

```
route = resource.add_route('GET', handler)
```

User still may use wildcard for accepting all HTTP methods (maybe we will add something like `resource.add_wildcard(handler)` later).

Since **names** belongs to **resources** now `app.router['name']` returns a **resource** instance instead of `aiohttp.web.Route`.

resource has `.url()` method, so `app.router['name'].url(parts={'a': 'b'}, query={'arg': 'param'})` still works as usual.

The change allows to rewrite static file handling and implement nested applications as well.

Decoupling of *HTTP location* and *HTTP method* makes life easier.

Backward compatibility

The refactoring is 99% compatible with previous implementation.

99% means all example and the most of current code works without modifications but we have subtle API backward incompatibles.

`app.router['name']` returns a `aiohttp.web.BaseResource` instance instead of `aiohttp.web.Route` but resource has the same `resource.url(...)` most useful method, so end user should feel no difference.

`route.match(...)` is **not** supported anymore, use *aiohttp.web.AbstractResource.resolve()* instead.

`app.router.add_route(method, path, handler, name='name')` now is just shortcut for:

```
resource = app.router.add_resource(path, name=name)
route = resource.add_route(method, handler)
return route
```

`app.router.register_route(...)` is still supported, it creates `aiohttp.web.ResourceAdapter` for every call (but it's deprecated now).

What's new in aiohttp 1.1

YARL and URL encoding

Since aiohttp 1.1 the library uses *yarl* for URL processing.

New API

`yarl.URL` gives handy methods for URL operations etc.

Client API still accepts `str` everywhere *url* is used, e.g. `session.get('http://example.com')` works as well as `session.get(yarl.URL('http://example.com'))`.

Internal API has been switched to `yarl.URL`. *aiohttp.CookieJar* accepts `URL` instances only.

On server side has added `web.Request.url` and `web.Request.rel_url` properties for representing relative and absolute request's URL.

URL using is the recommended way, already existed properties for retrieving URL parts are deprecated and will be eventually removed.

Redirection web exceptions accepts `yarl.URL` as *location* parameter. `str` is still supported and will be supported forever.

Reverse URL processing for *router* has been changed.

The main API is `aiohttp.web.Request.url_for(name, **kwargs)` which returns a `yarl.URL` instance for named resource. It does not support *query args* but adding *args* is trivial: `request.url_for('named_resource', param='a').with_query(arg='val')`.

The method returns a *relative* URL, absolute URL may be constructed by `request.url.join(request.url_for(...)` call.

URL encoding

YARL encodes all non-ASCII symbols on `yarl.URL` creation.

Thus `URL('https://www.python.org/')` becomes `'https://www.python.org/%D0%BF%D1%83%D1%82%D1%8C'`.

On filling route table it's possible to use both non-ASCII and percent encoded paths:

```
app.router.add_get('/', handler)
```

and:

```
app.router.add_get('/%D0%BF%D1%83%D1%82%D1%8C', handler)
```

are the same. Internally `'/'` is converted into percent-encoding representation.

Route matching also accepts both URL forms: raw and encoded by converting the route pattern to *canonical* (encoded) form on route registration.

Sub-Applications

Sub applications are designed for solving the problem of the big monolithic code base. Let's assume we have a project with own business logic and tools like administration panel and debug toolbar.

Administration panel is a separate application by its own nature but all toolbar URLs are served by prefix like `/admin`.

Thus we'll create a totally separate application named `admin` and connect it to main app with prefix:

```
admin = web.Application()
# setup admin routes, signals and middlewares

app.add_subapp('/admin/', admin)
```

Middlewares and signals from `app` and `admin` are chained.

It means that if URL is `'/admin/something'` middlewares from `app` are applied first and `admin.middlewares` are the next in the call chain.

The same is going for *on_response_prepare* signal – the signal is delivered to both top level `app` and `admin` if processing URL is routed to `admin` sub-application.

Common signals like *on_startup*, *on_shutdown* and *on_cleanup* are delivered to all registered sub-applications. The passed parameter is sub-application instance, not top-level application.

Third level sub-applications can be nested into second level ones – there are no limitation for nesting level.

Url reversing

Url reversing for sub-applications should generate urls with proper prefix.

But for getting URL sub-application's router should be used:

```
admin = web.Application()
admin.add_get('/resource', handler, name='name')

app.add_subapp('/admin/', admin)
```

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```
url = admin.router['name'].url_for()
```

The generated `url` from example will have a value `URL('/admin/resource')`.

Application freezing

Application can be used either as main app (`app.make_handler()`) or as sub-application – not both cases at the same time.

After connecting application by `.add_subapp()` call or starting serving web-server as toplevel application the application is **frozen**.

It means that registering new routes, signals and middlewares is forbidden. Changing state (`app['name'] = 'value'`) of frozen application is deprecated and will be eventually removed.

Migration to 2.x

Client

chunking

aiohttp does not support custom chunking sizes. It is up to the developer to decide how to chunk data streams. If chunking is enabled, aiohttp encodes the provided chunks in the "Transfer-encoding: chunked" format.

aiohttp does not enable chunked encoding automatically even if a *transfer-encoding* header is supplied: *chunked* has to be set explicitly. If *chunked* is set, then the *Transfer-encoding* and *content-length* headers are disallowed.

compression

Compression has to be enabled explicitly with the *compress* parameter. If compression is enabled, adding a *content-encoding* header is not allowed. Compression also enables the *chunked* transfer-encoding. Compression can not be combined with a *Content-Length* header.

Client Connector

1. By default a connector object manages a total number of concurrent connections. This limit was a per host rule in version 1.x. In 2.x, the *limit* parameter defines how many concurrent connection connector can open and a new *limit_per_host* parameter defines the limit per host. By default there is no per-host limit.
2. BaseConnector.close is now a normal function as opposed to coroutine in version 1.x
3. BaseConnector.conn_timeout was moved to ClientSession

ClientResponse.release

Internal implementation was significantly redesigned. It is not required to call *release* on the response object. When the client fully receives the payload, the underlying connection automatically returns back to pool. If the payload is not fully read, the connection is closed

Client exceptions

Exception hierarchy has been significantly modified. aiohttp now defines only exceptions that covers connection handling and server response misbehaviors. For developer specific mistakes, aiohttp uses python standard exceptions like ValueError or TypeError.

Reading a response content may raise a ClientPayloadError exception. This exception indicates errors specific to the payload encoding. Such as invalid compressed data, malformed chunked-encoded chunks or not enough data that satisfy the content-length header.

All exceptions are moved from *aiohttp.errors* module to top level *aiohttp* module.

New hierarchy of exceptions:

- *ClientError* - Base class for all client specific exceptions
  - *ClientResponseError* - exceptions that could happen after we get response from server
    - *WSServerHandshakeError* - web socket server response error
      - *ClientHttpProxyError* - proxy response
  - *ClientConnectionError* - exceptions related to low-level connection problems
    - *ClientOSError* - subset of connection errors that are initiated by an OSError exception
      - *ClientConnectorError* - connector related exceptions
      - *ClientProxyConnectionError* - proxy connection initialization error
      - *ServerConnectionError* - server connection related errors
      - *ServerDisconnectedError* - server disconnected
      - *ServerTimeoutError* - server operation timeout, (read timeout, etc)
      - *ServerFingerprintMismatch* - server fingerprint mismatch
  - *ClientPayloadError* - This exception can only be raised while reading the response payload if one of these errors occurs: invalid compression, malformed chunked encoding or not enough data that satisfy content-length header.

Client payload (form-data)

To unify form-data/payload handling a new *Payload* system was introduced. It handles customized handling of existing types and provide implementation for user-defined types.

1. FormData.__call__ does not take an encoding arg anymore and its return value changes from an iterator or bytes to a Payload instance. aiohttp provides payload adapters for some standard types like *str*, *byte*, *io.IOBase*, *StreamReader* or *DataQueue*.
2. a generator is not supported as data provider anymore, *streamer* can be used instead. For example, to upload data from file:

```
@aiohttp.streamer
def file_sender(writer, file_name=None):
      with open(file_name, 'rb') as f:
          chunk = f.read(2**16)
          while chunk:
              yield from writer.write(chunk)
              chunk = f.read(2**16)

# Then you can use `file_sender` like this:

async with session.post('http://httpbin.org/post',
                        data=file_sender(file_name='huge_file')) as resp:
       print(await resp.text())
```

Various

1. the *encoding* parameter is deprecated in *ClientSession.request()*. Payload encoding is controlled at the payload level. It is possible to specify an encoding for each payload instance.
2. the *version* parameter is removed in *ClientSession.request()* client version can be specified in the *ClientSession* constructor.
3. *aiohttp.MsgType* dropped, use *aiohttp.WSMsgType* instead.
4. *ClientResponse.url* is an instance of *yarl.URL* class (*url_obj* is deprecated)
5. *ClientResponse.raise_for_status()* raises `aiohttp.ClientResponseError` exception
6. *ClientResponse.json()* is strict about response's content type. if content type does not match, it raises `aiohttp.ClientResponseError` exception. To disable content type check you can pass `None` as *content_type* parameter.

Server

ServerHttpProtocol and low-level details

Internal implementation was significantly redesigned to provide better performance and support HTTP pipelining. ServerHttpProtocol is dropped, implementation is merged with RequestHandler a lot of low-level api's are dropped.

Application

1. Constructor parameter *loop* is deprecated. Loop is get configured by application runner, *run_app* function for any of gunicorn workers.
2. *Application.router.add_subapp* is dropped, use *Application.add_subapp* instead
3. *Application.finished* is dropped, use *Application.cleanup* instead

WebRequest and WebResponse

1. the *GET* and *POST* attributes no longer exist. Use the *query* attribute instead of *GET*
2. Custom chunking size is not support *WebResponse.chunked* - developer is responsible for actual chunking.
3. Payloads are supported as body. So it is possible to use client response's content object as body parameter for *WebResponse*
4. *FileSender* api is dropped, it is replaced with more general *FileResponse* class:

```
async def handle(request):
    return web.FileResponse('path-to-file.txt')
```

5. *WebSocketResponse.protocol* is renamed to *WebSocketResponse.ws_protocol*. *WebSocketResponse.protocol* is instance of *RequestHandler* class.

RequestPayloadError

Reading request's payload may raise a *RequestPayloadError* exception. The behavior is similar to *ClientPayloadError*.

WSGI

WSGI support has been dropped, as well as gunicorn wsgi support. We still provide default and uvloop gunicorn workers for *web.Application*

What's new in aiohttp 3.0

async/await everywhere

The main change is dropping `yield from` support and using `async`/`await` everywhere. Farewell, Python 3.4.

The minimal supported Python version is **3.5.3** now.

Why not *3.5.0*? Because *3.5.3* has a crucial change: `asyncio.get_event_loop()` returns the running loop instead of *default*, which may be different, e.g.:

```
loop = asyncio.new_event_loop()
loop.run_until_complete(f())
```

Note, `asyncio.set_event_loop()` was not called and default loop is not equal to actually executed one.

Application Runners

People constantly asked about ability to run aiohttp servers together with other asyncio code, but *`aiohttp.web.run_app()`* is blocking synchronous call.

aiohttp had support for starting the application without `run_app` but the API was very low-level and cumbersome.

Now application runners solve the task in a few lines of code, see *Application runners* for details.

Client Tracing

Other long awaited feature is tracing client request life cycle to figure out when and why client request spends a time waiting for connection establishment, getting server response headers etc.

Now it is possible by registering special signal handlers on every request processing stage. *Client Tracing* provides more info about the feature.

HTTPS support

Unfortunately asyncio has a bug with checking SSL certificates for non-ASCII site DNS names, e.g. https://\protect\begingroup\immediate\write\@unused\def\MessageBreak˙\let\protect\edefYourcommandwasignored.\MessageBreakTypeI<command><return>toreplaceitwithanothercommand,\MessageBreakor<return>tocontinuewithoutit.\errhelp\let\def\MessageBreak˙(inputenc)\def\errmessagePackageinputencError:UnicodecharĐÿ(U+438)\MessageBreaknotsetupforusewithLaTeX.˙˙Seetheinputencpackagedocumentationforexplanation.˙TypeH<return>forimmediatehelp\endgroup\protect\begingroup\immediate\write\@unused\def\MessageBreak˙\let\protect\edefYourcommandwasignored.\MessageBreakTypeI<command><return>toreplaceitwithanothercommand,\MessageBreakor<return>tocontinuewithoutit.\errhelp\let\def\MessageBreak˙(inputenc)\def\errmessagePackageinputencError:UnicodecharÑĄ(U+441)\MessageBreaknotsetupforusewithLaTeX.˙˙Seetheinputencpackagedocumentationforexplanation.˙TypeH<return>forimmediatehelp\endgroup\protect\begingroup\immediate\write\@unused\def\MessageBreak˙\let\protect\edefYourcommandwasignored.\MessageBreakTypeI<command><return>toreplaceitwithanothercommand,\MessageBreakor<return>tocontinuewithoutit.\errhelp\let\def\MessageBreak˙(inputenc)\def\errmessagePackageinputencError:UnicodecharÑĆ(U+442)\MessageBreaknotsetupforusewithLaTeX.˙˙Seetheinputencpackagedocumentationforexplanation.˙TypeH<return>forimmediatehelp\endgroup\protect\begingroup\immediate\write\@unused\def\MessageBreak˙\let\protect\edefYourcommandwasignored.\MessageBreakTypeI<command><return>toreplaceitwithanothercommand,\MessageBreakor<return>tocontinuewithoutit.\errhelp\let\def\MessageBreak˙(inputenc)\def\errmessagePackageinputencError:UnicodecharĐ¿(U+43E)\MessageBreaknotsetupforusewithLaTeX.˙˙Seetheinputencpackagedocumentationforexplanation.˙TypeH<return>forimmediatehelp\endgroup\protect\begingroup\immediate\write\@unused\def\MessageBreak˙\let\protect\edefYourcommandwasignored.\MessageBreakTypeI<command><return>toreplaceitwithanothercommand,\MessageBreakor<return>tocontinuewithoutit.\errhelp\let\def\MessageBreak˙(inputenc)\def\errmessagePackageinputencError:UnicodecharÑĂ(U+440)\MessageBreaknotsetupforusewithLaTeX.˙˙Seetheinputencpackagedocumentationforexplanation.˙TypeH<return>forimmediatehelp\endgroup\protect\begingroup\immediate\write\@unused\def\MessageBreak˙\let\protect\edefYourcommandwasignored.\MessageBreakTypeI<command><return>toreplaceitwithanothercommand,\MessageBreakor<return>tocontinuewithoutit.\errhelp\let\def\MessageBreak˙(inputenc)\def\errmessagePackageinputencError:UnicodecharĐÿ(U+438)\MessageBreaknotsetupforusewithLaTeX.˙˙Seetheinputencpackagedocumentationforexplanation.˙TypeH<return>forimmediatehelp\endgroup\protect\begingroup\immediate\write\@unused\def\MessageBreak˙\let\protect\edefYourcommandwasignored.\MessageBreakTypeI<command><return>toreplaceitwithanothercommand,\MessageBreakor<return>tocontinuewithoutit.\errhelp\let\def\MessageBreak˙(inputenc)\def\errmessagePackageinputencError:UnicodecharĐž(U+43A)\MessageBreaknotsetupforusewithLaTeX.˙˙Seetheinputencpackagedocumentationforexplanation.˙TypeH<return>forimmediatehelp\endgroup.\protect\begingroup\immediate\write\@unused\def\MessageBreak˙\let\protect\edefYourcommandwasignored.\MessageBreakTypeI<command><return>toreplaceitwithanothercommand,\MessageBreakor<return>tocontinuewithoutit.\errhelp\let\def\MessageBreak˙(inputenc)\def\errmessagePackageinputencError:UnicodecharÑĂ(U+440)\MessageBreaknotsetupforusewithLaTeX.˙˙Seetheinputencpackagedocumentationforexplanation.˙TypeH<return>forimmediatehelp\endgroup\protect\begingroup\immediate\write\@unused\def\MessageBreak˙\let\protect\edefYourcommandwasignored.\MessageBreakTypeI<command>

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˙˙Seetheinputencpackagedocumentationforexplanation.˙TypeH<return>forimmediatehelp\endgroup.

The bug has been fixed in upcoming Python 3.7 only (the change requires breaking backward compatibility in `ssl` API).

aiohttp installs a fix for older Python versions (3.5 and 3.6).

Dropped obsolete API

A switch to new major version is a great chance for dropping already deprecated features.

The release dropped a lot, see *Changelog* for details.

All removals was already marked as deprecated or related to very low level implementation details.

If user code did not raise `DeprecationWarning` it is compatible with aiohttp 3.0 most likely.

Summary

Enjoy aiohttp 3.0 release!

The full change log is here: *Changelog*.

12.5.2 Glossary

aiodns DNS resolver for asyncio.

https://pypi.python.org/pypi/aiodns

asyncio The library for writing single-threaded concurrent code using coroutines, multiplexing I/O access over sockets and other resources, running network clients and servers, and other related primitives.

Reference implementation of **PEP 3156**

https://pypi.python.org/pypi/asyncio/

callable Any object that can be called. Use `callable()` to check that.

cchardet cChardet is high speed universal character encoding detector - binding to charsetdetect.

https://pypi.python.org/pypi/cchardet/

chardet The Universal Character Encoding Detector

https://pypi.python.org/pypi/chardet/

gunicorn Gunicorn 'Green Unicorn' is a Python WSGI HTTP Server for UNIX.

http://gunicorn.org/

IDNA An Internationalized Domain Name in Applications (IDNA) is an industry standard for encoding Internet Domain Names that contain in whole or in part, in a language-specific script or alphabet, such as Arabic, Chinese, Cyrillic, Tamil, Hebrew or the Latin alphabet-based characters with diacritics or ligatures, such as French. These writing systems are encoded by computers in multi-byte Unicode. Internationalized domain names are stored in the Domain Name System as ASCII strings using Punycode transcription.

keep-alive A technique for communicating between HTTP client and server when connection is not closed after sending response but kept open for sending next request through the same socket.

It makes communication faster by getting rid of connection establishment for every request.

nginx Nginx [engine x] is an HTTP and reverse proxy server, a mail proxy server, and a generic TCP/UDP proxy server.

https://nginx.org/en/

percent-encoding A mechanism for encoding information in a Uniform Resource Locator (URL) if URL parts don't fit in safe characters space.

requests Currently the most popular synchronous library to make HTTP requests in Python.

https://requests.readthedocs.io

requoting Applying *percent-encoding* to non-safe symbols and decode percent encoded safe symbols back.

According to **RFC 3986** allowed path symbols are:

