

---

# **Gunicorn Documentation**

***Release 19.10.0***

**Benoit Chesneau**

**Nov 23, 2019**



---

## Contents

---

<b>1</b>	<b>Features</b>	<b>3</b>
<b>2</b>	<b>Contents</b>	<b>5</b>
2.1	Installation . . . . .	5
2.2	Running Gunicorn . . . . .	7
2.3	Configuration Overview . . . . .	9
2.4	Settings . . . . .	10
2.5	Instrumentation . . . . .	28
2.6	Deploying Gunicorn . . . . .	29
2.7	Signal Handling . . . . .	35
2.8	Custom Application . . . . .	37
2.9	Design . . . . .	38
2.10	FAQ . . . . .	41
2.11	Community . . . . .	44
2.12	Changelog . . . . .	44
	<b>Index</b>	<b>69</b>





**Website** <http://gunicorn.org>

**Source code** <https://github.com/benoitc/gunicorn>

**Issue tracker** <https://github.com/benoitc/gunicorn/issues>

**IRC** #gunicorn on Freenode

**Usage questions** <https://github.com/benoitc/gunicorn/issues>

Gunicorn ‘Green Unicorn’ is a Python WSGI HTTP Server for UNIX. It’s a pre-fork worker model ported from Ruby’s Unicorn project. The Gunicorn server is broadly compatible with various web frameworks, simply implemented, light on server resources, and fairly speedy.



# CHAPTER 1

---

## Features

---

- Natively supports WSGI, Django, and Paster
- Automatic worker process management
- Simple Python configuration
- Multiple worker configurations
- Various server hooks for extensibility
- Compatible with Python 2.x  $\geq 2.6$  or 3.x  $\geq 3.2$





## 2.1 Installation

**Requirements** Python 2.x >= 2.6 or Python 3.x >= 3.2

To install the latest released version of Gunicorn:

```
$ pip install gunicorn
```

### 2.1.1 From Source

You can install Gunicorn from source just as you would install any other Python package:

```
$ pip install git+https://github.com/benoitc/gunicorn.git
```

This will allow you to keep up to date with development on GitHub:

```
$ pip install -U git+https://github.com/benoitc/gunicorn.git
```

### 2.1.2 Async Workers

You may also want to install [Eventlet](#) or [Gevent](#) if you expect that your application code may need to pause for extended periods of time during request processing. Check out the [design docs](#) for more information on when you'll want to consider one of the alternate worker types.

```
$ pip install greenlet           # Required for both
$ pip install eventlet          # For eventlet workers
$ pip install gunicorn[eventlet] # Or, using extra
$ pip install gevent            # For gevent workers
$ pip install gunicorn[gevent]  # Or, using extra
```

**Note:** Both require `greenlet`, which should get installed automatically. If its installation fails, you probably need to install the Python headers. These headers are available in most package managers. On Ubuntu the package name for `apt-get` is `python-dev`.

`Gevent` also requires that `libevent 1.4.x` or `2.0.4` is installed. This could be a more recent version than what is available in your package manager. If `Gevent` fails to build even with `libevent` installed, this is the most likely reason.

---

### 2.1.3 Debian GNU/Linux

If you are using Debian GNU/Linux and it is recommended that you use system packages to install Gunicorn except maybe when you want to use different versions of Gunicorn with `virtualenv`. This has a number of advantages:

- Zero-effort installation: Automatically starts multiple Gunicorn instances based on configurations defined in `/etc/gunicorn.d`.
- Sensible default locations for logs (`/var/log/gunicorn`). Logs can be automatically rotated and compressed using `logrotate`.
- Improved security: Can easily run each Gunicorn instance with a dedicated UNIX user/group.
- Sensible upgrade path: Upgrades to newer versions result in less downtime, handle conflicting changes in configuration options, and can be quickly rolled back in case of incompatibility. The package can also be purged entirely from the system in seconds.

#### stable (“stretch”)

The version of Gunicorn in the Debian “stable” distribution is 19.6.0 (June 2017). You can install it using:

```
$ sudo apt-get install gunicorn
```

You can also use the most recent version by using [Debian Backports](#). First, copy the following line to your `/etc/apt/sources.list`:

```
deb http://ftp.debian.org/debian stretch-backports main
```

Then, update your local package lists:

```
$ sudo apt-get update
```

You can then install the latest version using:

```
$ sudo apt-get -t stretch-backports install gunicorn
```

#### oldstable (“jessie”)

The version of Gunicorn in the Debian “oldstable” distribution is 19.0 (June 2014). you can install it using:

```
$ sudo apt-get install gunicorn
```

You can also use the most recent version by using [Debian Backports](#). First, copy the following line to your `/etc/apt/sources.list`:

```
deb http://ftp.debian.org/debian jessie-backports main
```

Then, update your local package lists:

```
$ sudo apt-get update
```

You can then install the latest version using:

```
$ sudo apt-get -t jessie-backports install gunicorn
```

## Testing (“buster”) / Unstable (“sid”)

“buster” and “sid” contain the latest released version of Gunicorn. You can install it in the usual way:

```
$ sudo apt-get install gunicorn
```

### 2.1.4 Ubuntu

Ubuntu 12.04 (trusty) or later contains Gunicorn package by default so that you can install it in the usual way:

```
$ sudo apt-get update
$ sudo apt-get install gunicorn
```

## 2.2 Running Gunicorn

You can run Gunicorn by using commands or integrate with Django or Paster. For deploying Gunicorn in production see [Deploying Gunicorn](#).

### 2.2.1 Commands

After installing Gunicorn you will have access to the command line script `gunicorn`.

#### **gunicorn**

Basic usage:

```
$ gunicorn [OPTIONS] APP_MODULE
```

Where `APP_MODULE` is of the pattern `$(MODULE_NAME) : $(VARIABLE_NAME)`. The module name can be a full dotted path. The variable name refers to a WSGI callable that should be found in the specified module.

Example with the test app:

```
def app(environ, start_response):
    """Simplest possible application object"""
    data = b'Hello, World!\n'
    status = '200 OK'
    response_headers = [
        ('Content-type', 'text/plain'),
```

(continues on next page)

(continued from previous page)

```
        ('Content-Length', str(len(data)))
    ]
    start_response(status, response_headers)
    return iter([data])
```

You can now run the app with the following command:

```
$ gunicorn --workers=2 test:app
```

## Commonly Used Arguments

- `-c CONFIG`, `--config=CONFIG` - Specify a config file in the form `$(PATH)`, `file:$(PATH)`, or `python:$(MODULE_NAME)`.
- `-b BIND`, `--bind=BIND` - Specify a server socket to bind. Server sockets can be any of `$(HOST)`, `$(HOST):$(PORT)`, or `unix:$(PATH)`. An IP is a valid `$(HOST)`.
- `-w WORKERS`, `--workers=WORKERS` - The number of worker processes. This number should generally be between 2-4 workers per core in the server. Check the [FAQ](#) for ideas on tuning this parameter.
- `-k WORKERCLASS`, `--worker-class=WORKERCLASS` - The type of worker process to run. You'll definitely want to read the production page for the implications of this parameter. You can set this to `$(NAME)` where `$(NAME)` is one of `sync`, `eventlet`, `gevent`, `tornado`, `gthread`, `gaiohttp` (deprecated). `sync` is the default. See the [worker\\_class](#) documentation for more information.
- `-n APP_NAME`, `--name=APP_NAME` - If `setproctitle` is installed you can adjust the name of Gunicorn process as they appear in the process system table (which affects tools like `ps` and `top`).

Settings can be specified by using environment variable `GUNICORN_CMD_ARGS`.

See [Configuration Overview](#) and [Settings](#) for detailed usage.

## 2.2.2 Integration

We also provide integration for both Django and Paster applications.

### Django

Gunicorn will look for a WSGI callable named `application` if not specified. So for a typical Django project, invoking Gunicorn would look like:

```
$ gunicorn myproject.wsgi
```

---

**Note:** This requires that your project be on the Python path; the simplest way to ensure that is to run this command from the same directory as your `manage.py` file.

---

You can use the `-env` option to set the path to load the settings. In case you need it you can also add your application path to `PYTHONPATH` using the `-pythonpath` option:

```
$ gunicorn --env DJANGO_SETTINGS_MODULE=myproject.settings myproject.wsgi
```

## Paste

If you are a user/developer of a paste-compatible framework/app (as Pyramid, Pylons and Turbogears) you can use the `--paste` option to run your application.

For example:

```
$ gunicorn --paste development.ini -b :8080 --chdir /path/to/project
```

Or use a different application:

```
$ gunicorn --paste development.ini#admin -b :8080 --chdir /path/to/project
```

It is all here. No configuration files nor additional Python modules to write!

## 2.3 Configuration Overview

Gunicorn pulls configuration information from three distinct places.

The first place that Gunicorn will read configuration from is the framework specific configuration file. Currently this only affects Paster applications.

The second source of configuration information is a configuration file that is optionally specified on the command line. Anything specified in the Gunicorn config file will override any framework specific settings.