```
allowed       = unreserved / pct-encoded / sub-delims
                / ":" / "@" / "/"
```

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```
pct-encoded   = "%" HEXDIG HEXDIG

unreserved    = ALPHA / DIGIT / "-" / "." / "_" / "~"

sub-delims    = "!" / "$" / "&" / "'" / "(" / ")"
                / "*" / "+" / "," / ";" / "="
```

resource A concept reflects the HTTP **path**, every resource corresponds to *URI*.

May have a unique name.

Contains *route*'s for different HTTP methods.

route A part of *resource*, resource's *path* coupled with HTTP method.

web-handler An endpoint that returns HTTP response.

websocket A protocol providing full-duplex communication channels over a single TCP connection. The WebSocket protocol was standardized by the IETF as **RFC 6455**

yarl A library for operating with URL objects.

https://pypi.python.org/pypi/yarl

12.5.3 Changelog

3.7.4 (2021-02-25)

Bugfixes

- **(SECURITY BUG)** Started preventing open redirects in the `aiohttp.web.normalize_path_middleware` middleware. For more details, see https://github.com/aio-libs/aiohttp/security/advisories/GHSA-v6wp-4m6f-gcjg.

  Thanks to Beast Glatisant for finding the firstinstance of this issue and Jelmer Vernooij for reporting and tracking it down in aiohttp. #5497

3.7.3 (2020-11-18)

Features

- Use Brotli instead of brotlipy #3803
- Made exceptions pickleable. Also changed the repr of some exceptions. #4077

Bugfixes

- Raise a ClientResponseError instead of an AssertionError for a blank HTTP Reason Phrase. #3532
- Fix `web_middlewares.normalize_path_middleware` behavior for patch without slash. #3669
- Fix overshadowing of overlapped sub-applications prefixes. #3701
- Make *BaseConnector.close()* a coroutine and wait until the client closes all connections. Drop deprecated "with Connector():" syntax. #3736
- Reset the `sock_read` timeout each time data is received for a `aiohttp.client` response. #3808
- Fixed type annotation for add_view method of UrlDispatcher to accept any subclass of View #3880
- Fixed querying the address families from DNS that the current host supports. #5156
- Change return type of MultipartReader.__aiter__() and BodyPartReader.__aiter__() to AsyncIterator. #5163
- Provide x86 Windows wheels. #5230

Improved Documentation

- Add documentation for `aiohttp.web.FileResponse`. #3958
- Removed deprecation warning in tracing example docs #3964
- Fixed wrong "Usage" docstring of `aiohttp.client.request`. #4603
- Add aiohttp-pydantic to third party libraries #5228

Misc

- #4102

3.7.2 (2020-10-27)

Bugfixes

- Fixed static files handling for loops without `.sendfile()` support #5149

3.7.1 (2020-10-25)

Bugfixes

- Fixed a type error caused by the conditional import of *Protocol*. #5111
- Server doesn't send Content-Length for 1xx or 204 #4901
- Fix run_app typing #4957
- Always require `typing_extensions` library. #5107

- Fix a variable-shadowing bug causing *ThreadedResolver.resolve* to return the resolved IP as the `hostname` in each record, which prevented validation of HTTPS connections. #5110
- Added annotations to all public attributes. #5115
- Fix flaky test_when_timeout_smaller_second #5116
- Ensure sending a zero byte file does not throw an exception #5124
- Fix a bug in `web.run_app()` about Python version checking on Windows #5127

3.7.0 (2020-10-24)

Features

- Response headers are now prepared prior to running `on_response_prepare` hooks, directly before headers are sent to the client. #1958
- Add a `quote_cookie` option to `CookieJar`, a way to skip quotation wrapping of cookies containing special characters. #2571
- Call `AccessLogger.log` with the current exception available from `sys.exc_info()`. #3557
- *web.UrlDispatcher.add_routes* and *web.Application.add_routes* return a list of registered *AbstractRoute* instances. *AbstractRouteDef.register* (and all subclasses) return a list of registered resources registered resource. #3866
- Added properties of default ClientSession params to ClientSession class so it is available for introspection #3882
- Don't cancel web handler on peer disconnection, raise *OSError* on reading/writing instead. #4080
- Implement BaseRequest.get_extra_info() to access a protocol transports' extra info. #4189
- Added *ClientSession.timeout* property. #4191
- allow use of SameSite in cookies. #4224
- Use `loop.sendfile()` instead of custom implementation if available. #4269
- Apply SO_REUSEADDR to test server's socket. #4393
- Use .raw_host instead of slower .host in client API #4402
- Allow configuring the buffer size of input stream by passing `read_bufsize` argument. #4453
- Pass tests on Python 3.8 for Windows. #4513
- Add *method* and *url* attributes to *TraceRequestChunkSentParams* and *TraceResponseChunkReceivedParams*. #4674
- Add ClientResponse.ok property for checking status code under 400. #4711
- Don't ceil timeouts that are smaller than 5 seconds. #4850
- TCPSite now listens by default on all interfaces instead of just IPv4 when *None* is passed in as the host. #4894
- Bump `http_parser` to 2.9.4 #5070

Bugfixes

- Fix keepalive connections not being closed in time #3296
- Fix failed websocket handshake leaving connection hanging. #3380
- Fix tasks cancellation order on exit. The run_app task needs to be cancelled first for cleanup hooks to run with all tasks intact. #3805
- Don't start heartbeat until _writer is set #4062
- Fix handling of multipart file uploads without a content type. #4089
- Preserve view handler function attributes across middlewares #4174
- Fix the string representation of `ServerDisconnectedError`. #4175
- Raising RuntimeError when trying to get encoding from not read body #4214
- Remove warning messages from noop. #4282
- Raise ClientPayloadError if FormData re-processed. #4345
- Fix a warning about unfinished task in `web_protocol.py` #4408
- Fixed 'deflate' compression. According to RFC 2616 now. #4506
- Fixed OverflowError on platforms with 32-bit time_t #4515
- Fixed request.body_exists returns wrong value for methods without body. #4528
- Fix connecting to link-local IPv6 addresses. #4554
- Fix a problem with connection waiters that are never awaited. #4562
- Always make sure transport is not closing before reuse a connection.

  Reuse a protocol based on keepalive in headers is unreliable. For example, uWSGI will not support keepalive even it serves a HTTP 1.1 request, except explicitly configure uWSGI with a `--http-keepalive` option.

  Servers designed like uWSGI could cause aiohttp intermittently raise a ConnectionResetException when the protocol poll runs out and some protocol is reused. #4587
- Handle the last CRLF correctly even if it is received via separate TCP segment. #4630
- Fix the register_resource function to validate route name before splitting it so that route name can include python keywords. #4691
- Improve typing annotations for `web.Request`, `aiohttp.ClientResponse` and `multipart` module. #4736
- Fix resolver task is not awaited when connector is cancelled #4795
- Fix a bug "Aiohttp doesn't return any error on invalid request methods" #4798
- Fix HEAD requests for static content. #4809
- Fix incorrect size calculation for memoryview #4890
- Add HTTPMove to _all__. #4897
- Fixed the type annotations in the `tracing` module. #4912
- Fix typing for multipart `__aiter__`. #4931
- Fix for race condition on connections in BaseConnector that leads to exceeding the connection limit. #4936
- Add forced UTF-8 encoding for `application/rdap+json` responses. #4938

- Fix inconsistency between Python and C http request parsers in parsing pct-encoded URL. #4972
- Fix connection closing issue in HEAD request. #5012
- Fix type hint on BaseRunner.addresses (from `List[str]` to `List[Any]`) #5086
- Make *web.run_app()* more responsive to Ctrl+C on Windows for Python < 3.8. It slightly increases CPU load as a side effect. #5098

Improved Documentation

- Fix example code in client quick-start #3376
- Updated the docs so there is no contradiction in `ttl_dns_cache` default value #3512
- Add 'Deploy with SSL' to docs. #4201
- Change typing of the secure argument on StreamResponse.set_cookie from `Optional[str]` to `Optional[bool]` #4204
- Changes `ttl_dns_cache` type from int to Optional[int]. #4270
- Simplify README hello word example and add a documentation page for people coming from requests. #4272
- Improve some code examples in the documentation involving websockets and starting a simple HTTP site with an AppRunner. #4285
- Fix typo in code example in Multipart docs #4312
- Fix code example in Multipart section. #4314
- Update contributing guide so new contributors read the most recent version of that guide. Update command used to create test coverage reporting. #4810
- Spelling: Change "canonize" to "canonicalize". #4986
- Add `aiohttp-sse-client` library to third party usage list. #5084

Misc

- #2856, #4218, #4250

3.6.3 (2020-10-12)

Bugfixes

- Pin yarl to `<1.6.0` to avoid buggy behavior that will be fixed by the next aiohttp release.

3.6.2 (2019-10-09)

Features

- Made exceptions pickleable. Also changed the repr of some exceptions. #4077
- Use `Iterable` type hint instead of `Sequence` for `Application` *middleware* parameter. #4125

Bugfixes

- Reset the `sock_read` timeout each time data is received for a `aiohttp.ClientResponse`. #3808
- Fix handling of expired cookies so they are not stored in CookieJar. #4063
- Fix misleading message in the string representation of `ClientConnectorError`; `self.ssl == None` means default SSL context, not SSL disabled #4097
- Don't clobber HTTP status when using FileResponse. #4106

Improved Documentation

- Added minimal required logging configuration to logging documentation. #2469
- Update docs to reflect proxy support. #4100
- Fix typo in code example in testing docs. #4108

Misc

- #4102

3.6.1 (2019-09-19)

Features

- Compatibility with Python 3.8. #4056

Bugfixes

- correct some exception string format #4068
- Emit a warning when `ssl.OP_NO_COMPRESSION` is unavailable because the runtime is built against an outdated OpenSSL. #4052
- Update multidict requirement to >= 4.5 #4057

Improved Documentation

- Provide pytest-aiohttp namespace for pytest fixtures in docs. #3723

3.6.0 (2019-09-06)

Features

- Add support for Named Pipes (Site and Connector) under Windows. This feature requires Proactor event loop to work. #3629
- Removed `Transfer-Encoding: chunked` header from websocket responses to be compatible with more http proxy servers. #3798
- Accept non-GET request for starting websocket handshake on server side. #3980

Bugfixes

- Raise a ClientResponseError instead of an AssertionError for a blank HTTP Reason Phrase. #3532
- Fix an issue where cookies would sometimes not be set during a redirect. #3576
- Change normalize_path_middleware to use 308 redirect instead of 301.

  This behavior should prevent clients from being unable to use PUT/POST methods on endpoints that are redirected because of a trailing slash. #3579
- Drop the processed task from `all_tasks()` list early. It prevents logging about a task with unhandled exception when the server is used in conjunction with `asyncio.run()`. #3587
- `Signal` type annotation changed from `Signal[Callable[['TraceConfig'], Awaitable[None]]]` to `Signal[Callable[ClientSession, SimpleNamespace, ...]]`. #3595
- Use sanitized URL as Location header in redirects #3614
- Improve typing annotations for multipart.py along with changes required by mypy in files that references multipart.py. #3621
- Close session created inside `aiohttp.request` when unhandled exception occurs #3628
- Cleanup per-chunk data in generic data read. Memory leak fixed. #3631
- Use correct type for add_view and family #3633
- Fix _keepalive field in __slots__ of `RequestHandler`. #3644
- Properly handle ConnectionResetError, to silence the "Cannot write to closing transport" exception when clients disconnect uncleanly. #3648
- Suppress pytest warnings due to `test_utils` classes #3660
- Fix overshadowing of overlapped sub-application prefixes. #3701
- Fixed return type annotation for WSMessage.json() #3720
- Properly expose TooManyRedirects publicly as documented. #3818
- Fix missing brackets for IPv6 in proxy CONNECT request #3841

- Make the signature of `aiohttp.test_utils.TestClient.request` match `asyncio.ClientSession.request` according to the docs #3852
- Use correct style for re-exported imports, makes mypy `--strict` mode happy. #3868
- Fixed type annotation for add_view method of UrlDispatcher to accept any subclass of View #3880
- Made cython HTTP parser set Reason-Phrase of the response to an empty string if it is missing. #3906
- Add URL to the string representation of ClientResponseError. #3959
- Accept `istr` keys in `LooseHeaders` type hints. #3976
- Fixed race conditions in _resolve_host caching and throttling when tracing is enabled. #4013
- For URLs like "unix://localhost/..." set Host HTTP header to "localhost" instead of "localhost:None". #4039

Improved Documentation

- Modify documentation for Background Tasks to remove deprecated usage of event loop. #3526
- use `if __name__ == '__main__':` in server examples. #3775
- Update documentation reference to the default access logger. #3783
- Improve documentation for `web.BaseRequest.path` and `web.BaseRequest.raw_path`. #3791
- Removed deprecation warning in tracing example docs #3964

3.5.4 (2019-01-12)

Bugfixes

- Fix stream `.read()` / `.readany()` / `.iter_any()` which used to return a partial content only in case of compressed content #3525

3.5.3 (2019-01-10)

Bugfixes

- Fix type stubs for `aiohttp.web.run_app(access_log=True)` and fix edge case of `access_log=True` and the event loop being in debug mode. #3504
- Fix `aiohttp.ClientTimeout` type annotations to accept `None` for fields #3511
- Send custom per-request cookies even if session jar is empty #3515
- Restore Linux binary wheels publishing on PyPI

3.5.2 (2019-01-08)

Features

- `FileResponse` from `web_fileresponse.py` uses a `ThreadPoolExecutor` to work with files asynchronously. I/O based payloads from `payload.py` uses a `ThreadPoolExecutor` to work with I/O objects asynchronously. #3313
- Internal Server Errors in plain text if the browser does not support HTML. #3483

Bugfixes

- Preserve MultipartWriter parts headers on write. Refactor the way how `Payload.headers` are handled. Payload instances now always have headers and Content-Type defined. Fix Payload Content-Disposition header reset after initial creation. #3035
- Log suppressed exceptions in `GunicornWebWorker`. #3464
- Remove wildcard imports. #3468
- Use the same task for app initialization and web server handling in gunicorn workers. It allows to use Python3.7 context vars smoothly. #3471
- Fix handling of chunked+gzipped response when first chunk does not give uncompressed data #3477
- Replace `collections.MutableMapping` with `collections.abc.MutableMapping` to avoid a deprecation warning. #3480
- `Payload.size` type annotation changed from `Optional[float]` to `Optional[int]`. #3484
- Ignore done tasks when cancels pending activities on `web.run_app` finalization. #3497

Improved Documentation

- Add documentation for `aiohttp.web.HTTPException`. #3490

Misc

- #3487

3.5.1 (2018-12-24)

- Fix a regression about `ClientSession._requote_redirect_url` modification in debug mode.

3.5.0 (2018-12-22)

Features

- The library type annotations are checked in strict mode now.
- Add support for setting cookies for individual request (#2387)
- Application.add_domain implementation (#2809)
- The default `app` in the request returned by `test_utils.make_mocked_request` can now have objects assigned to it and retrieved using the `[]` operator. (#3174)
- Make `request.url` accessible when transport is closed. (#3177)
- Add `zlib_executor_size` argument to `Response` constructor to allow compression to run in a background executor to avoid blocking the main thread and potentially triggering health check failures. (#3205)
- Enable users to set `ClientTimeout` in `aiohttp.request` (#3213)
- Don't raise a warning if `NETRC` environment variable is not set and `~/.netrc` file doesn't exist. (#3267)
- Add default logging handler to web.run_app If the `Application.debug` flag is set and the default logger `aiohttp.access` is used, access logs will now be output using a *stderr* `StreamHandler` if no handlers are attached. Furthermore, if the default logger has no log level set, the log level will be set to `DEBUG`. (#3324)
- Add method argument to `session.ws_connect()`. Sometimes server API requires a different HTTP method for WebSocket connection establishment. For example, `Docker exec` needs POST. (#3378)
- Create a task per request handling. (#3406)

Bugfixes

- Enable passing `access_log_class` via `handler_args` (#3158)
- Return empty bytes with end-of-chunk marker in empty stream reader. (#3186)
- Accept `CIMultiDictProxy` instances for `headers` argument in `web.Response` constructor. (#3207)
- Don't uppercase HTTP method in parser (#3233)
- Make method match regexp RFC-7230 compliant (#3235)
- Add `app.pre_frozen` state to properly handle startup signals in sub-applications. (#3237)
- Enhanced parsing and validation of helpers.BasicAuth.decode. (#3239)
- Change imports from collections module in preparation for 3.8. (#3258)
- Ensure Host header is added first to ClientRequest to better replicate browser (#3265)
- Fix forward compatibility with Python 3.8: importing ABCs directly from the collections module will not be supported anymore. (#3273)
- Keep the query string by `normalize_path_middleware`. (#3278)
- Fix missing parameter `raise_for_status` for aiohttp.request() (#3290)
- Bracket IPv6 addresses in the HOST header (#3304)
- Fix default message for server ping and pong frames. (#3308)
- Fix tests/test_connector.py typo and tests/autobahn/server.py duplicate loop def. (#3337)
- Fix false-negative indicator end_of_HTTP_chunk in StreamReader.readchunk function (#3361)

- Release HTTP response before raising status exception (#3364)
- Fix task cancellation when `sendfile()` syscall is used by static file handling. (#3383)
- Fix stack trace for `asyncio.TimeoutError` which was not logged, when it is caught in the handler. (#3414)

Improved Documentation

- Improve documentation of `Application.make_handler` parameters. (#3152)
- Fix BaseRequest.raw_headers doc. (#3215)
- Fix typo in TypeError exception reason in `web.Application._handle` (#3229)
- Make server access log format placeholder %b documentation reflect behavior and docstring. (#3307)

Deprecations and Removals

- Deprecate modification of `session.requote_redirect_url` (#2278)
- Deprecate `stream.unread_data()` (#3260)
- Deprecated use of boolean in `resp.enable_compression()` (#3318)
- Encourage creation of aiohttp public objects inside a coroutine (#3331)
- Drop dead `Connection.detach()` and `Connection.writer`. Both methods were broken for more than 2 years. (#3358)
- Deprecate `app.loop`, `request.loop`, `client.loop` and `connector.loop` properties. (#3374)
- Deprecate explicit debug argument. Use asyncio debug mode instead. (#3381)
- Deprecate body parameter in HTTPException (and derived classes) constructor. (#3385)
- Deprecate bare connector close, use `async with connector:` and `await connector.close()` instead. (#3417)
- Deprecate obsolete `read_timeout` and `conn_timeout` in `ClientSession` constructor. (#3438)

Misc

- #3341, #3351

3.4.4 (2018-09-05)

- Fix installation from sources when compiling toolkit is not available (#3241)

3.4.3 (2018-09-04)

- Add `app.pre_frozen` state to properly handle startup signals in sub-applications. (#3237)

3.4.2 (2018-09-01)

- Fix `iter_chunks` type annotation (#3230)

3.4.1 (2018-08-28)

- Fix empty header parsing regression. (#3218)
- Fix BaseRequest.raw_headers doc. (#3215)
- Fix documentation building on ReadTheDocs (#3221)

3.4.0 (2018-08-25)

Features

- Add type hints (#3049)
- Add `raise_for_status` request parameter (#3073)
- Add type hints to HTTP client (#3092)
- Minor server optimizations (#3095)
- Preserve the cause when *HTTPException* is raised from another exception. (#3096)
- Add *close_boundary* option in *MultipartWriter.write* method. Support streaming (#3104)
- Added a `remove_slash` option to the `normalize_path_middleware` factory. (#3173)
- The class *AbstractRouteDef* is importable from *aiohttp.web*. (#3183)

Bugfixes

- Prevent double closing when client connection is released before the last `data_received()` callback. (#3031)
- Make redirect with *normalize_path_middleware* work when using url encoded paths. (#3051)
- Postpone web task creation to connection establishment. (#3052)
- Fix `sock_read` timeout. (#3053)
- When using a server-request body as the *data*= argument of a client request, iterate over the content with *readany* instead of *readline* to avoid *Line too long* errors. (#3054)
- fix *UrlDispatcher* has no attribute *add_options*, add *web.options* (#3062)
- correct filename in content-disposition with multipart body (#3064)
- Many HTTP proxies has buggy keepalive support. Let's not reuse connection but close it after processing every response. (#3070)
- raise 413 "Payload Too Large" rather than raising ValueError in request.post() Add helpful debug message to 413 responses (#3087)

- Fix *StreamResponse* equality, now that they are *MutableMapping* objects. (#3100)
- Fix server request objects comparison (#3116)
- Do not hang on *206 Partial Content* response with *Content-Encoding: gzip* (#3123)
- Fix timeout precondition checkers (#3145)

Improved Documentation

- Add a new FAQ entry that clarifies that you should not reuse response objects in middleware functions. (#3020)
- Add FAQ section "Why is creating a ClientSession outside of an event loop dangerous?" (#3072)
- Fix link to Rambler (#3115)
- Fix TCPSite documentation on the Server Reference page. (#3146)
- Fix documentation build configuration file for Windows. (#3147)
- Remove no longer existing lingering_timeout parameter of Application.make_handler from documentation. (#3151)
- Mention that `app.make_handler` is deprecated, recommend to use runners API instead. (#3157)

Deprecations and Removals

- Drop `loop.current_task()` from `helpers.current_task()` (#2826)
- Drop `reader` parameter from `request.multipart()`. (#3090)

3.3.2 (2018-06-12)

- Many HTTP proxies has buggy keepalive support. Let's not reuse connection but close it after processing every response. (#3070)
- Provide vendor source files in tarball (#3076)

3.3.1 (2018-06-05)

- Fix `sock_read` timeout. (#3053)
- When using a server-request body as the `data=` argument of a client request, iterate over the content with `readany` instead of `readline` to avoid `Line too long` errors. (#3054)

3.3.0 (2018-06-01)

Features

- Raise `ConnectionResetError` instead of `CancelledError` on trying to write to a closed stream. (#2499)
- Implement `ClientTimeout` class and support socket read timeout. (#2768)
- Enable logging when `aiohttp.web` is used as a program (#2956)
- Add canonical property to resources (#2968)

- Forbid reading response BODY after release (#2983)
- Implement base protocol class to avoid a dependency from internal `asyncio.streams.FlowControlMixin` (#2986)
- Cythonize `@helpers.reify`, 5% boost on macro benchmark (#2995)
- Optimize HTTP parser (#3015)
- Implement `runner.addresses` property. (#3036)
- Use `bytearray` instead of a list of `bytes` in websocket reader. It improves websocket message reading a little. (#3039)
- Remove heartbeat on closing connection on keepalive timeout. The used hack violates HTTP protocol. (#3041)
- Limit websocket message size on reading to 4 MB by default. (#3045)

Bugfixes

- Don't reuse a connection with the same URL but different proxy/TLS settings (#2981)
- When parsing the Forwarded header, the optional port number is now preserved. (#3009)

Improved Documentation

- Make Change Log more visible in docs (#3029)
- Make style and grammar improvements on the FAQ page. (#3030)
- Document that signal handlers should be async functions since aiohttp 3.0 (#3032)

Deprecations and Removals

- Deprecate custom application's router. (#3021)

Misc

- #3008, #3011

3.2.1 (2018-05-10)

- Don't reuse a connection with the same URL but different proxy/TLS settings (#2981)

3.2.0 (2018-05-06)

Features

- Raise `TooManyRedirects` exception when client gets redirected too many times instead of returning last response. (#2631)
- Extract route definitions into separate `web_routedef.py` file (#2876)
- Raise an exception on request body reading after sending response. (#2895)
- ClientResponse and RequestInfo now have real_url property, which is request url without fragment part being stripped (#2925)
- Speed up connector limiting (#2937)
- Added and links property for ClientResponse object (#2948)
- Add `request.config_dict` for exposing nested applications data. (#2949)
- Speed up HTTP headers serialization, server micro-benchmark runs 5% faster now. (#2957)
- Apply assertions in debug mode only (#2966)

Bugfixes

- expose property *app* for TestClient (#2891)
- Call on_chunk_sent when write_eof takes as a param the last chunk (#2909)
- A closing bracket was added to *__repr__* of resources (#2935)
- Fix compression of FileResponse (#2942)
- Fixes some bugs in the limit connection feature (#2964)

Improved Documentation

- Drop `async_timeout` usage from documentation for client API in favor of `timeout` parameter. (#2865)
- Improve Gunicorn logging documentation (#2921)
- Replace multipart writer *.serialize()* method with *.write()* in documentation. (#2965)

Deprecations and Removals

- Deprecate Application.make_handler() (#2938)

Misc

- #2958

3.1.3 (2018-04-12)

- Fix cancellation broadcast during DNS resolve (#2910)

3.1.2 (2018-04-05)

- Make `LineTooLong` exception more detailed about actual data size (#2863)
- Call `on_chunk_sent` when write_eof takes as a param the last chunk (#2909)

3.1.1 (2018-03-27)

- Support *asynchronous iterators* (and *asynchronous generators* as well) in both client and server API as request / response BODY payloads. (#2802)

3.1.0 (2018-03-21)

Welcome to aiohttp 3.1 release.

This is an *incremental* release, fully backward compatible with *aiohttp 3.0*.

But we have added several new features.

The most visible one is `app.add_routes()` (an alias for existing `app.router.add_routes()`. The addition is very important because all *aiohttp* docs now uses `app.add_routes()` call in code snippets. All your existing code still do register routes / resource without any warning but you've got the idea for a favorite way: noisy `app.router.add_get()` is replaced by `app.add_routes()`.

The library does not make a preference between decorators:

```
routes = web.RouteTableDef()

@routes.get('/')
async def hello(request):
    return web.Response(text="Hello, world")

app.add_routes(routes)
```

and route tables as a list:

```
async def hello(request):
    return web.Response(text="Hello, world")

app.add_routes([web.get('/', hello)])
```

Both ways are equal, user may decide basing on own code taste.

Also we have a lot of minor features, bug fixes and documentation updates, see below.

Features

- Relax JSON content-type checking in the `ClientResponse.json()` to allow "application/xxx+json" instead of strict "application/json". (#2206)
- Bump C HTTP parser to version 2.8 (#2730)
- Accept a coroutine as an application factory in `web.run_app` and gunicorn worker. (#2739)
- Implement application cleanup context (`app.cleanup_ctx` property). (#2747)
- Make `writer.write_headers` a coroutine. (#2762)
- Add tracking signals for getting request/response bodies. (#2767)
- Deprecate ClientResponseError.code in favor of .status to keep similarity with response classes. (#2781)
- Implement `app.add_routes()` method. (#2787)
- Implement `web.static()` and `RouteTableDef.static()` API. (#2795)
- Install a test event loop as default by `asyncio.set_event_loop()`. The change affects aiohttp test utils but backward compatibility is not broken for 99.99% of use cases. (#2804)
- Refactor `ClientResponse` constructor: make logically required constructor arguments mandatory, drop `_post_init()` method. (#2820)
- Use `app.add_routes()` in server docs everywhere (#2830)
- Websockets refactoring, all websocket writer methods are converted into coroutines. (#2836)
- Provide `Content-Range` header for `Range` requests (#2844)

Bugfixes

- Fix websocket client return EofStream. (#2784)
- Fix websocket demo. (#2789)
- Property `BaseRequest.http_range` now returns a python-like slice when requesting the tail of the range. It's now indicated by a negative value in `range.start` rather then in `range.stop` (#2805)
- Close a connection if an unexpected exception occurs while sending a request (#2827)
- Fix firing DNS tracing events. (#2841)

Improved Documentation

- Document behavior when cchardet detects encodings that are unknown to Python. (#2732)
- Add diagrams for tracing request life style. (#2748)
- Drop removed functionality for passing `StreamReader` as data at client side. (#2793)

3.0.9 (2018-03-14)

- Close a connection if an unexpected exception occurs while sending a request (#2827)

3.0.8 (2018-03-12)

- Use `asyncio.current_task()` on Python 3.7 (#2825)

3.0.7 (2018-03-08)

- Fix SSL proxy support by client. (#2810)
- Restore an imperative check in `setup.py` for python version. The check works in parallel to environment marker. As effect an error about unsupported Python versions is raised even on outdated systems with very old `setuptools` version installed. (#2813)

3.0.6 (2018-03-05)

- Add `_reuse_address` and `_reuse_port` to `web_runner.TCPSite.__slots__`. (#2792)

3.0.5 (2018-02-27)

- Fix `InvalidStateError` on processing a sequence of two `RequestHandler.data_received` calls on web server. (#2773)

3.0.4 (2018-02-26)

- Fix `IndexError` in HTTP request handling by server. (#2752)
- Fix MultipartWriter.append* no longer returning part/payload. (#2759)

3.0.3 (2018-02-25)

- Relax `attrs` dependency to minimal actually supported version 17.0.3 The change allows to avoid version conflicts with currently existing test tools.