Lastly, the command line arguments used to invoke Gunicorn are the final place considered for configuration settings. If an option is specified on the command line, this is the value that will be used.

**Once again, in order of least to most authoritative:**

1. Framework Settings
2. Configuration File
3. Command Line

---

**Note:** To check your configuration when using the command line or the configuration file you can run the following command:

```
$ gunicorn --check-config APP_MODULE
```

It also allows you to know if your application can be launched.

---

### 2.3.1 Command Line

If an option is specified on the command line, it overrides all other values that may have been specified in the app specific settings, or in the optional configuration file. Not all Gunicorn settings are available to be set from the command line. To see the full list of command line settings you can do the usual:

```
$ gunicorn -h
```

There is also a `--version` flag available to the command line scripts that isn't mentioned in the list of *settings*.

## 2.3.2 Configuration File

The configuration file should be a valid Python source file. It only needs to be readable from the file system. More specifically, it does not need to be importable. Any Python is valid. Just consider that this will be run every time you start Gunicorn (including when you signal Gunicorn to reload).

To set a parameter, just assign to it. There's no special syntax. The values you provide will be used for the configuration values.

For instance:

```
import multiprocessing

bind = "127.0.0.1:8000"
workers = multiprocessing.cpu_count() * 2 + 1
```

All the settings are mentioned in the *settings* list.

## 2.3.3 Framework Settings

Currently, only Paster applications have access to framework specific settings. If you have ideas for providing settings to WSGI applications or pulling information from Django's settings.py feel free to open an [issue](#) to let us know.

### Paster Applications

In your INI file, you can specify to use Gunicorn as the server like such:

```
[server:main]
use = egg:gunicorn#main
host = 192.168.0.1
port = 80
workers = 2
proc_name = brim
```

Any parameters that Gunicorn knows about will automatically be inserted into the base configuration. Remember that these will be overridden by the config file and/or the command line.

## 2.4 Settings

This is an exhaustive list of settings for Gunicorn. Some settings are only able to be set from a configuration file. The setting name is what should be used in the configuration file. The command line arguments are listed as well for reference on setting at the command line.

---

**Note:** Settings can be specified by using environment variable GUNICORN\_CMD\_ARGS. All available command line arguments can be used. For example, to specify the bind address and number of workers:

```
$ GUNICORN_CMD_ARGS="--bind=127.0.0.1 --workers=3" gunicorn app:app
```

New in version 19.7.

---

### 2.4.1 Config File

#### config

- `-c CONFIG, --config CONFIG`
- `None`

The Gunicorn config file.

A string of the form `PATH`, `file:PATH`, or `python:MODULE_NAME`.

Only has an effect when specified on the command line or as part of an application specific configuration.

Changed in version 19.4: Loading the config from a Python module requires the `python:` prefix.

### 2.4.2 Debugging

#### reload

- `--reload`
- `False`

Restart workers when code changes.

This setting is intended for development. It will cause workers to be restarted whenever application code changes.

The reloader is incompatible with application preloading. When using a paste configuration be sure that the server block does not import any application code or the reload will not work as designed.

The default behavior is to attempt inotify with a fallback to file system polling. Generally, inotify should be preferred if available because it consumes less system resources.

---

**Note:** In order to use the inotify reloader, you must have the `inotify` package installed.

---

#### reload\_engine

- `--reload-engine STRING`
- `auto`

The implementation that should be used to power *reload*.

Valid engines are:

- `'auto'`
- `'poll'`
- `'inotify'` (requires inotify)

New in version 19.7.

### reload\_extra\_files

- `--reload-extra-file FILES`
- `[]`

Extends *reload* option to also watch and reload on additional files (e.g., templates, configurations, specifications, etc.).

New in version 19.8.

### spew

- `--spew`
- `False`

Install a trace function that spews every line executed by the server.

This is the nuclear option.

### check\_config

- `--check-config`
- `False`

Check the configuration.

## 2.4.3 Logging

### accesslog

- `--access-logfile FILE`
- `None`

The Access log file to write to.

'-' means log to stdout.

### disable\_redirect\_access\_to\_syslog

- `--disable-redirect-access-to-syslog`
- `False`

Disable redirect access logs to syslog.

New in version 19.8.

### access\_log\_format

- `--access-logformat STRING`
- `%(h)s %(l)s %(u)s %(t)s "%(r)s" %(s)s %(b)s "%(f)s" "%(a)s"`



The access log format.

Identifier	Description
h	remote address
l	' - '
u	user name
t	date of the request
r	status line (e.g. GET / HTTP/1.1)
m	request method
U	URL path without query string
q	query string
H	protocol
s	status
B	response length
b	response length or ' - ' (CLF format)
f	referrer
a	user agent
T	request time in seconds
D	request time in microseconds
L	request time in decimal seconds
p	process ID
{Header}i	request header
{Header}o	response header
{Variable}e	environment variable

## errorlog

- `--error-logfile FILE, --log-file FILE`
- `-`

The Error log file to write to.

Using `' - '` for FILE makes gunicorn log to stderr.

Changed in version 19.2: Log to stderr by default.

## loglevel

- `--log-level LEVEL`
- `info`

The granularity of Error log outputs.

Valid level names are:

- `debug`
- `info`
- `warning`
- `error`
- `critical`

### capture\_output

- `--capture-output`
- `False`

Redirect stdout/stderr to specified file in *errorlog*.

New in version 19.6.

### logger\_class

- `--logger-class STRING`
- `gunicorn.glogging.Logger`

The logger you want to use to log events in Gunicorn.

The default class (`gunicorn.glogging.Logger`) handle most of normal usages in logging. It provides error and access logging.

You can provide your own logger by giving Gunicorn a Python path to a subclass like `gunicorn.glogging.Logger`.

### logconfig

- `--log-config FILE`
- `None`

The log config file to use. Gunicorn uses the standard Python logging module's Configuration file format.

### logconfig\_dict

- `--log-config-dict`
- `{}`

The log config dictionary to use, using the standard Python logging module's dictionary configuration format. This option takes precedence over the *logconfig* option, which uses the older file configuration format.

Format: <https://docs.python.org/3/library/logging.config.html#logging.config.dictConfig>

New in version 19.8.

### syslog\_addr

- `--log-syslog-to SYSLOG_ADDR`
- `udp://localhost:514`

Address to send syslog messages.

Address is a string of the form:

- `unix://PATH#TYPE` : for unix domain socket. TYPE can be `stream` for the stream driver or `dgram` for the dgram driver. `stream` is the default.
- `udp://HOST:PORT` : for UDP sockets
- `tcp://HOST:PORT` : for TCP sockets

### syslog

- `--log-syslog`
- `False`

Send *Gunicorn* logs to syslog.

Changed in version 19.8: You can now disable sending access logs by using the *disable\_redirect\_access\_to\_syslog* setting.

### syslog\_prefix

- `--log-syslog-prefix SYSLOG_PREFIX`
- `None`

Makes Gunicorn use the parameter as program-name in the syslog entries.

All entries will be prefixed by `gunicorn.<prefix>`. By default the program name is the name of the process.

### syslog\_facility

- `--log-syslog-facility SYSLOG_FACILITY`
- `user`

Syslog facility name

### enable\_stdio\_inheritance

- `-R, --enable-stdio-inheritance`
- `False`

Enable stdio inheritance.

Enable inheritance for stdio file descriptors in daemon mode.

Note: To disable the Python stdout buffering, you can to set the user environment variable `PYTHONUNBUFFERED`.

### statsd\_host

- `--statsd-host STATSD_ADDR`
- `None`

`host:port` of the statsd server to log to.

New in version 19.1.

### statsd\_prefix

- `--statsd-prefix STATSD_PREFIX`
- (empty string)

Prefix to use when emitting statsd metrics (a trailing `.` is added, if not provided).

New in version 19.2.

## 2.4.4 Process Naming

### proc\_name

- `-n STRING, --name STRING`
- `None`

A base to use with `setproctitle` for process naming.

This affects things like `ps` and `top`. If you're going to be running more than one instance of Gunicorn you'll probably want to set a name to tell them apart. This requires that you install the `setproctitle` module.

If not set, the `default_proc_name` setting will be used.

### default\_proc\_name

- `gunicorn`

Internal setting that is adjusted for each type of application.

## 2.4.5 SSL

### keyfile

- `--keyfile FILE`
- `None`

SSL key file

### certfile

- `--certfile FILE`
- `None`

SSL certificate file

### ssl\_version

- `--ssl-version`
- `_SSLMethod.PROTOCOL_TLS`

SSL version to use (see `stdlib ssl` module's)

Changed in version 19.7: The default value has been changed from `ssl.PROTOCOL_TLSv1` to `ssl.PROTOCOL_SSLv23`.