3.0.2 (2018-02-23)

Security Fix

- Prevent Windows absolute URLs in static files. Paths like `/static/D:\path` and `/static/\\hostname\drive\path` are forbidden.

3.0.1

- Technical release for fixing distribution problems.

3.0.0 (2018-02-12)

Features

- Speed up the *PayloadWriter.write* method for large request bodies. (#2126)
- StreamResponse and Response are now MutableMappings. (#2246)
- ClientSession publishes a set of signals to track the HTTP request execution. (#2313)
- Content-Disposition fast access in ClientResponse (#2455)
- Added support to Flask-style decorators with class-based Views. (#2472)
- Signal handlers (registered callbacks) should be coroutines. (#2480)
- Support `async with test_client.ws_connect(...)` (#2525)
- Introduce *site* and *application runner* as underlying API for *web.run_app* implementation. (#2530)
- Only quote multipart boundary when necessary and sanitize input (#2544)
- Make the *aiohttp.ClientResponse.get_encoding* method public with the processing of invalid charset while detecting content encoding. (#2549)
- Add optional configurable per message compression for *ClientWebSocketResponse* and *WebSocketResponse*. (#2551)
- Add hysteresis to *StreamReader* to prevent flipping between paused and resumed states too often. (#2555)
- Support *.netrc* by *trust_env* (#2581)
- Avoid to create a new resource when adding a route with the same name and path of the last added resource (#2586)
- *MultipartWriter.boundary* is *str* now. (#2589)
- Allow a custom port to be used by *TestServer* (and associated pytest fixtures) (#2613)
- Add param access_log_class to web.run_app function (#2615)
- Add `ssl` parameter to client API (#2626)
- Fixes performance issue introduced by #2577. When there are no middlewares installed by the user, no additional and useless code is executed. (#2629)
- Rename PayloadWriter to StreamWriter (#2654)
- New options *reuse_port*, *reuse_address* are added to *run_app* and *TCPSite*. (#2679)
- Use custom classes to pass client signals parameters (#2686)
- Use `attrs` library for data classes, replace *namedtuple*. (#2690)
- Pytest fixtures renaming, add `aiohttp_` prefix (#2578)
- Add `aiohttp-` prefix for `pytest-aiohttp` command line parameters (#2578)

Bugfixes

- Correctly process upgrade request from server to HTTP2. `aiohttp` does not support HTTP2 yet, the protocol is not upgraded but response is handled correctly. (#2277)
- Fix ClientConnectorSSLError and ClientProxyConnectionError for proxy connector (#2408)
- Fix connector convert OSError to ClientConnectorError (#2423)
- Fix connection attempts for multiple dns hosts (#2424)
- Fix writing to closed transport by raising *asyncio.CancelledError* (#2499)
- Fix warning in *ClientSession.__del__* by stopping to try to close it. (#2523)
- Fixed race-condition for iterating addresses from the DNSCache. (#2620)
- Fix default value of *access_log_format* argument in *web.run_app* (#2649)
- Freeze sub-application on adding to parent app (#2656)
- Do percent encoding for *.url_for()* parameters (#2668)
- Correctly process request start time and multiple request/response headers in access log extra (#2641)

Improved Documentation

- Improve tutorial docs, using *literalinclude* to link to the actual files. (#2396)
- Small improvement docs: better example for file uploads. (#2401)
- Rename *from_env* to *trust_env* in client reference. (#2451)
- Fixed mistype in *Proxy Support* section where *trust_env* parameter was used in *session.get("http://python.org", trust_env=True)* method instead of aiohttp.ClientSession constructor as follows: *aiohttp.ClientSession(trust_env=True)*. (#2688)
- Fix issue with unittest example not compiling in testing docs. (#2717)

Deprecations and Removals

- Simplify HTTP pipelining implementation (#2109)
- Drop *StreamReaderPayload* and *DataQueuePayload*. (#2257)
- Drop *md5* and *sha1* finger-prints (#2267)
- Drop WSMessage.tp (#2321)
- Drop Python 3.4 and Python 3.5.0, 3.5.1, 3.5.2. Minimal supported Python versions are 3.5.3 and 3.6.0. *yield from* is gone, use *async/await* syntax. (#2343)
- Drop *aiohttp.Timeout* and use *async_timeout.timeout* instead. (#2348)
- Drop *resolve* param from TCPConnector. (#2377)
- Add DeprecationWarning for returning HTTPException (#2415)
- *send_str()*, *send_bytes()*, *send_json()*, *ping()* and *pong()* are genuine async functions now. (#2475)
- Drop undocumented *app.on_pre_signal* and *app.on_post_signal*. Signal handlers should be coroutines, support for regular functions is dropped. (#2480)

- *StreamResponse.drain()* is not a part of public API anymore, just use *await StreamResponse.write()*. *StreamResponse.write* is converted to async function. (#2483)
- Drop deprecated *slow_request_timeout* param and ***kwargs`* from *RequestHandler*. (#2500)
- Drop deprecated *resource.url()*. (#2501)
- Remove *%u* and *%l* format specifiers from access log format. (#2506)
- Drop deprecated *request.GET* property. (#2547)
- Simplify stream classes: drop *ChunksQueue* and *FlowControlChunksQueue*, merge *FlowControlStreamReader* functionality into *StreamReader*, drop *FlowControlStreamReader* name. (#2555)
- Do not create a new resource on *router.add_get(..., allow_head=True)* (#2585)
- Drop access to TCP tuning options from PayloadWriter and Response classes (#2604)
- Drop deprecated *encoding* parameter from client API (#2606)
- Deprecate `verify_ssl`, `ssl_context` and `fingerprint` parameters in client API (#2626)
- Get rid of the legacy class StreamWriter. (#2651)
- Forbid non-strings in *resource.url_for()* parameters. (#2668)
- Deprecate inheritance from `ClientSession` and `web.Application` and custom user attributes for `ClientSession`, `web.Request` and `web.Application` (#2691)
- Drop *resp = await aiohttp.request(...)* syntax for sake of *async with aiohttp.request(...) as resp:*. (#2540)
- Forbid synchronous context managers for *ClientSession* and test server/client. (#2362)

Misc

- #2552

2.3.10 (2018-02-02)

- Fix 100% CPU usage on HTTP GET and websocket connection just after it (#1955)
- Patch broken *ssl.match_hostname()* on Python<3.7 (#2674)

2.3.9 (2018-01-16)

- Fix colon handing in path for dynamic resources (#2670)

2.3.8 (2018-01-15)

- Do not use *yarl.unquote* internal function in aiohttp. Fix incorrectly unquoted path part in URL dispatcher (#2662)
- Fix compatibility with *yarl==1.0.0* (#2662)

2.3.7 (2017-12-27)

- Fixed race-condition for iterating addresses from the DNSCache. (#2620)
- Fix docstring for request.host (#2591)
- Fix docstring for request.remote (#2592)

2.3.6 (2017-12-04)

- Correct *request.app* context (for handlers not just middlewares). (#2577)

2.3.5 (2017-11-30)

- Fix compatibility with *pytest* 3.3+ (#2565)

2.3.4 (2017-11-29)

- Make *request.app* point to proper application instance when using nested applications (with middlewares). (#2550)
- Change base class of ClientConnectorSSLError to ClientSSLError from ClientConnectorError. (#2563)
- Return client connection back to free pool on error in *connector.connect()*. (#2567)

2.3.3 (2017-11-17)

- Having a *;* in Response content type does not assume it contains a charset anymore. (#2197)
- Use *getattr(asyncio, 'async')* for keeping compatibility with Python 3.7. (#2476)
- Ignore *NotImplementedError* raised by *set_child_watcher* from *uvloop*. (#2491)
- Fix warning in *ClientSession.__del__* by stopping to try to close it. (#2523)
- Fixed typo's in Third-party libraries page. And added async-v20 to the list (#2510)

2.3.2 (2017-11-01)

- Fix passing client max size on cloning request obj. (#2385)
- Fix ClientConnectorSSLError and ClientProxyConnectionError for proxy connector. (#2408)
- Drop generated *_http_parser* shared object from tarball distribution. (#2414)
- Fix connector convert OSError to ClientConnectorError. (#2423)
- Fix connection attempts for multiple dns hosts. (#2424)
- Fix ValueError for AF_INET6 sockets if a preexisting INET6 socket to the *aiohttp.web.run_app* function. (#2431)
- *_SessionRequestContextManager* closes the session properly now. (#2441)
- Rename *from_env* to *trust_env* in client reference. (#2451)

2.3.1 (2017-10-18)

- Relax attribute lookup in warning about old-styled middleware (#2340)

2.3.0 (2017-10-18)

Features

- Add SSL related params to *ClientSession.request* (#1128)
- Make enable_compression work on HTTP/1.0 (#1828)
- Deprecate registering synchronous web handlers (#1993)
- Switch to *multidict 3.0*. All HTTP headers preserve casing now but compared in case-insensitive way. (#1994)
- Improvement for *normalize_path_middleware*. Added possibility to handle URLs with query string. (#1995)
- Use towncrier for CHANGES.txt build (#1997)
- Implement *trust_env=True* param in *ClientSession*. (#1998)
- Added variable to customize proxy headers (#2001)
- Implement *router.add_routes* and router decorators. (#2004)
- Deprecated *BaseRequest.has_body* in favor of *BaseRequest.can_read_body* Added *BaseRequest.body_exists* attribute that stays static for the lifetime of the request (#2005)
- Provide *BaseRequest.loop* attribute (#2024)
- Make *_CoroGuard* awaitable and fix *ClientSession.close* warning message (#2026)
- Responses to redirects without Location header are returned instead of raising a RuntimeError (#2030)
- Added *get_client*, *get_server*, *setUpAsync* and *tearDownAsync* methods to AioHTTPTestCase (#2032)
- Add automatically a SafeChildWatcher to the test loop (#2058)
- add ability to disable automatic response decompression (#2110)
- Add support for throttling DNS request, avoiding the requests saturation when there is a miss in the DNS cache and many requests getting into the connector at the same time. (#2111)
- Use request for getting access log information instead of message/transport pair. Add *RequestBase.remote* property for accessing to IP of client initiated HTTP request. (#2123)
- json() raises a ContentTypeError exception if the content-type does not meet the requirements instead of raising a generic ClientResponseError. (#2136)
- Make the HTTP client able to return HTTP chunks when chunked transfer encoding is used. (#2150)
- add *append_version* arg into *StaticResource.url* and *StaticResource.url_for* methods for getting an url with hash (version) of the file. (#2157)
- Fix parsing the Forwarded header. * commas and semicolons are allowed inside quoted-strings; * empty forwarded-pairs (as in for=_1;;by=_2) are allowed; * non-standard parameters are allowed (although this alone could be easily done in the previous parser). (#2173)
- Don't require ssl module to run. aiohttp does not require SSL to function. The code paths involved with SSL will only be hit upon SSL usage. Raise *RuntimeError* if HTTPS protocol is required but ssl module is not present. (#2221)
- Accept coroutine fixtures in pytest plugin (#2223)

- Call *shutdown_asyncgens* before event loop closing on Python 3.6. (#2227)
- Speed up Signals when there are no receivers (#2229)
- Raise *InvalidURL* instead of *ValueError* on fetches with invalid URL. (#2241)
- Move *DummyCookieJar* into *cookiejar.py* (#2242)
- *run_app*: Make *print=None* disable printing (#2260)
- Support *brotli* encoding (generic-purpose lossless compression algorithm) (#2270)
- Add server support for WebSockets Per-Message Deflate. Add client option to add deflate compress header in WebSockets request header. If calling ClientSession.ws_connect() with *compress=15* the client will support deflate compress negotiation. (#2273)
- Support *verify_ssl*, *fingerprint*, *ssl_context* and *proxy_headers* by *client.ws_connect*. (#2292)
- Added *aiohttp.ClientConnectorSSLError* when connection fails due *ssl.SSLError* (#2294)
- *aiohttp.web.Application.make_handler* support *access_log_class* (#2315)
- Build HTTP parser extension in non-strict mode by default. (#2332)

Bugfixes

- Clear auth information on redirecting to other domain (#1699)
- Fix missing app.loop on startup hooks during tests (#2060)
- Fix issue with synchronous session closing when using *ClientSession* as an asynchronous context manager. (#2063)
- Fix issue with *CookieJar* incorrectly expiring cookies in some edge cases. (#2084)
- Force use of IPv4 during test, this will make tests run in a Docker container (#2104)
- Warnings about unawaited coroutines now correctly point to the user's code. (#2106)
- Fix issue with *IndexError* being raised by the *StreamReader.iter_chunks()* generator. (#2112)
- Support HTTP 308 Permanent redirect in client class. (#2114)
- Fix *FileResponse* sending empty chunked body on 304. (#2143)
- Do not add *Content-Length: 0* to GET/HEAD/TRACE/OPTIONS requests by default. (#2167)
- Fix parsing the Forwarded header according to RFC 7239. (#2170)
- Securely determining remote/scheme/host #2171 (#2171)
- Fix header name parsing, if name is split into multiple lines (#2183)
- Handle session close during connection, *KeyError: <aiohttp.connector._TransportPlaceholder>* (#2193)
- Fixes uncaught *TypeError* in *helpers.guess_filename* if *name* is not a string (#2201)
- Raise OSError on async DNS lookup if resolved domain is an alias for another one, which does not have an A or CNAME record. (#2231)
- Fix incorrect warning in *StreamReader*. (#2251)
- Properly clone state of web request (#2284)
- Fix C HTTP parser for cases when status line is split into different TCP packets. (#2311)
- Fix *web.FileResponse* overriding user supplied Content-Type (#2317)

Improved Documentation

- Add a note about possible performance degradation in *await resp.text()* if charset was not provided by *Content-Type* HTTP header. Pass explicit encoding to solve it. (#1811)
- Drop *disqus* widget from documentation pages. (#2018)
- Add a graceful shutdown section to the client usage documentation. (#2039)
- Document *connector_owner* parameter. (#2072)
- Update the doc of web.Application (#2081)
- Fix mistake about access log disabling. (#2085)
- Add example usage of on_startup and on_shutdown signals by creating and disposing an aiopg connection engine. (#2131)
- Document *encoded=True* for *yarl.URL*, it disables all yarl transformations. (#2198)
- Document that all app's middleware factories are run for every request. (#2225)
- Reflect the fact that default resolver is threaded one starting from aiohttp 1.1 (#2228)

Deprecations and Removals

- Drop deprecated *Server.finish_connections* (#2006)
- Drop %O format from logging, use %b instead. Drop %e format from logging, environment variables are not supported anymore. (#2123)
- Drop deprecated secure_proxy_ssl_header support (#2171)
- Removed TimeService in favor of simple caching. TimeService also had a bug where it lost about 0.5 seconds per second. (#2176)
- Drop unused response_factory from static files API (#2290)

Misc

- #2013, #2014, #2048, #2094, #2149, #2187, #2214, #2225, #2243, #2248

2.2.5 (2017-08-03)

- Don't raise deprecation warning on *loop.run_until_complete(client.close())* (#2065)

2.2.4 (2017-08-02)