### cert\_reqs

- `--cert-reqs`
- `VerifyMode.CERT_NONE`

Whether client certificate is required (see `stdlib ssl` module's)

**ca\_certs**

- `--ca-certs FILE`
- `None`

CA certificates file

**suppress\_ragged\_eofs**

- `--suppress-ragged-eofs`
- `True`

Suppress ragged EOFs (see stdlib ssl module's)

**do\_handshake\_on\_connect**

- `--do-handshake-on-connect`
- `False`

Whether to perform SSL handshake on socket connect (see stdlib ssl module's)

**ciphers**

- `--ciphers`
- `TLSv1`

Ciphers to use (see stdlib ssl module's)

## 2.4.6 Security

**limit\_request\_line**

- `--limit-request-line INT`
- `4094`

The maximum size of HTTP request line in bytes.

This parameter is used to limit the allowed size of a client's HTTP request-line. Since the request-line consists of the HTTP method, URI, and protocol version, this directive places a restriction on the length of a request-URI allowed for a request on the server. A server needs this value to be large enough to hold any of its resource names, including any information that might be passed in the query part of a GET request. Value is a number from 0 (unlimited) to 8190.

This parameter can be used to prevent any DDOS attack.

**limit\_request\_fields**

- `--limit-request-fields INT`
- `100`

Limit the number of HTTP headers fields in a request.

This parameter is used to limit the number of headers in a request to prevent DDOS attack. Used with the `limit_request_field_size` it allows more safety. By default this value is 100 and can't be larger than 32768.

### limit\_request\_field\_size

- `--limit-request-field_size INT`
- 8190

Limit the allowed size of an HTTP request header field.

Value is a positive number or 0. Setting it to 0 will allow unlimited header field sizes.

<b>Warning:</b> Setting this parameter to a very high or unlimited value can open up for DDOS attacks.
--

## 2.4.7 Server Hooks

### on\_starting

- ```
def on_starting(server):  
    pass
```

Called just before the master process is initialized.

The callable needs to accept a single instance variable for the Arbiter.

### on\_reload

- ```
def on_reload(server):  
    pass
```

Called to recycle workers during a reload via SIGHUP.

The callable needs to accept a single instance variable for the Arbiter.

### when\_ready

- ```
def when_ready(server):  
    pass
```

Called just after the server is started.

The callable needs to accept a single instance variable for the Arbiter.

### pre\_fork

- ```
def pre_fork(server, worker):  
    pass
```

Called just before a worker is forked.

The callable needs to accept two instance variables for the Arbiter and new Worker.

### **post\_fork**

- ```
def post_fork(server, worker):  
    pass
```

Called just after a worker has been forked.

The callable needs to accept two instance variables for the Arbiter and new Worker.

### **post\_worker\_init**

- ```
def post_worker_init(worker):  
    pass
```

Called just after a worker has initialized the application.

The callable needs to accept one instance variable for the initialized Worker.

### **worker\_int**

- ```
def worker_int(worker):  
    pass
```

Called just after a worker exited on SIGINT or SIGQUIT.

The callable needs to accept one instance variable for the initialized Worker.

### **worker\_abort**

- ```
def worker_abort(worker):  
    pass
```

Called when a worker received the SIGABRT signal.

This call generally happens on timeout.

The callable needs to accept one instance variable for the initialized Worker.

### **pre\_exec**

- ```
def pre_exec(server):  
    pass
```

Called just before a new master process is forked.

The callable needs to accept a single instance variable for the Arbiter.

## pre\_request

- ```
def pre_request(worker, req):  
    worker.log.debug("%s %s" % (req.method, req.path))
```

Called just before a worker processes the request.

The callable needs to accept two instance variables for the Worker and the Request.

## post\_request

- ```
def post_request(worker, req, environ, resp):  
    pass
```

Called after a worker processes the request.

The callable needs to accept two instance variables for the Worker and the Request.

## child\_exit

- ```
def child_exit(server, worker):  
    pass
```

Called just after a worker has been exited, in the master process.

The callable needs to accept two instance variables for the Arbiter and the just-exited Worker.

New in version 19.7.

## worker\_exit

- ```
def worker_exit(server, worker):  
    pass
```

Called just after a worker has been exited, in the worker process.

The callable needs to accept two instance variables for the Arbiter and the just-exited Worker.

## nworkers\_changed

- ```
def nworkers_changed(server, new_value, old_value):  
    pass
```

Called just after *num\_workers* has been changed.

The callable needs to accept an instance variable of the Arbiter and two integers of number of workers after and before change.

If the number of workers is set for the first time, *old\_value* would be *None*.



## on\_exit

- ```
def on_exit(server):
    pass
```

Called just before exiting Gunicorn.

The callable needs to accept a single instance variable for the Arbiter.

## 2.4.8 Server Mechanics

### preload\_app

- `--preload`
- `False`

Load application code before the worker processes are forked.

By preloading an application you can save some RAM resources as well as speed up server boot times. Although, if you defer application loading to each worker process, you can reload your application code easily by restarting workers.

### sendfile

- `--no-sendfile`
- `None`

Disables the use of `sendfile()`.

If not set, the value of the `SENDFILE` environment variable is used to enable or disable its usage.

New in version 19.2.

Changed in version 19.4: Swapped `--sendfile` with `--no-sendfile` to actually allow disabling.

Changed in version 19.6: added support for the `SENDFILE` environment variable

### reuse\_port

- `--reuse-port`
- `False`

Set the `SO_REUSEPORT` flag on the listening socket.

New in version 19.8.

### chdir

- `--chdir`
- `/home/docs/checkouts/readthedocs.org/user_builds/gunicorn-docs/checkouts/19.x/docs/source`

Chdir to specified directory before apps loading.

### daemon

- `-D, --daemon`
- `False`

Daemonize the Gunicorn process.

Detaches the server from the controlling terminal and enters the background.

### raw\_env

- `-e ENV, --env ENV`
- `[]`

Set environment variable (key=value).

Pass variables to the execution environment. Ex.:

```
$ gunicorn -b 127.0.0.1:8000 --env FOO=1 test:app
```

and test for the foo variable environment in your application.

### pidfile

- `-p FILE, --pid FILE`
- `None`

A filename to use for the PID file.

If not set, no PID file will be written.

### worker\_tmp\_dir

- `--worker-tmp-dir DIR`
- `None`

A directory to use for the worker heartbeat temporary file.

If not set, the default temporary directory will be used.

---

**Note:** The current heartbeat system involves calling `os.fchmod` on temporary file handlers and may block a worker for arbitrary time if the directory is on a disk-backed filesystem.

See [How do I avoid Gunicorn excessively blocking in `os.fchmod`?](#) for more detailed information and a solution for avoiding this problem.

---

### user

- `-u USER, --user USER`
- `1005`

Switch worker processes to run as this user.

A valid user id (as an integer) or the name of a user that can be retrieved with a call to `pwd.getpwnam(value)` or `None` to not change the worker process user.

### group

- `-g GROUP, --group GROUP`
- `205`

Switch worker process to run as this group.

A valid group id (as an integer) or the name of a user that can be retrieved with a call to `pwd.getgrnam(value)` or `None` to not change the worker processes group.

### umask

- `-m INT, --umask INT`
- `0`

A bit mask for the file mode on files written by Gunicorn.

Note that this affects unix socket permissions.

A valid value for the `os.umask(mode)` call or a string compatible with `int(value, 0)` (0 means Python guesses the base, so values like 0, 0xFF, 0022 are valid for decimal, hex, and octal representations)

### initgroups

- `--initgroups`
- `False`

If true, set the worker process's group access list with all of the groups of which the specified username is a member, plus the specified group id.

New in version 19.7.

### tmp\_upload\_dir

- `None`

Directory to store temporary request data as they are read.

This may disappear in the near future.

This path should be writable by the process permissions set for Gunicorn workers. If not specified, Gunicorn will choose a system generated temporary directory.

### secure\_scheme\_headers

- `{ 'X-FORWARDED-PROTOCOL': 'ssl', 'X-FORWARDED-PROTO': 'https', 'X-FORWARDED-SSL': 'on' }`

A dictionary containing headers and values that the front-end proxy uses to indicate HTTPS requests. These tell Gunicorn to set `wsgi.url_scheme` to `https`, so your application can tell that the request is secure.

The dictionary should map upper-case header names to exact string values. The value comparisons are case-sensitive, unlike the header names, so make sure they're exactly what your front-end proxy sends when handling HTTPS requests.

It is important that your front-end proxy configuration ensures that the headers defined here can not be passed directly from the client.

### forwarded\_allow\_ips

- `--forwarded-allow-ips` STRING
- `127.0.0.1`

Front-end's IPs from which allowed to handle set secure headers. (comma separate).

Set to `*` to disable checking of Front-end IPs (useful for setups where you don't know in advance the IP address of Front-end, but you still trust the environment).

By default, the value of the `FORWARDED_ALLOW_IPS` environment variable. If it is not defined, the default is `"127.0.0.1"`.

### pythonpath

- `--pythonpath` STRING
- `None`

A comma-separated list of directories to add to the Python path.

e.g. `"/home/djangoprojects/myproject,/home/python/mylibrary"`.