- Fix issue with synchronous session closing when using ClientSession as an asynchronous context manager. (#2063)

2.2.3 (2017-07-04)

- Fix *_CoroGuard* for python 3.4

2.2.2 (2017-07-03)

- Allow *await session.close()* along with *yield from session.close()*

2.2.1 (2017-07-02)

- Relax *yarl* requirement to 0.11+
- Backport #2026: *session.close is* a coroutine (#2029)

2.2.0 (2017-06-20)

- Add doc for add_head, update doc for add_get. (#1944)
- Fixed consecutive calls for *Response.write_eof*.
- Retain method attributes (e.g. `__doc__`) when registering synchronous handlers for resources. (#1953)
- Added signal TERM handling in *run_app* to gracefully exit (#1932)
- Fix websocket issues caused by frame fragmentation. (#1962)
- Raise RuntimeError is you try to set the Content Length and enable chunked encoding at the same time (#1941)
- Small update for *unittest_run_loop*
- Use CIMultiDict for ClientRequest.skip_auto_headers (#1970)
- Fix wrong startup sequence: test server and *run_app()* are not raise *DeprecationWarning* now (#1947)
- Make sure cleanup signal is sent if startup signal has been sent (#1959)
- Fixed server keep-alive handler, could cause 100% cpu utilization (#1955)
- Connection can be destroyed before response get processed if *await aiohttp.request(..)* is used (#1981)
- MultipartReader does not work with -OO (#1969)
- Fixed *ClientPayloadError* with blank *Content-Encoding* header (#1931)
- Support *deflate* encoding implemented in *httpbin.org/deflate* (#1918)
- Fix BadStatusLine caused by extra *CRLF* after *POST* data (#1792)
- Keep a reference to *ClientSession* in response object (#1985)
- Deprecate undocumented *app.on_loop_available* signal (#1978)

2.1.0 (2017-05-26)

- Added support for experimental *async-tokio* event loop written in Rust https://github.com/PyO3/tokio
- Write to transport `\r\n` before closing after keepalive timeout, otherwise client can not detect socket disconnection. (#1883)
- Only call *loop.close* in *run_app* if the user did *not* supply a loop. Useful for allowing clients to specify their own cleanup before closing the asyncio loop if they wish to tightly control loop behavior
- Content disposition with semicolon in filename (#917)
- Added *request_info* to response object and *ClientResponseError*. (#1733)
- Added *history* to *ClientResponseError*. (#1741)
- Allow to disable redirect url re-quoting (#1474)
- Handle RuntimeError from transport (#1790)
- Dropped "%O" in access logger (#1673)
- Added *args* and *kwargs* to *unittest_run_loop*. Useful with other decorators, for example @*patch*. (#1803)
- Added *iter_chunks* to response.content object. (#1805)
- Avoid creating TimerContext when there is no timeout to allow compatibility with Tornado. (#1817) (#1180)
- Add *proxy_from_env* to *ClientRequest* to read from environment variables. (#1791)
- Add DummyCookieJar helper. (#1830)
- Fix assertion errors in Python 3.4 from noop helper. (#1847)
- Do not unquote + in match_info values (#1816)
- Use Forwarded, X-Forwarded-Scheme and X-Forwarded-Host for better scheme and host resolution. (#1134)
- Fix sub-application middlewares resolution order (#1853)
- Fix applications comparison (#1866)
- Fix static location in index when prefix is used (#1662)
- Make test server more reliable (#1896)
- Extend list of web exceptions, add HTTPUnprocessableEntity, HTTPFailedDependency, HTTPInsufficientStorage status codes (#1920)

2.0.7 (2017-04-12)

- Fix *pypi* distribution
- Fix exception description (#1807)
- Handle socket error in FileResponse (#1773)
- Cancel websocket heartbeat on close (#1793)

2.0.6 (2017-04-04)

- Keeping blank values for *request.post()* and *multipart.form()* (#1765)
- TypeError in data_received of ResponseHandler (#1770)
- Fix `web.run_app` not to bind to default host-port pair if only socket is passed (#1786)

2.0.5 (2017-03-29)

- Memory leak with aiohttp.request (#1756)
- Disable cleanup closed ssl transports by default.
- Exception in request handling if the server responds before the body is sent (#1761)

2.0.4 (2017-03-27)

- Memory leak with aiohttp.request (#1756)
- Encoding is always UTF-8 in POST data (#1750)
- Do not add "Content-Disposition" header by default (#1755)

2.0.3 (2017-03-24)

- Call https website through proxy will cause error (#1745)
- Fix exception on multipart/form-data post if content-type is not set (#1743)

2.0.2 (2017-03-21)

- Fixed Application.on_loop_available signal (#1739)
- Remove debug code

2.0.1 (2017-03-21)

- Fix allow-head to include name on route (#1737)
- Fixed AttributeError in WebSocketResponse.can_prepare (#1736)

2.0.0 (2017-03-20)

- Added *json* to *ClientSession.request()* method (#1726)
- Added session's *raise_for_status* parameter, automatically calls raise_for_status() on any request. (#1724)
- *response.json()* raises *ClientReponseError* exception if response's content type does not match (#1723)
  - Cleanup timer and loop handle on any client exception.
- Deprecate *loop* parameter for Application's constructor

2.0.0rc1 (2017-03-15)

- Properly handle payload errors (#1710)
- Added *ClientWebSocketResponse.get_extra_info()* (#1717)
- It is not possible to combine Transfer-Encoding and chunked parameter, same for compress and Content-Encoding (#1655)
- Connector's *limit* parameter indicates total concurrent connections. New *limit_per_host* added, indicates total connections per endpoint. (#1601)
- Use url's *raw_host* for name resolution (#1685)
- Change *ClientResponse.url* to *yarl.URL* instance (#1654)
- Add max_size parameter to web.Request reading methods (#1133)
- Web Request.post() stores data in temp files (#1469)
- Add the *allow_head=True* keyword argument for *add_get* (#1618)
- *run_app* and the Command Line Interface now support serving over Unix domain sockets for faster inter-process communication.
- *run_app* now supports passing a preexisting socket object. This can be useful e.g. for socket-based activated applications, when binding of a socket is done by the parent process.
- Implementation for Trailer headers parser is broken (#1619)
- Fix FileResponse to not fall on bad request (range out of file size)
- Fix FileResponse to correct stream video to Chromes
- Deprecate public low-level api (#1657)
- Deprecate *encoding* parameter for ClientSession.request() method
- Dropped aiohttp.wsgi (#1108)
- Dropped *version* from ClientSession.request() method
- Dropped websocket version 76 support (#1160)
- Dropped: *aiohttp.protocol.HttpPrefixParser* (#1590)
- Dropped: Servers response's *.started*, *.start()* and *.can_start()* method (#1591)
- Dropped: Adding *sub app* via *app.router.add_subapp()* is deprecated use *app.add_subapp()* instead (#1592)
- Dropped: *Application.finish()* and *Application.register_on_finish()* (#1602)
- Dropped: *web.Request.GET* and *web.Request.POST*
- Dropped: aiohttp.get(), aiohttp.options(), aiohttp.head(), aiohttp.post(), aiohttp.put(), aiohttp.patch(), aiohttp.delete(), and aiohttp.ws_connect() (#1593)
- Dropped: *aiohttp.web.WebSocketResponse.receive_msg()* (#1605)
- Dropped: *ServerHttpProtocol.keep_alive_timeout* attribute and *keep-alive*, *keep_alive_on*, *timeout*, *log* constructor parameters (#1606)
- Dropped: *TCPConnector's` .resolve*, *.resolved_hosts*, *.clear_resolved_hosts()* attributes and *resolve* constructor parameter (#1607)
- Dropped *ProxyConnector* (#1609)

1.3.5 (2017-03-16)

- Fixed None timeout support (#1720)

1.3.4 (2017-03-14)

- Revert timeout handling in client request
- Fix StreamResponse representation after eof
- Fix file_sender to not fall on bad request (range out of file size)
- Fix file_sender to correct stream video to Chromes
- Fix NotImplementedError server exception (#1703)
- Clearer error message for URL without a host name. (#1691)
- Silence deprecation warning in __repr__ (#1690)
- IDN + HTTPS = *ssl.CertificateError* (#1685)

1.3.3 (2017-02-19)

- Fixed memory leak in time service (#1656)

1.3.2 (2017-02-16)

- Awaiting on WebSocketResponse.send_* does not work (#1645)
- Fix multiple calls to client ws_connect when using a shared header dict (#1643)
- Make CookieJar.filter_cookies() accept plain string parameter. (#1636)

1.3.1 (2017-02-09)

- Handle CLOSING in WebSocketResponse.__anext__
- Fixed AttributeError 'drain' for server websocket handler (#1613)

1.3.0 (2017-02-08)

- Multipart writer validates the data on append instead of on a request send (#920)
- Multipart reader accepts multipart messages with or without their epilogue to consistently handle valid and legacy behaviors (#1526) (#1581)
- Separate read + connect + request timeouts # 1523
- Do not swallow Upgrade header (#1587)
- Fix polls demo run application (#1487)
- Ignore unknown 1XX status codes in client (#1353)
- Fix sub-Multipart messages missing their headers on serialization (#1525)
- Do not use readline when reading the content of a part in the multipart reader (#1535)

- Add optional flag for quoting *FormData* fields (#916)
- 416 Range Not Satisfiable if requested range end > file size (#1588)
- Having a *:* or @ in a route does not work (#1552)
- Added *receive_timeout* timeout for websocket to receive complete message. (#1325)
- Added *heartbeat* parameter for websocket to automatically send *ping* message. (#1024) (#777)
- Remove *web.Application* dependency from *web.UrlDispatcher* (#1510)
- Accepting back-pressure from slow websocket clients (#1367)
- Do not pause transport during set_parser stage (#1211)
- Lingering close does not terminate before timeout (#1559)
- *setsockopt* may raise *OSError* exception if socket is closed already (#1595)
- Lots of CancelledError when requests are interrupted (#1565)
- Allow users to specify what should happen to decoding errors when calling a responses *text()* method (#1542)
- Back port std module *http.cookies* for python3.4.2 (#1566)
- Maintain url's fragment in client response (#1314)
- Allow concurrently close WebSocket connection (#754)
- Gzipped responses with empty body raises ContentEncodingError (#609)
- Return 504 if request handle raises TimeoutError.
- Refactor how we use keep-alive and close lingering timeouts.
- Close response connection if we can not consume whole http message during client response release
- Abort closed ssl client transports, broken servers can keep socket open un-limit time (#1568)
- Log warning instead of *RuntimeError* is websocket connection is closed.
- Deprecated: *aiohttp.protocol.HttpPrefixParser* will be removed in 1.4 (#1590)
- Deprecated: Servers response's *.started*, *.start()* and *.can_start()* method will be removed in 1.4 (#1591)
- Deprecated: Adding *sub app* via *app.router.add_subapp()* is deprecated use *app.add_subapp()* instead, will be removed in 1.4 (#1592)
- Deprecated: aiohttp.get(), aiohttp.options(), aiohttp.head(), aiohttp.post(), aiohttp.put(), aiohttp.patch(), aiohttp.delete(), and aiohttp.ws_connect() will be removed in 1.4 (#1593)
- Deprecated: *Application.finish()* and *Application.register_on_finish()* will be removed in 1.4 (#1602)

1.2.0 (2016-12-17)

- Extract *BaseRequest* from *web.Request*, introduce *web.Server* (former *RequestHandlerFactory*), introduce new low-level web server which is not coupled with *web.Application* and routing (#1362)
- Make *TestServer.make_url* compatible with *yarl.URL* (#1389)
- Implement range requests for static files (#1382)
- Support task attribute for StreamResponse (#1410)
- Drop *TestClient.app* property, use *TestClient.server.app* instead (BACKWARD INCOMPATIBLE)
- Drop *TestClient.handler* property, use *TestClient.server.handler* instead (BACKWARD INCOMPATIBLE)

- *TestClient.server* property returns a test server instance, was *asyncio.AbstractServer* (BACKWARD INCOMPATIBLE)
- Follow gunicorn's signal semantics in *Gunicorn[UVLoop]WebWorker* (#1201)
- Call worker_int and worker_abort callbacks in *Gunicorn[UVLoop]WebWorker* (#1202)
- Has functional tests for client proxy (#1218)
- Fix bugs with client proxy target path and proxy host with port (#1413)
- Fix bugs related to the use of unicode hostnames (#1444)
- Preserve cookie quoting/escaping (#1453)
- FileSender will send gzipped response if gzip version available (#1426)
- Don't override *Content-Length* header in *web.Response* if no body was set (#1400)
- Introduce *router.post_init()* for solving (#1373)
- Fix raise error in case of multiple calls of *TimeServive.stop()*
- Allow to raise web exceptions on router resolving stage (#1460)
- Add a warning for session creation outside of coroutine (#1468)
- Avoid a race when application might start accepting incoming requests but startup signals are not processed yet e98e8c6
- Raise a *RuntimeError* when trying to change the status of the HTTP response after the headers have been sent (#1480)
- Fix bug with https proxy acquired cleanup (#1340)
- Use UTF-8 as the default encoding for multipart text parts (#1484)

1.1.6 (2016-11-28)

- Fix *BodyPartReader.read_chunk* bug about returns zero bytes before *EOF* (#1428)

1.1.5 (2016-11-16)

- Fix static file serving in fallback mode (#1401)

1.1.4 (2016-11-14)

- Make *TestServer.make_url* compatible with *yarl.URL* (#1389)
- Generate informative exception on redirects from server which does not provide redirection headers (#1396)

1.1.3 (2016-11-10)

- Support *root* resources for sub-applications (#1379)

1.1.2 (2016-11-08)

- Allow starting variables with an underscore (#1379)
- Properly process UNIX sockets by gunicorn worker (#1375)
- Fix ordering for *FrozenList*
- Don't propagate pre and post signals to sub-application (#1377)

1.1.1 (2016-11-04)

- Fix documentation generation (#1120)

1.1.0 (2016-11-03)

- Drop deprecated *WSClientDisconnectedError* (BACKWARD INCOMPATIBLE)
- Use *yarl.URL* in client API. The change is 99% backward compatible but *ClientResponse.url* is an *yarl.URL* instance now. (#1217)
- Close idle keep-alive connections on shutdown (#1222)
- Modify regex in AccessLogger to accept underscore and numbers (#1225)
- Use *yarl.URL* in web server API. *web.Request.rel_url* and *web.Request.url* are added. URLs and templates are percent-encoded now. (#1224)
- Accept *yarl.URL* by server redirections (#1278)
- Return *yarl.URL* by *.make_url()* testing utility (#1279)
- Properly format IPv6 addresses by *aiohttp.web.run_app* (#1139)
- Use *yarl.URL* by server API (#1288)
  - Introduce *resource.url_for()*, deprecate *resource.url()*.
  - Implement *StaticResource*.
  - Inherit *SystemRoute* from *AbstractRoute*
  - Drop old-style routes: *Route*, *PlainRoute*, *DynamicRoute*, *StaticRoute*, *ResourceAdapter*.
- Revert *resp.url* back to *str*, introduce *resp.url_obj* (#1292)
- Raise ValueError if BasicAuth login has a ":" character (#1307)
- Fix bug when ClientRequest send payload file with opened as open('filename', 'r+b') (#1306)
- Enhancement to AccessLogger (pass *extra* dict) (#1303)
- Show more verbose message on import errors (#1319)
- Added save and load functionality for *CookieJar* (#1219)
- Added option on *StaticRoute* to follow symlinks (#1299)
- Force encoding of *application/json* content type to utf-8 (#1339)

- Fix invalid invocations of *errors.LineTooLong* (#1335)
- Websockets: Stop *async for* iteration when connection is closed (#1144)
- Ensure TestClient HTTP methods return a context manager (#1318)
- Raise *ClientDisconnectedError* to *FlowControlStreamReader* read function if *ClientSession* object is closed by client when reading data. (#1323)
- Document deployment without *Gunicorn* (#1120)
- Add deprecation warning for MD5 and SHA1 digests when used for fingerprint of site certs in TCPConnector. (#1186)
- Implement sub-applications (#1301)
- Don't inherit *web.Request* from *dict* but implement *MutableMapping* protocol.
- Implement frozen signals
- Don't inherit *web.Application* from *dict* but implement *MutableMapping* protocol.
- Support freezing for web applications
- Accept access_log parameter in *web.run_app*, use *None* to disable logging
- Don't flap *tcp_cork* and *tcp_nodelay* in regular request handling. *tcp_nodelay* is still enabled by default.
- Improve performance of web server by removing premature computing of Content-Type if the value was set by *web.Response* constructor.