### paste

- `--paste` STRING, `--paster` STRING
- `None`

Load a PasteDeploy config file. The argument may contain a `#` symbol followed by the name of an app section from the config file, e.g. `production.ini#admin`.

At this time, using alternate server blocks is not supported. Use the command line arguments to control server configuration instead.

### proxy\_protocol

- `--proxy-protocol`
- `False`

Enable detect PROXY protocol (PROXY mode).

Allow using HTTP and Proxy together. It may be useful for work with stunnel as HTTPS frontend and Gunicorn as HTTP server.

PROXY protocol: <http://haproxy.1wt.eu/download/1.5/doc/proxy-protocol.txt>

Example for stunnel config:

```
[https]
protocol = proxy
accept  = 443
connect = 80
cert = /etc/ssl/certs/stunnel.pem
key = /etc/ssl/certs/stunnel.key
```

### proxy\_allow\_ips

- `--proxy-allow-from`
- `127.0.0.1`

Front-end's IPs from which allowed accept proxy requests (comma separate).

Set to `*` to disable checking of Front-end IPs (useful for setups where you don't know in advance the IP address of Front-end, but you still trust the environment)

### raw\_paste\_global\_conf

- `--paste-global CONF`
- `[]`

Set a PasteDeploy global config variable in `key=value` form.

The option can be specified multiple times.

The variables are passed to the the PasteDeploy entrypoint. Example:

```
$ gunicorn -b 127.0.0.1:8000 --paste development.ini --paste-global FOO=1 --paste-
↪global BAR=2
```

New in version 19.7.

### strip\_header\_spaces

- `--strip-header-spaces`
- `False`

Strip spaces present between the header name and the the `:`.

This is known to induce vulnerabilities and is not compliant with the HTTP/1.1 standard. See <https://portswigger.net/research/http-desync-attacks-request-smuggling-reborn>.

Use with care and only if necessary.

## 2.4.9 Server Socket

### bind

- `-b ADDRESS, --bind ADDRESS`
- `['127.0.0.1:8000']`

The socket to bind.

A string of the form: `HOST`, `HOST:PORT`, `unix:PATH`. An IP is a valid `HOST`.

Multiple addresses can be bound. ex.:

```
$ gunicorn -b 127.0.0.1:8000 -b [::1]:8000 test:app
```

will bind the `test:app` application on localhost both on ipv6 and ipv4 interfaces.

### backlog

- `--backlog INT`
- 2048

The maximum number of pending connections.

This refers to the number of clients that can be waiting to be served. Exceeding this number results in the client getting an error when attempting to connect. It should only affect servers under significant load.

Must be a positive integer. Generally set in the 64-2048 range.

## 2.4.10 Worker Processes

### workers

- `-w INT`, `--workers INT`
- 1

The number of worker processes for handling requests.

A positive integer generally in the  $2-4 \times \$(NUM\_CORES)$  range. You'll want to vary this a bit to find the best for your particular application's work load.

By default, the value of the `WEB_CONCURRENCY` environment variable. If it is not defined, the default is 1.

### worker\_class

- `-k STRING`, `--worker-class STRING`
- `sync`

The type of workers to use.

The default class (`sync`) should handle most “normal” types of workloads. You'll want to read [Design](#) for information on when you might want to choose one of the other worker classes. Required libraries may be installed using `setuptools`' `extra_require` feature.

A string referring to one of the following bundled classes:

- `sync`
- `eventlet` - Requires `eventlet >= 0.24.1` (or install it via `pip install gunicorn[eventlet]`)
- `gevent` - Requires `gevent >= 0.13` (or install it via `pip install gunicorn[gevent]`)
- `tornado` - Requires `tornado >= 0.2` (or install it via `pip install gunicorn[tornado]`)

- `gthread` - Python 2 requires the `futures` package to be installed (or install it via `pip install gunicorn[gthread]`)
- `gaiohttp` - Deprecated.

Optionally, you can provide your own worker by giving Gunicorn a Python path to a subclass of `gunicorn.workers.base.Worker`. This alternative syntax will load the `gevent` class: `gunicorn.workers.ggevent.GeventWorker`.

Deprecated since version 19.8: The `gaiohttp` worker is deprecated. Please use `aiohttp.worker.GunicornWebWorker` instead. See [AsyncIO Workers](#) for more information on how to use it.

## threads

- `--threads INT`
- `1`

The number of worker threads for handling requests.

Run each worker with the specified number of threads.

A positive integer generally in the  $2-4 \times \$(NUM\_CORES)$  range. You'll want to vary this a bit to find the best for your particular application's work load.

If it is not defined, the default is 1.

This setting only affects the `Gthread` worker type.

---

**Note:** If you try to use the `sync` worker type and set the `threads` setting to more than 1, the `gthread` worker type will be used instead.

---

## worker\_connections

- `--worker-connections INT`
- `1000`

The maximum number of simultaneous clients.

This setting only affects the `Eventlet` and `Gevent` worker types.

## max\_requests

- `--max-requests INT`
- `0`

The maximum number of requests a worker will process before restarting.

Any value greater than zero will limit the number of requests a worker will process before automatically restarting. This is a simple method to help limit the damage of memory leaks.

If this is set to zero (the default) then the automatic worker restarts are disabled.

### max\_requests\_jitter

- `--max-requests-jitter INT`
- 0

The maximum jitter to add to the *max\_requests* setting.

The jitter causes the restart per worker to be randomized by `randint(0, max_requests_jitter)`. This is intended to stagger worker restarts to avoid all workers restarting at the same time.

New in version 19.2.

### timeout

- `-t INT, --timeout INT`
- 30

Workers silent for more than this many seconds are killed and restarted.

Generally set to thirty seconds. Only set this noticeably higher if you're sure of the repercussions for sync workers. For the non sync workers it just means that the worker process is still communicating and is not tied to the length of time required to handle a single request.

### graceful\_timeout

- `--graceful-timeout INT`
- 30

Timeout for graceful workers restart.

After receiving a restart signal, workers have this much time to finish serving requests. Workers still alive after the timeout (starting from the receipt of the restart signal) are force killed.

### keepalive

- `--keep-alive INT`
- 2

The number of seconds to wait for requests on a Keep-Alive connection.

Generally set in the 1-5 seconds range for servers with direct connection to the client (e.g. when you don't have separate load balancer). When Gunicorn is deployed behind a load balancer, it often makes sense to set this to a higher value.

---

**Note:** `sync` worker does not support persistent connections and will ignore this option.

---

## 2.5 Instrumentation

New in version 19.1.

Gunicorn provides an optional instrumentation of the arbiter and workers using the [statsD](#) protocol over UDP. Thanks to the `gunicorn.instrument.statsd` module, Gunicorn becomes a statsD client. The use of UDP cleanly



isolates Gunicorn from the receiving end of the statsD metrics so that instrumentation does not cause Gunicorn to be held up by a slow statsD consumer.

To use statsD, just tell Gunicorn where the statsD server is:

```
$ gunicorn --statsd-host=localhost:8125 --statsd-prefix=service.app ...
```

The Statsd logger overrides `gunicorn.glogging.Logger` to track all requests. The following metrics are generated:

- `gunicorn.requests`: request rate per second
- `gunicorn.request.duration`: histogram of request duration (in millisecond)
- `gunicorn.workers`: number of workers managed by the arbiter (gauge)
- `gunicorn.log.critical`: rate of critical log messages
- `gunicorn.log.error`: rate of error log messages
- `gunicorn.log.warning`: rate of warning log messages
- `gunicorn.log.exception`: rate of exceptional log messages

See the `statsd-host` setting for more information.

## 2.6 Deploying Gunicorn

We strongly recommend to use Gunicorn behind a proxy server.

### 2.6.1 Nginx Configuration

Although there are many HTTP proxies available, we strongly advise that you use [Nginx](#). If you choose another proxy server you need to make sure that it buffers slow clients when you use default Gunicorn workers. Without this buffering Gunicorn will be easily susceptible to denial-of-service attacks. You can use [Hey](#) to check if your proxy is behaving properly.