  While the patch boosts speed of trivial *web.Response(text='OK', content_type='text/plain)* very well please don't expect significant boost of your application – a couple DB requests and business logic is still the main bottleneck.
- Boost performance by adding a custom time service (#1350)
- Extend *ClientResponse* with *content_type* and *charset* properties like in *web.Request*. (#1349)
- Disable aiodns by default (#559)
- Don't flap *tcp_cork* in client code, use TCP_NODELAY mode by default.
- Implement *web.Request.clone()* (#1361)

1.0.5 (2016-10-11)

- Fix StreamReader._read_nowait to return all available data up to the requested amount (#1297)

1.0.4 (2016-09-22)

- Fix FlowControlStreamReader.read_nowait so that it checks whether the transport is paused (#1206)

1.0.2 (2016-09-22)

- Make CookieJar compatible with 32-bit systems (#1188)
- Add missing *WSMsgType* to *web_ws.__all__*, see (#1200)
- Fix *CookieJar* ctor when called with *loop=None* (#1203)
- Fix broken upper-casing in wsgi support (#1197)

1.0.1 (2016-09-16)

- Restore *aiohttp.web.MsgType* alias for *aiohttp.WSMsgType* for sake of backward compatibility (#1178)
- Tune alabaster schema.
- Use *text/html* content type for displaying index pages by static file handler.
- Fix *AssertionError* in static file handling (#1177)
- Fix access log formats *%O* and *%b* for static file handling
- Remove *debug* setting of GunicornWorker, use *app.debug* to control its debug-mode instead

1.0.0 (2016-09-16)

- Change default size for client session's connection pool from unlimited to 20 (#977)
- Add IE support for cookie deletion. (#994)
- Remove deprecated *WebSocketResponse.wait_closed* method (BACKWARD INCOMPATIBLE)
- Remove deprecated *force* parameter for *ClientResponse.close* method (BACKWARD INCOMPATIBLE)
- Avoid using of mutable CIMultiDict kw param in make_mocked_request (#997)
- Make WebSocketResponse.close a little bit faster by avoiding new task creating just for timeout measurement
- Add *proxy* and *proxy_auth* params to *client.get()* and family, deprecate *ProxyConnector* (#998)
- Add support for websocket send_json and receive_json, synchronize server and client API for websockets (#984)
- Implement router shourtcuts for most useful HTTP methods, use *app.router.add_get()*, *app.router.add_post()* etc. instead of *app.router.add_route()* (#986)
- Support SSL connections for gunicorn worker (#1003)
- Move obsolete examples to legacy folder
- Switch to multidict 2.0 and title-cased strings (#1015)
- *{FOO}e* logger format is case-sensitive now
- Fix logger report for unix socket 8e8469b
- Rename aiohttp.websocket to aiohttp._ws_impl
- Rename aiohttp.MsgType tp aiohttp.WSMsgType
- Introduce aiohttp.WSMessage officially
- Rename Message -> WSMessage
- Remove deprecated decode param from resp.read(decode=True)
- Use 5min default client timeout (#1028)

- Relax HTTP method validation in UrlDispatcher (#1037)
- Pin minimal supported asyncio version to 3.4.2+ (*loop.is_close()* should be present)
- Remove aiohttp.websocket module (BACKWARD INCOMPATIBLE) Please use high-level client and server approaches
- Link header for 451 status code is mandatory
- Fix test_client fixture to allow multiple clients per test (#1072)
- make_mocked_request now accepts dict as headers (#1073)
- Add Python 3.5.2/3.6+ compatibility patch for async generator protocol change (#1082)
- Improvement test_client can accept instance object (#1083)
- Simplify ServerHttpProtocol implementation (#1060)
- Add a flag for optional showing directory index for static file handling (#921)
- Define *web.Application.on_startup()* signal handler (#1103)
- Drop ChunkedParser and LinesParser (#1111)
- Call *Application.startup* in GunicornWebWorker (#1105)
- Fix client handling hostnames with 63 bytes when a port is given in the url (#1044)
- Implement proxy support for ClientSession.ws_connect (#1025)
- Return named tuple from WebSocketResponse.can_prepare (#1016)
- Fix access_log_format in *GunicornWebWorker* (#1117)
- Setup Content-Type to application/octet-stream by default (#1124)
- Deprecate debug parameter from app.make_handler(), use *Application(debug=True)* instead (#1121)
- Remove fragment string in request path (#846)
- Use aiodns.DNSResolver.gethostbyname() if available (#1136)
- Fix static file sending on uvloop when sendfile is available (#1093)
- Make prettier urls if query is empty dict (#1143)
- Fix redirects for HEAD requests (#1147)
- Default value for *StreamReader.read_nowait* is -1 from now (#1150)
- *aiohttp.StreamReader* is not inherited from *asyncio.StreamReader* from now (BACKWARD INCOMPATIBLE) (#1150)
- Streams documentation added (#1150)
- Add *multipart* coroutine method for web Request object (#1067)
- Publish ClientSession.loop property (#1149)
- Fix static file with spaces (#1140)
- Fix piling up asyncio loop by cookie expiration callbacks (#1061)
- Drop *Timeout* class for sake of *async_timeout* external library. *aiohttp.Timeout* is an alias for *async_timeout.timeout*
- *use_dns_cache* parameter of *aiohttp.TCPConnector* is *True* by default (BACKWARD INCOMPATIBLE) (#1152)

- *aiohttp.TCPConnector* uses asynchronous DNS resolver if available by default (BACKWARD INCOMPATIBLE) (#1152)
- Conform to RFC3986 - do not include url fragments in client requests (#1174)
- Drop *ClientSession.cookies* (BACKWARD INCOMPATIBLE) (#1173)
- Refactor *AbstractCookieJar* public API (BACKWARD INCOMPATIBLE) (#1173)
- Fix clashing cookies with have the same name but belong to different domains (BACKWARD INCOMPATIBLE) (#1125)
- Support binary Content-Transfer-Encoding (#1169)

0.22.5 (08-02-2016)

- Pin miltidict version to >=1.2.2

0.22.3 (07-26-2016)

- Do not filter cookies if unsafe flag provided (#1005)

0.22.2 (07-23-2016)

- Suppress CancelledError when Timeout raises TimeoutError (#970)
- Don't expose *aiohttp.__version__*
- Add unsafe parameter to CookieJar (#968)
- Use unsafe cookie jar in test client tools
- Expose aiohttp.CookieJar name

0.22.1 (07-16-2016)

- Large cookie expiration/max-age does not break an event loop from now (fixes (#967))

0.22.0 (07-15-2016)

- Fix bug in serving static directory (#803)
- Fix command line arg parsing (#797)
- Fix a documentation chapter about cookie usage (#790)
- Handle empty body with gzipped encoding (#758)
- Support 451 Unavailable For Legal Reasons http status (#697)
- Fix Cookie share example and few small typos in docs (#817)
- UrlDispatcher.add_route with partial coroutine handler (#814)
- Optional support for aiodns (#728)
- Add ServiceRestart and TryAgainLater websocket close codes (#828)
- Fix prompt message for *web.run_app* (#832)

- Allow to pass None as a timeout value to disable timeout logic (#834)
- Fix leak of connection slot during connection error (#835)
- Gunicorn worker with uvloop support *aiohttp.worker.GunicornUVLoopWebWorker* (#878)
- Don't send body in response to HEAD request (#838)
- Skip the preamble in MultipartReader (#881)
- Implement BasicAuth decode classmethod. (#744)
- Don't crash logger when transport is None (#889)
- Use a create_future compatibility wrapper instead of creating Futures directly (#896)
- Add test utilities to aiohttp (#902)
- Improve Request.__repr__ (#875)
- Skip DNS resolving if provided host is already an ip address (#874)
- Add headers to ClientSession.ws_connect (#785)
- Document that server can send pre-compressed data (#906)
- Don't add Content-Encoding and Transfer-Encoding if no body (#891)
- Add json() convenience methods to websocket message objects (#897)
- Add client_resp.raise_for_status() (#908)
- Implement cookie filter (#799)
- Include an example of middleware to handle error pages (#909)
- Fix error handling in StaticFileMixin (#856)
- Add mocked request helper (#900)
- Fix empty ALLOW Response header for cls based View (#929)
- Respect CONNECT method to implement a proxy server (#847)
- Add pytest_plugin (#914)
- Add tutorial
- Add backlog option to support more than 128 (default value in "create_server" function) concurrent connections (#892)
- Allow configuration of header size limits (#912)
- Separate sending file logic from StaticRoute dispatcher (#901)
- Drop deprecated share_cookies connector option (BACKWARD INCOMPATIBLE)
- Drop deprecated support for tuple as auth parameter. Use aiohttp.BasicAuth instead (BACKWARD INCOMPATIBLE)
- Remove deprecated *request.payload* property, use *content* instead. (BACKWARD INCOMPATIBLE)
- Drop all mentions about api changes in documentation for versions older than 0.16
- Allow to override default cookie jar (#963)
- Add manylinux wheel builds
- Dup a socket for sendfile usage (#964)

0.21.6 (05-05-2016)

- Drop initial query parameters on redirects (#853)

0.21.5 (03-22-2016)

- Fix command line arg parsing (#797)

0.21.4 (03-12-2016)

- Fix ResourceAdapter: don't add method to allowed if resource is not match (#826)
- Fix Resource: append found method to returned allowed methods

0.21.2 (02-16-2016)

- Fix a regression: support for handling ~/path in static file routes was broken (#782)

0.21.1 (02-10-2016)

- Make new resources classes public (#767)
- Add *router.resources()* view
- Fix cmd-line parameter names in doc

0.21.0 (02-04-2016)

- Introduce on_shutdown signal (#722)
- Implement raw input headers (#726)
- Implement web.run_app utility function (#734)
- Introduce on_cleanup signal
- Deprecate Application.finish() / Application.register_on_finish() in favor of on_cleanup.
- Get rid of bare aiohttp.request(), aiohttp.get() and family in docs (#729)
- Deprecate bare aiohttp.request(), aiohttp.get() and family (#729)
- Refactor keep-alive support (#737):
  - Enable keepalive for HTTP 1.0 by default
  - Disable it for HTTP 0.9 (who cares about 0.9, BTW?)
  - For keepalived connections
    - Send *Connection: keep-alive* for HTTP 1.0 only
    - don't send *Connection* header for HTTP 1.1
  - For non-keepalived connections
    - Send *Connection: close* for HTTP 1.1 only
    - don't send *Connection* header for HTTP 1.0

- Add version parameter to ClientSession constructor, deprecate it for session.request() and family (#736)
- Enable access log by default (#735)
- Deprecate app.router.register_route() (the method was not documented intentionally BTW).
- Deprecate app.router.named_routes() in favor of app.router.named_resources()
- route.add_static accepts pathlib.Path now (#743)
- Add command line support: *$ python -m aiohttp.web package.main* (#740)
- FAQ section was added to docs. Enjoy and fill free to contribute new topics
- Add async context manager support to ClientSession
- Document ClientResponse's host, method, url properties
- Use CORK/NODELAY in client API (#748)
- ClientSession.close and Connector.close are coroutines now
- Close client connection on exception in ClientResponse.release()
- Allow to read multipart parts without content-length specified (#750)
- Add support for unix domain sockets to gunicorn worker (#470)
- Add test for default Expect handler (#601)
- Add the first demo project
- Rename *loader* keyword argument in *web.Request.json* method. (#646)
- Add local socket binding for TCPConnector (#678)

0.20.2 (01-07-2016)

- Enable use of *await* for a class based view (#717)
- Check address family to fill wsgi env properly (#718)
- Fix memory leak in headers processing (thanks to Marco Paolini) (#723)

0.20.1 (12-30-2015)

- Raise RuntimeError is Timeout context manager was used outside of task context.
- Add number of bytes to stream.read_nowait (#700)
- Use X-FORWARDED-PROTO for wsgi.url_scheme when available

0.20.0 (12-28-2015)

- Extend list of web exceptions, add HTTPMisdirectedRequest, HTTPUpgradeRequired, HTTPPreconditionRequired, HTTPTooManyRequests, HTTPRequestHeaderFieldsTooLarge, HTTPVariantAlsoNegotiates, HTTPNotExtended, HTTPNetworkAuthenticationRequired status codes (#644)
- Do not remove AUTHORIZATION header by WSGI handler (#649)
- Fix broken support for https proxies with authentication (#617)
- Get REMOTE_* and SEVER_* http vars from headers when listening on unix socket (#654)

- Add HTTP 308 support (#663)
- Add Tf format (time to serve request in seconds, %06f format) to access log (#669)
- Remove one and a half years long deprecated ClientResponse.read_and_close() method
- Optimize chunked encoding: use a single syscall instead of 3 calls on sending chunked encoded data
- Use TCP_CORK and TCP_NODELAY to optimize network latency and throughput (#680)
- Websocket XOR performance improved (#687)
- Avoid sending cookie attributes in Cookie header (#613)
- Round server timeouts to seconds for grouping pending calls. That leads to less amount of poller syscalls e.g. epoll.poll(). (#702)
- Close connection on websocket handshake error (#703)
- Implement class based views (#684)
- Add *headers* parameter to ws_connect() (#709)
- Drop unused function *parse_remote_addr()* (#708)
- Close session on exception (#707)
- Store http code and headers in WSServerHandshakeError (#706)
- Make some low-level message properties readonly (#710)

0.19.0 (11-25-2015)

- Memory leak in ParserBuffer (#579)
- Support gunicorn's *max_requests* settings in gunicorn worker
- Fix wsgi environment building (#573)
- Improve access logging (#572)
- Drop unused host and port from low-level server (#586)
- Add Python 3.5 *async for* implementation to server websocket (#543)
- Add Python 3.5 *async for* implementation to client websocket
- Add Python 3.5 *async with* implementation to client websocket
- Add charset parameter to web.Response constructor (#593)
- Forbid passing both Content-Type header and content_type or charset params into web.Response constructor
- Forbid duplicating of web.Application and web.Request (#602)
- Add an option to pass Origin header in ws_connect (#607)
- Add json_response function (#592)
- Make concurrent connections respect limits (#581)
- Collect history of responses if redirects occur (#614)
- Enable passing pre-compressed data in requests (#621)
- Expose named routes via UrlDispatcher.named_routes() (#622)
- Allow disabling sendfile by environment variable AIOHTTP_NOSENDFILE (#629)

- Use ensure_future if available
- Always quote params for Content-Disposition (#641)
- Support async for in multipart reader (#640)
- Add Timeout context manager (#611)

0.18.4 (13-11-2015)

- Relax rule for router names again by adding dash to allowed characters: they may contain identifiers, dashes, dots and columns

0.18.3 (25-10-2015)

- Fix formatting for _RequestContextManager helper (#590)

0.18.2 (22-10-2015)

- Fix regression for OpenSSL < 1.0.0 (#583)

0.18.1 (20-10-2015)

- Relax rule for router names: they may contain dots and columns starting from now

0.18.0 (19-10-2015)

- Use errors.HttpProcessingError.message as HTTP error reason and message (#459)
- Optimize cythonized multidict a bit
- Change repr's of multidicts and multidict views
- default headers in ClientSession are now case-insensitive
- Make '=' char and 'wss://' schema safe in urls (#477)
- *ClientResponse.close()* forces connection closing by default from now (#479)

  N.B. Backward incompatible change: was *.close(force=False) Using `force* parameter for the method is deprecated: use *.release()* instead.
- Properly requote URL's path (#480)
- add *skip_auto_headers* parameter for client API (#486)
- Properly parse URL path in aiohttp.web.Request (#489)
- Raise RuntimeError when chunked enabled and HTTP is 1.0 (#488)
- Fix a bug with processing io.BytesIO as data parameter for client API (#500)
- Skip auto-generation of Content-Type header (#507)
- Use sendfile facility for static file handling (#503)
- Default *response_factory* in *app.router.add_static* now is *StreamResponse*, not *None*. The functionality is not changed if default is not specified.