An [example configuration](#) file for fast clients with [Nginx](#):

Listing 1: `nginx.conf`

```
worker_processes 1;

user nobody nogroup;
# 'user nobody nobody;' for systems with 'nobody' as a group instead
error_log /var/log/nginx/error.log warn;
pid /var/run/nginx.pid;

events {
    worker_connections 1024; # increase if you have lots of clients
    accept_mutex off; # set to 'on' if nginx worker_processes > 1
    # 'use epoll;' to enable for Linux 2.6+
    # 'use kqueue;' to enable for FreeBSD, OSX
}

http {
    include mime.types;
    # fallback in case we can't determine a type
```

(continues on next page)

(continued from previous page)

```
default_type application/octet-stream;
access_log /var/log/nginx/access.log combined;
sendfile on;

upstream app_server {
    # fail_timeout=0 means we always retry an upstream even if it failed
    # to return a good HTTP response

    # for UNIX domain socket setups
    server unix:/tmp/gunicorn.sock fail_timeout=0;

    # for a TCP configuration
    # server 192.168.0.7:8000 fail_timeout=0;
}

server {
    # if no Host match, close the connection to prevent host spoofing
    listen 80 default_server;
    return 444;
}

server {
    # use 'listen 80 deferred;' for Linux
    # use 'listen 80 accept_filter=httppready;' for FreeBSD
    listen 80;
    client_max_body_size 4G;

    # set the correct host(s) for your site
    server_name example.com www.example.com;

    keepalive_timeout 5;

    # path for static files
    root /path/to/app/current/public;

    location / {
        # checks for static file, if not found proxy to app
        try_files $uri @proxy_to_app;
    }

    location @proxy_to_app {
        proxy_set_header X-Forwarded-For $proxy_add_x_forwarded_for;
        proxy_set_header X-Forwarded-Proto $scheme;
        proxy_set_header Host $http_host;
        # we don't want nginx trying to do something clever with
        # redirects, we set the Host: header above already.
        proxy_redirect off;
        proxy_pass http://app_server;
    }

    error_page 500 502 503 504 /500.html;
    location = /500.html {
        root /path/to/app/current/public;
    }
}
}
```

If you want to be able to handle streaming request/responses or other fancy features like Comet, Long polling, or Web sockets, you need to turn off the proxy buffering. **When you do this** you must run with one of the async worker classes.

To turn off buffering, you only need to add `proxy_buffering off;` to your `location` block:

```
...
location @proxy_to_app {
    proxy_set_header X-Forwarded-For $proxy_add_x_forwarded_for;
    proxy_set_header Host $http_host;
    proxy_redirect off;
    proxy_buffering off;

    proxy_pass http://app_server;
}
...
```

It is recommended to pass protocol information to Gunicorn. Many web frameworks use this information to generate URLs. Without this information, the application may mistakenly generate ‘http’ URLs in ‘https’ responses, leading to mixed content warnings or broken applications. To configure Nginx to pass an appropriate header, add a `proxy_set_header` directive to your `location` block:

```
...
proxy_set_header X-Forwarded-Proto $scheme;
...
```

If you are running Nginx on a different host than Gunicorn you need to tell Gunicorn to trust the `X-Forwarded-*` headers sent by Nginx. By default, Gunicorn will only trust these headers if the connection comes from localhost. This is to prevent a malicious client from forging these headers:

```
$ gunicorn -w 3 --forwarded-allow-ips="10.170.3.217,10.170.3.220" test:app
```

When the Gunicorn host is completely firewalled from the external network such that all connections come from a trusted proxy (e.g. Heroku) this value can be set to ‘\*’. Using this value is **potentially dangerous** if connections to Gunicorn may come from untrusted proxies or directly from clients since the application may be tricked into serving SSL-only content over an insecure connection.

Gunicorn 19 introduced a breaking change concerning how `REMOTE_ADDR` is handled. Previous to Gunicorn 19 this was set to the value of `X-Forwarded-For` if received from a trusted proxy. However, this was not in compliance with [RFC 3875](#) which is why the `REMOTE_ADDR` is now the IP address of **the proxy** and **not the actual user**. You should instead configure Nginx to send the user’s IP address through the `X-Forwarded-For` header like this:

```
...
proxy_set_header X-Forwarded-For $proxy_add_x_forwarded_for;
...
```

It is also worth noting that the `REMOTE_ADDR` will be completely empty if you bind Gunicorn to a UNIX socket and not a TCP `host:port` tuple.

## 2.6.2 Using Virtualenv

To serve an app from a [Virtualenv](#) it is generally easiest to just install Gunicorn directly into the Virtualenv. This will create a set of Gunicorn scripts for that Virtualenv which can be used to run applications normally.

If you have Virtualenv installed, you should be able to do something like this:

```
$ mkdir ~/venvs/  
$ virtualenv ~/venvs/webapp  
$ source ~/venvs/webapp/bin/activate  
$ pip install gunicorn  
$ deactivate
```

Then you just need to use one of the three Gunicorn scripts that was installed into `~/venvs/webapp/bin`.

Note: You can force the installation of Gunicorn in your Virtualenv by passing `-I` or `--ignore-installed` option to pip:

```
$ source ~/venvs/webapp/bin/activate  
$ pip install -I gunicorn
```

### 2.6.3 Monitoring

---

**Note:** Make sure that when using either of these service monitors you do not enable the Gunicorn's daemon mode. These monitors expect that the process they launch will be the process they need to monitor. Daemonizing will fork-exec which creates an unmonitored process and generally just confuses the monitor services.

---

#### Gaffer

##### Using Gaffer and gaffer

[Gaffer](#) can be used to monitor Gunicorn. A simple configuration is:

```
[process:gunicorn]  
cmd = gunicorn -w 3 test:app  
cwd = /path/to/project
```

Then you can easily manage Gunicorn using [Gaffer](#).

##### Using a Procfile

Create a Procfile in your project:

```
gunicorn = gunicorn -w 3 test:app
```

You can launch any other applications that should be launched at the same time.

Then you can start your Gunicorn application using [Gaffer](#):

```
gaffer start
```

If gaffer is launched you can also load your Procfile in it directly:

```
gaffer load
```

All your applications will be then supervised by gaffer.

## Runit

A popular method for deploying Gunicorn is to have it monitored by [runit](#). Here is an [example service definition](#):

```
#!/bin/sh

GUNICORN=/usr/local/bin/gunicorn
ROOT=/path/to/project
PID=/var/run/gunicorn.pid

APP=main:application

if [ -f $PID ]; then rm $PID; fi

cd $ROOT
exec $GUNICORN -c $ROOT/gunicorn.conf.py --pid=$PID $APP
```

Save this as `/etc/sv/[app_name]/run`, and make it executable (`chmod u+x /etc/sv/[app_name]/run`). Then run `ln -s /etc/sv/[app_name] /etc/service/[app_name]`. If [runit](#) is installed, Gunicorn should start running automatically as soon as you create the symlink.

If it doesn't start automatically, run the script directly to troubleshoot.

## Supervisor

Another useful tool to monitor and control Gunicorn is [Supervisor](#). A [simple configuration](#) is:

```
[program:gunicorn]
command=/path/to/gunicorn main:application -c /path/to/gunicorn.conf.py
directory=/path/to/project
user=nobody
autostart=true
autorestart=true
redirect_stderr=true
```

## Upstart

Using Gunicorn with [upstart](#) is simple. In this example we will run the app “myapp” from a [virtualenv](#). All errors will go to `/var/log/upstart/myapp.log`.

**/etc/init/myapp.conf:**

```
description "myapp"

start on (filesystem)
stop on runlevel [016]

respawn
setuid nobody
setgid nogroup
chdir /path/to/app/directory

exec /path/to/virtualenv/bin/gunicorn myapp:app
```

## Systemd

A tool that is starting to be common on linux systems is [Systemd](#). Below are configurations files and instructions for using systemd to create a unix socket for incoming Gunicorn requests. Systemd will listen on this socket and start gunicorn automatically in response to traffic. Later in this section are instructions for configuring Nginx to forward web traffic to the newly created unix socket:

**/etc/systemd/system/gunicorn.service:**

```
[Unit]
Description=gunicorn daemon
Requires=gunicorn.socket
After=network.target

[Service]
PIDFile=/run/gunicorn/pid
User=someuser
Group=someuser
RuntimeDirectory=gunicorn
WorkingDirectory=/home/someuser/applicationroot
ExecStart=/usr/bin/gunicorn --pid /run/gunicorn/pid \
    --bind unix:/run/gunicorn/socket applicationname.wsgi
ExecReload=/bin/kill -s HUP $MAINPID
ExecStop=/bin/kill -s TERM $MAINPID
PrivateTmp=true

[Install]
WantedBy=multi-user.target
```

**/etc/systemd/system/gunicorn.socket:**

```
[Unit]
Description=gunicorn socket

[Socket]
ListenStream=/run/gunicorn/socket

[Install]
WantedBy=sockets.target
```

**/etc/tmpfiles.d/gunicorn.conf:**

```
d /run/gunicorn 0755 someuser somegroup -
```

Next enable the socket so it autostarts at boot:

```
systemctl enable gunicorn.socket
```

Either reboot, or start the services manually:

```
systemctl start gunicorn.socket
```

After running `curl --unix-socket /run/gunicorn/socket http`, Gunicorn should start and you should see some HTML from your server in the terminal.

You must now configure your web proxy to send traffic to the new Gunicorn socket. Edit your `nginx.conf` to include the following:

**/etc/nginx/nginx.conf:**

```
...
http {
    server {
        listen      8000;
        server_name 127.0.0.1;
        location / {
            proxy_pass http://unix:/run/gunicorn/socket;
        }
    }
}
...
```

**Note:** The `listen` and `server_name` used here are configured for a local machine. In a production server you will most likely listen on port 80, and use your URL as the `server_name`.

Now make sure you enable the nginx service so it automatically starts at boot:

```
systemctl enable nginx.service
```

Either reboot, or start Nginx with the following command:

```
systemctl start nginx
```

Now you should be able to test Nginx with Gunicorn by visiting <http://127.0.0.1:8000/> in any web browser. Systemd is now set up.

## 2.6.4 Logging

Logging can be configured by using various flags detailed in the [configuration documentation](#) or by creating a [logging configuration file](#). Send the `USR1` signal to rotate logs if you are using the `logrotate` utility:

```
kill -USR1 $(cat /var/run/gunicorn.pid)
```

**Note:** Overriding the `LOGGING` dictionary requires to set `disable_existing_loggers: False` to not interfere with the Gunicorn logging.

**Warning:** Gunicorn error log is here to log errors from Gunicorn, not from another application.

## 2.7 Signal Handling

A brief description of the signals handled by Gunicorn. We also document the signals used internally by Gunicorn to communicate with the workers.

### 2.7.1 Master process

- `QUIT, INT`: Quick shutdown

- **TERM**: Graceful shutdown. Waits for workers to finish their current requests up to the *graceful\_timeout*.
- **HUP**: Reload the configuration, start the new worker processes with a new configuration and gracefully shutdown older workers. If the application is not preloaded (using the *preload\_app* option), Gunicorn will also load the new version of it.
- **TTIN**: Increment the number of processes by one
- **TTOU**: Decrement the number of processes by one
- **USR1**: Reopen the log files
- **USR2**: Upgrade Gunicorn on the fly. A separate **TERM** signal should be used to kill the old master process. This signal can also be used to use the new versions of pre-loaded applications. See *Upgrading to a new binary on the fly* for more information.
- **WINCH**: Gracefully shutdown the worker processes when Gunicorn is daemonized.

## 2.7.2 Worker process

Sending signals directly to the worker processes should not normally be needed. If the master process is running, any exited worker will be automatically respawned.

- **QUIT, INT**: Quick shutdown
- **TERM**: Graceful shutdown
- **USR1**: Reopen the log files

## 2.7.3 Reload the configuration

The **HUP** signal can be used to reload the Gunicorn configuration on the fly.

```
2013-06-29 06:26:55 [20682] [INFO] Handling signal: hup
2013-06-29 06:26:55 [20682] [INFO] Hang up: Master
2013-06-29 06:26:55 [20703] [INFO] Booting worker with pid: 20703
2013-06-29 06:26:55 [20702] [INFO] Booting worker with pid: 20702
2013-06-29 06:26:55 [20688] [INFO] Worker exiting (pid: 20688)
2013-06-29 06:26:55 [20687] [INFO] Worker exiting (pid: 20687)
2013-06-29 06:26:55 [20689] [INFO] Worker exiting (pid: 20689)
2013-06-29 06:26:55 [20704] [INFO] Booting worker with pid: 20704
```

Sending a **HUP** signal will reload the configuration, start the new worker processes with a new configuration and gracefully shutdown older workers. If the application is not preloaded (using the *preload\_app* option), Gunicorn will also load the new version of it.

## 2.7.4 Upgrading to a new binary on the fly

Changed in version 19.6.0: PID file naming format has been changed from `<name>.pid.oldbin` to `<name>.pid.2`.

If you need to replace the Gunicorn binary with a new one (when upgrading to a new version or adding/removing server modules), you can do it without any service downtime - no incoming requests will be lost. Preloaded applications will also be reloaded.

First, replace the old binary with a new one, then send a **USR2** signal to the current master process. It executes a new binary whose PID file is postfixed with `.2` (e.g. `/var/run/gunicorn.pid.2`), which in turn starts a new master process and new worker processes:



| PID         | USER    | PR | NI | VIRT  | RES  | SHR  | S | %CPU | %MEM | TIME+   | COMMAND          |
|-------------|---------|----|----|-------|------|------|---|------|------|---------|------------------|
| 20844       | benoitc | 20 | 0  | 54808 | 11m  | 3352 | S | 0.0  | 0.1  | 0:00.36 | gunicorn: master |
| ↪[test:app] |         |    |    |       |      |      |   |      |      |         |                  |
| 20849       | benoitc | 20 | 0  | 54808 | 9.9m | 1500 | S | 0.0  | 0.1  | 0:00.02 | gunicorn: worker |
| ↪[test:app] |         |    |    |       |      |      |   |      |      |         |                  |
| 20850       | benoitc | 20 | 0  | 54808 | 9.9m | 1500 | S | 0.0  | 0.1  | 0:00.01 | gunicorn: worker |
| ↪[test:app] |         |    |    |       |      |      |   |      |      |         |                  |
| 20851       | benoitc | 20 | 0  | 54808 | 9.9m | 1500 | S | 0.0  | 0.1  | 0:00.01 | gunicorn: worker |
| ↪[test:app] |         |    |    |       |      |      |   |      |      |         |                  |
| 20854       | benoitc | 20 | 0  | 55748 | 12m  | 3348 | S | 0.0  | 0.2  | 0:00.35 | gunicorn: master |
| ↪[test:app] |         |    |    |       |      |      |   |      |      |         |                  |
| 20859       | benoitc | 20 | 0  | 55748 | 11m  | 1500 | S | 0.0  | 0.1  | 0:00.01 | gunicorn: worker |
| ↪[test:app] |         |    |    |       |      |      |   |      |      |         |                  |
| 20860       | benoitc | 20 | 0  | 55748 | 11m  | 1500 | S | 0.0  | 0.1  | 0:00.00 | gunicorn: worker |
| ↪[test:app] |         |    |    |       |      |      |   |      |      |         |                  |
| 20861       | benoitc | 20 | 0  | 55748 | 11m  | 1500 | S | 0.0  | 0.1  | 0:00.01 | gunicorn: worker |
| ↪[test:app] |         |    |    |       |      |      |   |      |      |         |                  |

At this point, two instances of Gunicorn are running, handling the incoming requests together. To phase the old instance out, you have to send a WINCH signal to the old master process, and its worker processes will start to gracefully shut down.

At this point you can still revert to the old process since it hasn't closed its listen sockets yet, by following these steps:

- Send a HUP signal to the old master process - it will start the worker processes without reloading a configuration file
- Send a TERM signal to the new master process to gracefully shut down its worker processes
- Send a QUIT signal to the new master process to force it quit

If for some reason the new worker processes do not quit, send a KILL signal to them after the new master process quits, and everything will back to exactly as before the upgrade attempt.

If the update is successful and you want to keep the new master process, send a TERM signal to the old master process to leave only the new server running:

| PID         | USER    | PR | NI | VIRT  | RES | SHR  | S | %CPU | %MEM | TIME+   | COMMAND          |
|-------------|---------|----|----|-------|-----|------|---|------|------|---------|------------------|
| 20854       | benoitc | 20 | 0  | 55748 | 12m | 3348 | S | 0.0  | 0.2  | 0:00.45 | gunicorn: master |
| ↪[test:app] |         |    |    |       |     |      |   |      |      |         |                  |
| 20859       | benoitc | 20 | 0  | 55748 | 11m | 1500 | S | 0.0  | 0.1  | 0:00.02 | gunicorn: worker |
| ↪[test:app] |         |    |    |       |     |      |   |      |      |         |                  |
| 20860       | benoitc | 20 | 0  | 55748 | 11m | 1500 | S | 0.0  | 0.1  | 0:00.02 | gunicorn: worker |
| ↪[test:app] |         |    |    |       |     |      |   |      |      |         |                  |
| 20861       | benoitc | 20 | 0  | 55748 | 11m | 1500 | S | 0.0  | 0.1  | 0:00.01 | gunicorn: worker |
| ↪[test:app] |         |    |    |       |     |      |   |      |      |         |                  |

## 2.8 Custom Application

New in version 19.0.

Sometimes, you want to integrate Gunicorn with your WSGI application. In this case, you can inherit from `gunicorn.app.base.BaseApplication`.

Here is a small example where we create a very small WSGI app and load it with a custom Application:

```
from __future__ import unicode_literals

import multiprocessing

import gunicorn.app.base

from gunicorn.six import iteritems


def number_of_workers():
    return (multiprocessing.cpu_count() * 2) + 1


def handler_app(environ, start_response):
    response_body = b'Works fine'
    status = '200 OK'

    response_headers = [
        ('Content-Type', 'text/plain'),
    ]

    start_response(status, response_headers)

    return [response_body]


class StandaloneApplication(gunicorn.app.base.BaseApplication):

    def __init__(self, app, options=None):
        self.options = options or {}
        self.application = app
        super(StandaloneApplication, self).__init__()

    def load_config(self):
        config = dict([(key, value) for key, value in iteritems(self.options)
                       if key in self.cfg.settings and value is not None])
        for key, value in iteritems(config):
            self.cfg.set(key.lower(), value)

    def load(self):
        return self.application


if __name__ == '__main__':
    options = {
        'bind': '%s:%s' % ('127.0.0.1', '8080'),
        'workers': number_of_workers(),
    }
    StandaloneApplication(handler_app, options).run()
```

## 2.9 Design

A brief description of the architecture of Gunicorn.