- Drop *ClientResponse.message* attribute, it was always implementation detail.
- Streams are optimized for speed and mostly memory in case of a big HTTP message sizes (#496)
- Fix a bug for server-side cookies for dropping cookie and setting it again without Max-Age parameter.
- Don't trim redirect URL in client API (#499)
- Extend precision of access log "D" to milliseconds (#527)
- Deprecate *StreamResponse.start()* method in favor of *StreamResponse.prepare()* coroutine (#525)

  .start() is still supported but responses begun with *.start()* does not call signal for response preparing to be sent.
- Add *StreamReader.__repr__*
- Drop Python 3.3 support, from now minimal required version is Python 3.4.1 (#541)
- Add *async with* support for *ClientSession.request()* and family (#536)
- Ignore message body on 204 and 304 responses (#505)
- *TCPConnector* processed both IPv4 and IPv6 by default (#559)
- Add *.routes()* view for urldispatcher (#519)
- Route name should be a valid identifier name from now (#567)
- Implement server signals (#562)
- Drop a year-old deprecated *files* parameter from client API.
- Added *async for* support for aiohttp stream (#542)

0.17.4 (09-29-2015)

- Properly parse URL path in aiohttp.web.Request (#489)
- Add missing coroutine decorator, the client api is await-compatible now

0.17.3 (08-28-2015)

- Remove Content-Length header on compressed responses (#450)
- Support Python 3.5
- Improve performance of transport in-use list (#472)
- Fix connection pooling (#473)

0.17.2 (08-11-2015)

- Don't forget to pass *data* argument forward (#462)
- Fix multipart read bytes count (#463)

0.17.1 (08-10-2015)

- Fix multidict comparison to arbitrary abc.Mapping

0.17.0 (08-04-2015)

- Make StaticRoute support Last-Modified and If-Modified-Since headers (#386)
- Add Request.if_modified_since and Stream.Response.last_modified properties
- Fix deflate compression when writing a chunked response (#395)
- Request`s content-length header is cleared now after redirect from POST method (#391)
- Return a 400 if server received a non HTTP content (#405)
- Fix keep-alive support for aiohttp clients (#406)
- Allow gzip compression in high-level server response interface (#403)
- Rename TCPConnector.resolve and family to dns_cache (#415)
- Make UrlDispatcher ignore quoted characters during url matching (#414) Backward-compatibility warning: this may change the url matched by your queries if they send quoted character (like %2F for /) (#414)
- Use optional cchardet accelerator if present (#418)
- Borrow loop from Connector in ClientSession if loop is not set
- Add context manager support to ClientSession for session closing.
- Add toplevel get(), post(), put(), head(), delete(), options(), patch() coroutines.
- Fix IPv6 support for client API (#425)
- Pass SSL context through proxy connector (#421)
- Make the rule: path for add_route should start with slash
- Don't process request finishing by low-level server on closed event loop
- Don't override data if multiple files are uploaded with same key (#433)
- Ensure multipart.BodyPartReader.read_chunk read all the necessary data to avoid false assertions about malformed multipart payload
- Don't send body for 204, 205 and 304 http exceptions (#442)
- Correctly skip Cython compilation in MSVC not found (#453)
- Add response factory to StaticRoute (#456)
- Don't append trailing CRLF for multipart.BodyPartReader (#454)

0.16.6 (07-15-2015)

- Skip compilation on Windows if vcvarsall.bat cannot be found (#438)

0.16.5 (06-13-2015)

- Get rid of all comprehensions and yielding in _multidict (#410)

0.16.4 (06-13-2015)

- Don't clear current exception in multidict's *__repr__* (cythonized versions) (#410)

0.16.3 (05-30-2015)

- Fix StaticRoute vulnerability to directory traversal attacks (#380)

0.16.2 (05-27-2015)

- Update python version required for *__del__* usage: it's actually 3.4.1 instead of 3.4.0
- Add check for presence of loop.is_closed() method before call the former (#378)

0.16.1 (05-27-2015)

- Fix regression in static file handling (#377)

0.16.0 (05-26-2015)

- Unset waiter future after cancellation (#363)
- Update request url with query parameters (#372)
- Support new *fingerprint* param of TCPConnector to enable verifying SSL certificates via MD5, SHA1, or SHA256 digest (#366)
- Setup uploaded filename if field value is binary and transfer encoding is not specified (#349)
- Implement *ClientSession.close()* method
- Implement *connector.closed* readonly property
- Implement *ClientSession.closed* readonly property
- Implement *ClientSession.connector* readonly property
- Implement *ClientSession.detach* method
- Add *__del__* to client-side objects: sessions, connectors, connections, requests, responses.
- Refactor connections cleanup by connector (#357)
- Add *limit* parameter to connector constructor (#358)
- Add *request.has_body* property (#364)
- Add *response_class* parameter to *ws_connect()* (#367)

- *ProxyConnector* does not support keep-alive requests by default starting from now (#368)
- Add *connector.force_close* property
- Add ws_connect to ClientSession (#374)
- Support optional *chunk_size* parameter in *router.add_static()*

0.15.3 (04-22-2015)

- Fix graceful shutdown handling
- Fix *Expect* header handling for not found and not allowed routes (#340)

0.15.2 (04-19-2015)

- Flow control subsystem refactoring
- HTTP server performance optimizations
- Allow to match any request method with *
- Explicitly call drain on transport (#316)
- Make chardet module dependency mandatory (#318)
- Support keep-alive for HTTP 1.0 (#325)
- Do not chunk single file during upload (#327)
- Add ClientSession object for cookie storage and default headers (#328)
- Add *keep_alive_on* argument for HTTP server handler.

0.15.1 (03-31-2015)

- Pass Autobahn Testsuite tests
- Fixed websocket fragmentation
- Fixed websocket close procedure
- Fixed parser buffer limits
- Added *timeout* parameter to WebSocketResponse ctor
- Added *WebSocketResponse.close_code* attribute

0.15.0 (03-27-2015)

- Client WebSockets support
- New Multipart system (#273)
- Support for “Except” header (#287) (#267)
- Set default Content-Type for post requests (#184)
- Fix issue with construction dynamic route with regexps and trailing slash (#266)
- Add repr to web.Request
- Add repr to web.Response

- Add repr for NotFound and NotAllowed match infos
- Add repr for web.Application
- Add repr to UrlMappingMatchInfo (#217)
- Gunicorn 19.2.x compatibility

0.14.4 (01-29-2015)

- Fix issue with error during constructing of url with regex parts (#264)

0.14.3 (01-28-2015)

- Use path='/' by default for cookies (#261)

0.14.2 (01-23-2015)

- Connections leak in BaseConnector (#253)
- Do not swallow websocket reader exceptions (#255)
- web.Request's read, text, json are memorized (#250)

0.14.1 (01-15-2015)

- HttpMessage._add_default_headers does not overwrite existing headers (#216)
- Expose multidict classes at package level
- add *aiohttp.web.WebSocketResponse*
- According to RFC 6455 websocket subprotocol preference order is provided by client, not by server
- websocket's ping and pong accept optional message parameter
- multidict views do not accept *getall* parameter anymore, it returns the full body anyway.
- multidicts have optional Cython optimization, cythonized version of multidicts is about 5 times faster than pure Python.
- multidict.getall() returns *list*, not *tuple*.
- Backward incompatible change: now there are two mutable multidicts (*MultiDict*, *CIMultiDict*) and two immutable multidict proxies (*MultiDictProxy* and *CIMultiDictProxy*). Previous edition of multidicts was not a part of public API BTW.
- Router refactoring to push Not Allowed and Not Found in middleware processing
- Convert *ConnectionError* to *aiohttp.DisconnectedError* and don't eat *ConnectionError* exceptions from web handlers.
- Remove hop headers from Response class, wsgi response still uses hop headers.
- Allow to send raw chunked encoded response.
- Allow to encode output bytes stream into chunked encoding.
- Allow to compress output bytes stream with *deflate* encoding.
- Server has 75 seconds keepalive timeout now, was non-keepalive by default.

- Application does not accept ***kwargs* anymore ((#243)).
- Request is inherited from dict now for making per-request storage to middlewares ((#242)).

0.13.1 (12-31-2014)

- Add *aiohttp.web.StreamResponse.started* property (#213)
- HTML escape traceback text in *ServerHttpProtocol.handle_error*
- Mention handler and middlewares in *aiohttp.web.RequestHandler.handle_request* on error ((#218))

0.13.0 (12-29-2014)

- *StreamResponse.charset* converts value to lower-case on assigning.
- Chain exceptions when raise *ClientRequestError*.
- Support custom regexps in route variables (#204)
- Fixed graceful shutdown, disable keep-alive on connection closing.
- Decode HTTP message with *utf-8* encoding, some servers send headers in utf-8 encoding (#207)
- Support *aiohtt.web* middlewares (#209)
- Add ssl_context to TCPConnector (#206)

0.12.0 (12-12-2014)

- Deep refactoring of *aiohttp.web* in backward-incompatible manner. Sorry, we have to do this.
- Automatically force aiohttp.web handlers to coroutines in *UrlDispatcher.add_route()* (#186)
- Rename *Request.POST()* function to *Request.post()*
- Added POST attribute
- Response processing refactoring: constructor does not accept Request instance anymore.
- Pass application instance to finish callback
- Exceptions refactoring
- Do not unquote query string in *aiohttp.web.Request*
- Fix concurrent access to payload in *RequestHandle.handle_request()*
- Add access logging to *aiohttp.web*
- Gunicorn worker for *aiohttp.web*
- Removed deprecated *AsyncGunicornWorker*
- Removed deprecated HttpClient

0.11.0 (11-29-2014)

- Support named routes in *aiohttp.web.UrlDispatcher* (#179)
- Make websocket subprotocols conform to spec (#181)

0.10.2 (11-19-2014)

- Don't unquote *environ['PATH_INFO']* in wsgi.py (#177)

0.10.1 (11-17-2014)

- aiohttp.web.HTTPException and descendants now files response body with string like *404: NotFound*
- Fix multidict *__iter__*, the method should iterate over keys, not (key, value) pairs.

0.10.0 (11-13-2014)

- Add aiohttp.web subpackage for highlevel HTTP server support.
- Add *reason* optional parameter to aiohttp.protocol.Response ctor.
- Fix aiohttp.client bug for sending file without content-type.
- Change error text for connection closed between server responses from 'Can not read status line' to explicit 'Connection closed by server'
- Drop closed connections from connector (#173)
- Set server.transport to None on .closing() (#172)

0.9.3 (10-30-2014)

- Fix compatibility with asyncio 3.4.1+ (#170)

0.9.2 (10-16-2014)

- Improve redirect handling (#157)
- Send raw files as is (#153)
- Better websocket support (#150)

0.9.1 (08-30-2014)

- Added MultiDict support for client request params and data (#114).
- Fixed parameter type for IncompleteRead exception (#118).
- Strictly require ASCII headers names and values (#137)
- Keep port in ProxyConnector (#128).
- Python 3.4.1 compatibility (#131).

0.9.0 (07-08-2014)

- Better client basic authentication support (#112).
- Fixed incorrect line splitting in HttpRequestParser (#97).
- Support StreamReader and DataQueue as request data.
- Client files handling refactoring (#20).
- Backward incompatible: Replace DataQueue with StreamReader for request payload (#87).

0.8.4 (07-04-2014)

- Change ProxyConnector authorization parameters.

0.8.3 (07-03-2014)

- Publish TCPConnector properties: verify_ssl, family, resolve, resolved_hosts.
- Don't parse message body for HEAD responses.
- Refactor client response decoding.

0.8.2 (06-22-2014)

- Make ProxyConnector.proxy immutable property.
- Make UnixConnector.path immutable property.
- Fix resource leak for aiohttp.request() with implicit connector.
- Rename Connector's reuse_timeout to keepalive_timeout.

0.8.1 (06-18-2014)

- Use case insensitive multidict for server request/response headers.
- MultiDict.getall() accepts default value.
- Catch server ConnectionError.
- Accept MultiDict (and derived) instances in aiohttp.request header argument.
- Proxy 'CONNECT' support.

0.8.0 (06-06-2014)

- Add support for utf-8 values in HTTP headers
- Allow to use custom response class instead of HttpResponse
- Use MultiDict for client request headers
- Use MultiDict for server request/response headers
- Store response headers in ClientResponse.headers attribute
- Get rid of timeout parameter in aiohttp.client API

- Exceptions refactoring

0.7.3 (05-20-2014)

- Simple HTTP proxy support.

0.7.2 (05-14-2014)

- Get rid of *__del__* methods
- Use ResourceWarning instead of logging warning record.

0.7.1 (04-28-2014)

- Do not unquote client request urls.
- Allow multiple waiters on transport drain.
- Do not return client connection to pool in case of exceptions.
- Rename SocketConnector to TCPConnector and UnixSocketConnector to UnixConnector.

0.7.0 (04-16-2014)

- Connection flow control.
- HTTP client session/connection pool refactoring.
- Better handling for bad server requests.

0.6.5 (03-29-2014)

- Added client session reuse timeout.
- Better client request cancellation support.
- Better handling responses without content length.
- Added HttpClient verify_ssl parameter support.

0.6.4 (02-27-2014)

- Log content-length missing warning only for put and post requests.

0.6.3 (02-27-2014)

- Better support for server exit.
- Read response body until EOF if content-length is not defined (#14)

0.6.2 (02-18-2014)

- Fix trailing char in allowed_methods.
- Start slow request timer for first request.

0.6.1 (02-17-2014)

- Added utility method HttpResponse.read_and_close()
- Added slow request timeout.
- Enable socket SO_KEEPALIVE if available.

0.6.0 (02-12-2014)

- Better handling for process exit.

0.5.0 (01-29-2014)

- Allow to use custom HttpRequest client class.
- Use gunicorn keepalive setting for asynchronous worker.
- Log leaking responses.
- python 3.4 compatibility

0.4.4 (11-15-2013)

- Resolve only AF_INET family, because it is not clear how to pass extra info to asyncio.

0.4.3 (11-15-2013)

- Allow to wait completion of request with *HttpResponse.wait_for_close()*

0.4.2 (11-14-2013)

- Handle exception in client request stream.
- Prevent host resolving for each client request.

0.4.1 (11-12-2013)

- Added client support for *expect: 100-continue* header.