## 2.9.1 Server Model

Gunicorn is based on the pre-fork worker model. This means that there is a central master process that manages a set of worker processes. The master never knows anything about individual clients. All requests and responses are handled completely by worker processes.

### Master

The master process is a simple loop that listens for various process signals and reacts accordingly. It manages the list of running workers by listening for signals like TTIN, TTOU, and CHLD. TTIN and TTOU tell the master to increase or decrease the number of running workers. CHLD indicates that a child process has terminated, in this case the master process automatically restarts the failed worker.

### Sync Workers

The most basic and the default worker type is a synchronous worker class that handles a single request at a time. This model is the simplest to reason about as any errors will affect at most a single request. Though as we describe below only processing a single request at a time requires some assumptions about how applications are programmed.

`sync` worker does not support persistent connections - each connection is closed after response has been sent (even if you manually add `Keep-Alive` or `Connection: keep-alive` header in your application).

### Async Workers

The asynchronous workers available are based on [Greenlets](#) (via [Eventlet](#) and [Gevent](#)). Greenlets are an implementation of cooperative multi-threading for Python. In general, an application should be able to make use of these worker classes with no changes.

### Tornado Workers

There's also a Tornado worker class. It can be used to write applications using the Tornado framework. Although the Tornado workers are capable of serving a WSGI application, this is not a recommended configuration.

### AsyncIO Workers

These workers are compatible with python3. You have two kind of workers.

The worker `gthread` is a threaded worker. It accepts connections in the main loop, accepted connections are added to the thread pool as a connection job. On keepalive connections are put back in the loop waiting for an event. If no event happen after the keep alive timeout, the connection is closed.

The worker `gaiohttp` is a full asyncio worker using [aiohttp](#).

**Note:** The `gaiohttp` worker requires the [aiohttp](#) module to be installed. [aiohttp](#) has removed its native WSGI application support in version 2. If you want to continue to use the `gaiohttp` worker with your WSGI application (e.g. an application that uses Flask or Django), there are three options available:

1. Install [aiohttp](#) version 1.3.5 instead of version 2:

```
$ pip install aiohttp==1.3.5
```

2. Use [aiohttp\\_wsgi](#) to wrap your WSGI application. You can take a look at the [example](#) in the Gunicorn repository.

3. Port your application to use `aiohttp`'s `web.Application` API.
  4. Use the `aiohttp.worker.GunicornWebWorker` worker instead of the deprecated `gaiohttp` worker.
- 

## 2.9.2 Choosing a Worker Type

The default synchronous workers assume that your application is resource-bound in terms of CPU and network bandwidth. Generally this means that your application shouldn't do anything that takes an undefined amount of time. An example of something that takes an undefined amount of time is a request to the internet. At some point the external network will fail in such a way that clients will pile up on your servers. So, in this sense, any web application which makes outgoing requests to APIs will benefit from an asynchronous worker.

This resource bound assumption is why we require a buffering proxy in front of a default configuration Gunicorn. If you exposed synchronous workers to the internet, a DOS attack would be trivial by creating a load that trickles data to the servers. For the curious, [Hey](#) is an example of this type of load.

Some examples of behavior requiring asynchronous workers:

- Applications making long blocking calls (Ie, external web services)
- Serving requests directly to the internet
- Streaming requests and responses
- Long polling
- Web sockets
- Comet

## 2.9.3 How Many Workers?

DO NOT scale the number of workers to the number of clients you expect to have. Gunicorn should only need 4-12 worker processes to handle hundreds or thousands of requests per second.

Gunicorn relies on the operating system to provide all of the load balancing when handling requests. Generally we recommend  $(2 \times \text{\$num\_cores}) + 1$  as the number of workers to start off with. While not overly scientific, the formula is based on the assumption that for a given core, one worker will be reading or writing from the socket while the other worker is processing a request.

Obviously, your particular hardware and application are going to affect the optimal number of workers. Our recommendation is to start with the above guess and tune using TTIN and TTOU signals while the application is under load.

Always remember, there is such a thing as too many workers. After a point your worker processes will start thrashing system resources decreasing the throughput of the entire system.

## 2.9.4 How Many Threads?

Since Gunicorn 19, a `threads` option can be used to process requests in multiple threads. Using threads assumes use of the `gthread` worker. One benefit from threads is that requests can take longer than the worker timeout while notifying the master process that it is not frozen and should not be killed. Depending on the system, using multiple threads, multiple worker processes, or some mixture, may yield the best results. For example, CPython may not perform as well as Jython when using threads, as threading is implemented differently by each. Using threads instead of processes is a good way to reduce the memory footprint of Gunicorn, while still allowing for application upgrades using the `reload`

signal, as the application code will be shared among workers but loaded only in the worker processes (unlike when using the `preload` setting, which loads the code in the master process).

---

**Note:** Under Python 2.x, you need to install the ‘futures’ package to use this feature.

---

## 2.10 FAQ

### 2.10.1 WSGI Bits

#### How do I set `SCRIPT_NAME`?

By default `SCRIPT_NAME` is an empty string. The value could be set by setting `SCRIPT_NAME` in the environment or as an HTTP header.

### 2.10.2 Server Stuff

#### How do I reload my application in Gunicorn?

You can gracefully reload by sending HUP signal to gunicorn:

```
$ kill -HUP masterpid
```

#### How might I test a proxy configuration?

The [Hey](#) program is a great way to test that your proxy is correctly buffering responses for the synchronous workers:

```
$ hey -n 10000 -c 100 http://127.0.0.1:5000/
```

This runs a benchmark of 10000 requests with 100 running concurrently.

#### How can I name processes?

If you install the Python package [setproctitle](#) Gunicorn will set the process names to something a bit more meaningful. This will affect the output you see in tools like `ps` and `top`. This helps for distinguishing the master process as well as between masters when running more than one app on a single machine. See the [proc\\_name](#) setting for more information.

#### Why is there no HTTP Keep-Alive?

The default Sync workers are designed to run behind Nginx which only uses HTTP/1.0 with its upstream servers. If you want to deploy Gunicorn to handle unbuffered requests (ie, serving requests directly from the internet) you should use one of the async workers.

### 2.10.3 Worker Processes

#### How do I know which type of worker to use?

Read the [Design](#) page for help on the various worker types.

#### What types of workers are there?

Check out the configuration docs for [worker\\_class](#).

#### How can I figure out the best number of worker processes?

Here is our recommendation for tuning the [number of workers](#).

#### How can I change the number of workers dynamically?

TTIN and TTOU signals can be sent to the master to increase or decrease the number of workers.

To increase the worker count by one:

```
$ kill -TTIN $masterpid
```

To decrease the worker count by one:

```
$ kill -TTOU $masterpid
```

#### Does Gunicorn suffer from the thundering herd problem?

The thundering herd problem occurs when many sleeping request handlers, which may be either threads or processes, wake up at the same time to handle a new request. Since only one handler will receive the request, the others will have been awakened for no reason, wasting CPU cycles. At this time, Gunicorn does not implement any IPC solution for coordinating between worker processes. You may experience high load due to this problem when using many workers or threads. However [a work has been started](#) to remove this issue.

#### Why I don't see any logs in the console?

In version R19, Gunicorn doesn't log by default in the console. To watch the logs in the console you need to use the option `--log-file=-`. In version R20, Gunicorn logs to the console by default again.

### 2.10.4 Kernel Parameters

When dealing with large numbers of concurrent connections there are a handful of kernel parameters that you might need to adjust. Generally these should only affect sites with a very large concurrent load. These parameters are not specific to Gunicorn, they would apply to any sort of network server you may be running.

These commands are for Linux. Your particular OS may have slightly different parameters.

### How can I increase the maximum number of file descriptors?

One of the first settings that usually needs to be bumped is the maximum number of open file descriptors for a given process. For the confused out there, remember that Unices treat sockets as files.

```
$ sudo ulimit -n 2048
```

### How can I increase the maximum socket backlog?

Listening sockets have an associated queue of incoming connections that are waiting to be accepted. If you happen to have a stampede of clients that fill up this queue new connections will eventually start getting dropped.

```
$ sudo sysctl -w net.core.somaxconn="2048"
```

### How can I disable the use of `sendfile()`

Disabling the use `sendfile()` can be done by using the `--no-sendfile` setting or by setting the environment variable `SENDFILE` to 0.

## 2.10.5 Troubleshooting

### How do I fix Django reporting an `ImproperlyConfigured` error?

With asynchronous workers, creating URLs with the `reverse` function of `django.core.urlresolvers` may fail. Use `reverse_lazy` instead.

### How do I avoid Gunicorn excessively blocking in `os.fchmod`?

The current heartbeat system involves calling `os.fchmod` on temporary file handlers and may block a worker for arbitrary time if the directory is on a disk-backed filesystem. For example, by default `/tmp` is not mounted as `tmpfs` in Ubuntu; in AWS an EBS root instance volume may sometimes hang for half a minute and during this time Gunicorn workers may completely block in `os.fchmod`. `os.fchmod` may introduce extra delays if the disk gets full. Also Gunicorn may refuse to start if it can't create the files when the disk is full.