0.4 (11-06-2013)

- Added custom wsgi application close procedure
- Fixed concurrent host failure in HttpClient

0.3 (11-04-2013)

- Added PortMapperWorker
- Added HttpClient
- Added TCP connection timeout to HTTP client
- Better client connection errors handling
- Gracefully handle process exit

0.2

- Fix packaging

12.5.4 Indices and tables

- genindex
- modindex
- search

12.6 Who uses aiohttp?

The list of *aiohttp* users: both libraries, big projects and web sites.

Please don't hesitate to add your awesome project to the list by making a Pull Request on GitHub.

If you like the project – please go to GitHub and press *Star* button!

12.6.1 Third-Party libraries

aiohttp is not the library for making HTTP requests and creating WEB server only.

It is the grand basement for libraries built *on top* of aiohttp.

This page is a list of these tools.

Please feel free to add your open sourced library if it's not enlisted yet by making Pull Request to https://github.com/aio-libs/aiohttp/

- Why do you might want to include your awesome library into the list?
- Just because the list increases your library visibility. People will have an easy way to find it.

Officially supported

This list contains libraries which are supported by *aio-libs* team and located on https://github.com/aio-libs

aiohttp extensions

- **aiohttp-session** provides sessions for `aiohttp.web`.
- aiohttp-debugtoolbar is a library for *debug toolbar* support for `aiohttp.web`.
- aiohttp-security auth and permissions for `aiohttp.web`.
- aiohttp-devtools provides development tools for `aiohttp.web` applications.
- aiohttp-cors CORS support for aiohttp.
- aiohttp-sse Server-sent events support for aiohttp.
- pytest-aiohttp pytest plugin for aiohttp support.
- aiohttp-mako Mako template renderer for aiohttp.web.
- aiohttp-jinja2 Jinja2 template renderer for aiohttp.web.
- aiozipkin distributed tracing instrumentation for *aiohttp* client and server.

Database drivers

- aiopg PostgreSQL async driver.
- aiomysql MySql async driver.
- aioredis Redis async driver.

Other tools

- aiodocker Python Docker API client based on asyncio and aiohttp.
- aiobotocore asyncio support for botocore library using aiohttp.

Approved third-party libraries

The libraries are not part of `aio-libs` but they are proven to be very well written and highly recommended for usage.

- uvloop Ultra fast implementation of asyncio event loop on top of `libuv`.

  We are highly recommending to use it instead of standard `asyncio`.

Database drivers

- asyncpg Another PostgreSQL async driver. It's much faster than `aiopg` but it is not drop-in replacement – the API is different. Anyway please take a look on it – the driver is really incredible fast.

Others

The list of libraries which are exists but not enlisted in former categories.

They may be perfect or not – we don't know.

Please add your library reference here first and after some time period ask to raise the status.

- aiohttp-cache A cache system for aiohttp server.
- aiocache Caching for asyncio with multiple backends (framework agnostic)
- gain Web crawling framework based on asyncio for everyone.
- aiohttp-swagger Swagger API Documentation builder for aiohttp server.
- aiohttp-swaggerify Library to automatically generate swagger2.0 definition for aiohttp endpoints.
- aiohttp-validate Simple library that helps you validate your API endpoints requests/responses with json schema.
- aiohttp-pydantic An `aiohttp.View` to validate the HTTP request's body, query-string, and headers regarding function annotations and generate Open API doc. Python 3.8+ required.
- raven-aiohttp An aiohttp transport for raven-python (Sentry client).
- webargs A friendly library for parsing HTTP request arguments, with built-in support for popular web frameworks, including Flask, Django, Bottle, Tornado, Pyramid, webapp2, Falcon, and aiohttp.
- aioauth-client OAuth client for aiohttp.
- aiohttpretty A simple asyncio compatible httpretty mock using aiohttp.
- aioresponses a helper for mock/fake web requests in python aiohttp package.
- aiohttp-transmute A transmute implementation for aiohttp.
- aiohttp_apiset Package to build routes using swagger specification.
- aiohttp-login Registration and authorization (including social) for aiohttp applications.
- aiohttp_utils Handy utilities for building aiohttp.web applications.
- aiohttpproxy Simple aiohttp HTTP proxy.
- aiohttp_traversal Traversal based router for aiohttp.web.
- aiohttp_autoreload Makes aiohttp server auto-reload on source code change.
- gidgethub An async GitHub API library for Python.
- aiohttp_jrpc aiohttp JSON-RPC service.
- fbemissary A bot framework for the Facebook Messenger platform, built on asyncio and aiohttp.
- aioslacker slacker wrapper for asyncio.
- aioreloader Port of tornado reloader to asyncio.
- aiohttp_babel Babel localization support for aiohttp.
- python-mocket a socket mock framework - for all kinds of socket animals, web-clients included.

- aioraft asyncio RAFT algorithm based on aiohttp.
- home-assistant Open-source home automation platform running on Python 3.
- discord.py Discord client library.
- aiogram A fully asynchronous library for Telegram Bot API written with asyncio and aiohttp.
- vk.py Extremely-fast Python 3.6+ toolkit for create applications work`s with VKAPI.
- aiohttp-graphql GraphQL and GraphIQL interface for aiohttp.
- aiohttp-sentry An aiohttp middleware for reporting errors to Sentry. Python 3.5+ is required.
- aiohttp-datadog An aiohttp middleware for reporting metrics to DataDog. Python 3.5+ is required.
- async-v20 Asynchronous FOREX client for OANDA's v20 API. Python 3.6+
- aiohttp-jwt An aiohttp middleware for JWT(JSON Web Token) support. Python 3.5+ is required.
- AWS Xray Python SDK Native tracing support for Aiohttp applications.
- GINO An asyncio ORM on top of SQLAlchemy core, delivered with an aiohttp extension.
- aiohttp-apispec Build and document REST APIs with `aiohttp` and `apispec`.
- eider-py Python implementation of the Eider RPC protocol.
- asynapplicationinsights A client for Azure Application Insights implemented using `aiohttp` client, including a middleware for `aiohttp` servers to collect web apps telemetry.
- aiogmaps Asynchronous client for Google Maps API Web Services. Python 3.6+ required.
- DBGR Terminal based tool to test and debug HTTP APIs with `aiohttp`.
- rororo Implement `aiohtp.web` OpenAPI 3 server applications with schema first approach. Python 3.6+ required.
- aiohttp-middlewares Collection of useful middlewares for `aiohttp.web` applications. Python 3.6+ required.
- aiohttp-tus tus.io protocol implementation for `aiohttp.web` applications. Python 3.6+ required.
- aiohttp-sse-client A Server-Sent Event python client base on aiohttp. Python 3.6+ required.

12.6.2 Built with aiohttp

aiohttp is used to build useful libraries built on top of it, and there's a page dedicated to list them: *Third-Party libraries*.

There are also projects that leverage the power of aiohttp to provide end-user tools, like command lines or software with full user interfaces.

This page aims to list those projects. If you are using aiohttp in your software and if it's playing a central role, you can add it here in this list.

You can also add a **Built with aiohttp** link somewhere in your project, pointing to https://github.com/aio-libs/aiohttp.

- Molotov Load testing tool.
- Arsenic Async WebDriver.
- Home Assistant Home Automation Platform.
- Backend.AI Code execution API service.
- doh-proxy DNS Over HTTPS Proxy.
- Mariner Command-line torrent searcher.

- DEEPaaS API REST API for Machine learning, Deep learning and artificial intelligence applications.

12.6.3 Powered by aiohttp

Web sites powered by aiohttp.

Feel free to fork documentation on github, add a link to your site and make a Pull Request!

- Farmer Business Network
- Home Assistant
- KeepSafe
- Skyscanner Hotels
- Ocean S.A.
- GNS3
- TutorCruncher socket
- Morpheus messaging microservice
- Eyepea - Custom telephony solutions
- ALLOcloud - Telephony in the cloud
- helpmanual - comprehensive help and man page database
- bedevere - CPython's GitHub bot, helps maintain and identify issues with a CPython pull request.
- miss-islington - CPython's GitHub bot, backports and merge CPython's pull requests
- noa technologies - Bike-sharing management platform - SSE endpoint, pushes real time updates of bikes location.
- Wargaming: World of Tanks
- Yandex
- Rambler
- Escargot - Chat server
- Prom.ua - Online trading platform
- globo.com - (some parts) Brazilian largest media portal
- Glose - Social reader for E-Books
- Emoji Generator - Text icon generator

12.7 Contributing

12.7.1 Instructions for contributors

In order to make a clone of the GitHub repo: open the link and press the "Fork" button on the upper-right menu of the web page.

I hope everybody knows how to work with git and github nowadays :)

Workflow is pretty straightforward:

0. Make sure you are reading the latest version of this document. It can be found in the GitHub repo in the `docs` subdirectory.
1. Clone the GitHub repo using the `--recurse-submodules` argument
2. Setup your machine with the required dev environment
3. Make a change
4. Make sure all tests passed
5. Add a file into the `CHANGES` folder (see *Changelog update* for how).
6. Commit changes to your own aiohttp clone
7. Make a pull request from the github page of your clone against the master branch
8. Optionally make backport Pull Request(s) for landing a bug fix into released aiohttp versions.

Note: The project uses *Squash-and-Merge* strategy for *GitHub Merge* button.

Basically it means that there is **no need to rebase** a Pull Request against *master* branch. Just `git merge` *master* into your working copy (a fork) if needed. The Pull Request is automatically squashed into the single commit once the PR is accepted.

Note: GitHub issue and pull request threads are automatically locked when there has not been any recent activity for one year. Please open a new issue for related bugs.

If you feel like there are important points in the locked discussions, please include those excerpts into that new issue.

12.7.2 Preconditions for running aiohttp test suite

We expect you to use a python virtual environment to run our tests.

There are several ways to make a virtual environment.

If you like to use *virtualenv* please run:

```
$ cd aiohttp
$ virtualenv --python=`which python3` venv
$ . venv/bin/activate
```

For standard python *venv*:

```
$ cd aiohttp
$ python3 -m venv venv
$ . venv/bin/activate
```

For *virtualenvwrapper*:

```
$ cd aiohttp
$ mkvirtualenv --python=`which python3` aiohttp
```

There are other tools like *pyvenv* but you know the rule of thumb now: create a python3 virtual environment and activate it.

After that please install libraries required for development:

```
$ pip install -r requirements/dev.txt
```

Note: For now, the development tooling depends on `make` and assumes an Unix OS If you wish to contribute to aiohttp from a Windows machine, the easiest way is probably to configure the WSL so you can use the same instructions. If it's not possible for you or if it doesn't work, please contact us so we can find a solution together.

Install pre-commit hooks:

```
$ pre-commit install
```

Warning: If you plan to use temporary `print()`, `pdb` or `ipdb` within the test suite, execute it with `-s`:

```
$ pytest tests -s
```

in order to run the tests without output capturing.

Congratulations, you are ready to run the test suite!

12.7.3 Run autoformatter

The project uses black + isort formatters to keep the source code style. Please run *make fmt* after every change before starting tests.

```
$ make fmt
```

12.7.4 Run aiohttp test suite

After all the preconditions are met you can run tests typing the next command:

```
$ make test
```

The command at first will run the *linters* (sorry, we don't accept pull requests with pyflakes, black, isort, or mypy errors).

On *lint* success the tests will be run.

Please take a look on the produced output.

Any extra texts (print statements and so on) should be removed.

12.7.5 Tests coverage

We are trying hard to have good test coverage; please don't make it worse.

Use:

```
$ make cov-dev
```

to run test suite and collect coverage information. Once the command has finished check your coverage at the file that appears in the last line of the output: `open file:///.../aiohttp/htmlcov/index.html`

Please go to the link and make sure that your code change is covered.

The project uses *codecov.io* for storing coverage results. Visit https://codecov.io/gh/aio-libs/aiohttp for looking on coverage of master branch, history, pull requests etc.

The browser extension https://docs.codecov.io/docs/browser-extension is highly recommended for analyzing the coverage just in *Files Changed* tab on *GitHub Pull Request* review page.

12.7.6 Documentation

We encourage documentation improvements.

Please before making a Pull Request about documentation changes run:

```
$ make doc
```

Once it finishes it will output the index html page `open file:///.../aiohttp/docs/_build/html/index.html`.

Go to the link and make sure your doc changes looks good.

12.7.7 Spell checking

We use `pyenchant` and `sphinxcontrib-spelling` for running spell checker for documentation:

```
$ make doc-spelling
```

Unfortunately there are problems with running spell checker on MacOS X.

To run spell checker on Linux box you should install it first:

```
$ sudo apt-get install enchant
$ pip install sphinxcontrib-spelling
```

12.7.8 Changelog update

The `CHANGES.rst` file is managed using towncrier tool and all non trivial changes must be accompanied by a news entry.

To add an entry to the news file, first you need to have created an issue describing the change you want to make. A Pull Request itself *may* function as such, but it is preferred to have a dedicated issue (for example, in case the PR ends up rejected due to code quality reasons).

Once you have an issue or pull request, you take the number and you create a file inside of the `CHANGES/` directory named after that issue number with an extension of `.removal`, `.feature`, `.bugfix`, or `.doc`. Thus if your issue or PR number is `1234` and this change is fixing a bug, then you would create a file `CHANGES/1234.bugfix`. PRs can span multiple categories by creating multiple files (for instance, if you added a feature and deprecated/removed the old feature at the same time, you would create `CHANGES/NNNN.feature` and `CHANGES/NNNN.removal`). Likewise if a PR touches multiple issues/PRs you may create a file for each of them with the exact same contents and *Towncrier* will deduplicate them.

The contents of this file are *reStructuredText* formatted text that will be used as the content of the news file entry. You do not need to reference the issue or PR numbers here as *towncrier* will automatically add a reference to all of the affected issues when rendering the news file.

12.7.9 Making a Pull Request

After finishing all steps make a GitHub Pull Request with *master* base branch.

12.7.10 Backporting

All Pull Requests are created against *master* git branch.

If the Pull Request is not a new functionality but bug fixing *backport* to maintenance branch would be desirable.

aiohttp project committer may ask for making a *backport* of the PR into maintained branch(es), in this case he or she adds a github label like *needs backport to 3.1*.

***Backporting* is performed *after* main PR merging into master.** Please do the following steps:

1. Find *Pull Request's commit* for cherry-picking.

   aiohttp does *squashing* PRs on merging, so open your PR page on github and scroll down to message like `asvetlov merged commit f7b8921 into master 9 days ago`. `f7b8921` is the required commit number.

2. Run cherry_picker tool for making backport PR (the tool is already pre-installed from `./requirements/dev.txt`), e.g. `cherry_picker f7b8921 3.1`.

3. In case of conflicts fix them and continue cherry-picking by `cherry_picker --continue`.

   `cherry_picker --abort` stops the process.

   `cherry_picker --status` shows current cherry-picking status (like `git status`)

4. After all conflicts are done the tool opens a New Pull Request page in a browser with pre-filed information. Create a backport Pull Request and wait for review/merging.

5. *aiohttp committer* should remove *backport Git label* after merging the backport.

12.7.11 How to become an aiohttp committer

Contribute!

The easiest way is providing Pull Requests for issues in our bug tracker. But if you have a great idea for the library improvement – please make an issue and Pull Request.

The rules for committers are simple:

1. No wild commits! Everything should go through PRs.
2. Take a part in reviews. It's very important part of maintainer's activity.
3. Pickup issues created by others, especially if they are simple.
4. Keep test suite comprehensive. In practice it means leveling up coverage. 97% is not bad but we wish to have 100% someday. Well, 99% is good target too.
5. Don't hesitate to improve our docs. Documentation is very important thing, it's the key for project success. The documentation should not only cover our public API but help newbies to start using the project and shed a light on non-obvious gotchas.

After positive answer aiohttp committer creates an issue on github with the proposal for nomination. If the proposal will collect only positive votes and no strong objection – you'll be a new member in our team.

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