Currently to avoid these problems you can create a `tmpfs` mount (for a new directory or for `/tmp`) and pass its path to `--worker-tmp-dir`. First, check whether your `/tmp` is disk-backed or RAM-backed:

```
$ df /tmp
Filesystem      1K-blocks    Used Available Use% Mounted on
/dev/xvda1             ...      ...      ...    ... /
```

No luck. Let's create a new `tmpfs` mount:

```
sudo cp /etc/fstab /etc/fstab.orig
sudo mkdir /mem
echo 'tmpfs          /mem tmpfs defaults,size=64m,mode=1777,noatime,comment=for-gunicorn_
↪0 0' | sudo tee -a /etc/fstab
sudo mount /mem
```

Check the result:

```
$ df /mem
Filesystem      1K-blocks  Used Available Use% Mounted on
tmpfs           65536      0     65536    0% /mem
```

Now you can set `--worker-tmp-dir /mem`.

## 2.11 Community

Use these channels to communicate about the project.

### 2.11.1 Project Management & Discussions

Gunicorn uses [GitHub](#) for the project management. GitHub issues are used for 3 different purposes:

- [Bug tracker](#) : to check latest bug
- [Forum](#) : Stackoverflow-style questions about Gunicorn usage
- [Mailing list](#) : Discussion of Gunicorn development, new features and project management.

Project maintenance guidelines are available on the [wiki](#) .

### 2.11.2 IRC

The Gunicorn channel is on the [Freenode](#) IRC network. You can chat with other on [#gunicorn](#) channel.

### 2.11.3 Issue Tracking

Bug reports, enhancement requests and tasks generally go in the [Github issue tracker](#).

### 2.11.4 Security Issues

The security mailing list is a place to report security issues. Only developers are subscribed to it. To post a message to the list use the address to [security@gunicorn.org](mailto:security@gunicorn.org) .

## 2.12 Changelog

### 2.12.1 19.9.10 / 2019/11/23

- unblock select loop during reload of a sync worker
- security fix: http desync attack
- handle `wsgi.input_terminated`
- added support for str and bytes in unix socket addresses
- fixed `max_requests` setting
- headers values are now encoded as LATN1, not ASCII
- fixed `InotifyReloader`: handle `module.__file__` is None



- fixed compatibility with tornado 6
- fixed root logging
- Prevent removal of unix sockets from *reuse\_port*
- Clear tornado ioloop before `os.fork`
- Miscellaneous fixes and improvement for linting using Pylints

## 2.12.2 History

### Changelog - 2018

---

**Note:** Please see [Changelog](#) for the latest changes

---

#### 19.9.0 / 2018/07/03

- fix: address a regression that prevented syslog support from working ([issue 1668](#), [pull request 1773](#))
- fix: correctly set *REMOTE\_ADDR* on versions of Python 3 affected by [Python Issue 30205](#) ([issue 1755](#), [pull request 1796](#))
- fix: show zero response length correctly in access log ([pull request 1787](#))
- fix: prevent raising `AttributeError` when `--reload` is not passed in case of a `SyntaxError` raised from the WSGI application. ([issue 1805](#), [pull request 1806](#))
- The internal module `gunicorn.workers.async` was renamed to `gunicorn.workers.base_async` since `async` is now a reserved word in Python 3.7. ([pull request 1527](#))

#### 19.8.1 / 2018/04/30

- fix: secure scheme headers when bound to a unix socket ([issue 1766](#), [pull request 1767](#))

#### 19.8.0 / 2018/04/28

- Eventlet 0.21.0 support ([issue 1584](#))
- Tornado 5 support ([issue 1728](#), [pull request 1752](#))
- support watching additional files with `--reload-extra-file` ([pull request 1527](#))
- support configuring logging with a dictionary with `--logging-config-dict` ([issue 1087](#), [pull request 1110](#), [pull request 1602](#))
- add support for the `--config` flag in the `GUNICORN_CMD_ARGS` environment variable ([issue 1576](#), [pull request 1581](#))
- disable `SO_REUSEPORT` by default and add the `--reuse-port` setting ([issue 1553](#), [issue 1603](#), [pull request 1669](#))
- fix: installing *inotify* on MacOS no longer breaks the reloader ([issue 1540](#), [pull request 1541](#))
- fix: do not throw `TypeError` when `SO_REUSEPORT` is not available ([issue 1501](#), [pull request 1491](#))

- fix: properly decode HTTP paths containing certain non-ASCII characters ([issue 1577](#), [pull request 1578](#))
- fix: remove whitespace when logging header values under gevent ([pull request 1607](#))
- fix: close unlinked temporary files ([issue 1327](#), [pull request 1428](#))
- fix: parse `--umask=0` correctly ([issue 1622](#), [pull request 1632](#))
- fix: allow loading applications using relative file paths ([issue 1349](#), [pull request 1481](#))
- fix: force blocking mode on the gevent sockets ([issue 880](#), [pull request 1616](#))
- fix: preserve leading / in request path ([issue 1512](#), [pull request 1511](#))
- fix: forbid contradictory secure scheme headers
- fix: handle malformed basic authentication headers in access log ([issue 1683](#), [pull request 1684](#))
- fix: defer handling of USR1 signal to a new greenlet under gevent ([issue 1645](#), [pull request 1651](#))
- fix: the threaded worker would sometimes close the wrong keep-alive connection under Python 2 ([issue 1698](#), [pull request 1699](#))
- fix: re-open log files on USR1 signal using `handler._open` to support subclasses of `FileHandler` ([issue 1739](#), [pull request 1742](#))
- deprecation: the `gaiohttp` worker is deprecated, see the [worker\\_class](#) documentation for more information ([issue 1338](#), [pull request 1418](#), [pull request 1569](#))

## Changelog - 2017

---

**Note:** Please see [Changelog](#) for the latest changes

---

### 19.7.1 / 2017/03/21

- fix: continue if `SO_REUSEPORT` seems to be available but fails ([issue 1480](#))
- fix: support non-decimal values for the `umask` command line option ([issue 1325](#))

### 19.7.0 / 2017/03/01

- The previously deprecated `gunicorn_django` command has been removed. Use the [gunicorn](#) command-line interface instead.
- The previously deprecated `django_settings` setting has been removed. Use the `raw_env` setting instead.
- The default value of `ssl_version` has been changed from `ssl.PROTOCOL_TLSv1` to `ssl.PROTOCOL_SSLv23`.
- fix: initialize the group access list when `initgroups` is set ([issue 1297](#))
- add environment variables to gunicorn access log format ([issue 1291](#))
- add `-paste-global-conf` option ([issue 1304](#))
- fix: print access logs to STDOUT ([issue 1184](#))
- remove upper limit on max header size config ([issue 1313](#))
- fix: print original exception on `AppImportError` ([issue 1334](#))

- use `SO_REUSEPORT` if available ([issue 1344](#))
- [fix leak](#) of duplicate file descriptor for bound sockets.
- add `--reload-engine` option, support inotify and other backends ([issue 1368](#), [issue 1459](#))
- [fix](#): reject request with invalid HTTP versions
- add `child_exit` callback ([issue 1394](#))
- add support for eventlets `_AlreadyHandled` object ([issue 1406](#))
- format boot tracebacks properly with reloader ([issue 1408](#))
- refactor socket activation and fd inheritance for better support of SystemD ([issue 1310](#))
- [fix](#): o fds are given by default in gunicorn ([issue 1423](#))
- add ability to pass settings to `GUNICORN_CMD_ARGS` environment variable which helps in container world ([issue 1385](#))
- [fix](#): catch access denied to pid file ([issue 1091](#))
- many additions and improvements to the documentation

## Breaking Change

- **Python 2.6.0** is the last supported version

## Changelog - 2016

---

**Note:** Please see *Changelog* for the latest changes

---

### 19.6.0 / 2016/05/21

#### Core & Logging

- improvement of the binary upgrade behaviour using `USR2`: remove file locking ([issue 1270](#))
- add the `--capture-output` setting to capture stdout/stderr tot the log file ([issue 1271](#))
- Allow disabling `sendfile()` via the `SENDFILE` environment variable ([issue 1252](#))
- [fix](#) reload under pycharm ([issue 1129](#))

#### Workers

- [fix](#): make sure to remove the signal from the worker pipe ([issue 1269](#))
- [fix](#): **gthread** worker, handle removed socket in the select loop ([issue 1258](#))

## 19.5.0 / 2016/05/10

### Core

- fix: Ensure response to HEAD request won't have message body
- fix: lock domain socket and remove on last arbiter exit ([issue 1220](#))
- improvement: use `EnvironmentError` instead of `socket.error` ([issue 939](#))
- add: new `FORWARDED_ALLOW_IPS` environment variable ([issue 1205](#))
- fix: infinite recursion when destroying sockets ([issue 1219](#))
- fix: close sockets on shutdown ([issue 922](#))
- fix: clean up `sys.exc_info` calls to drop circular refs ([issue 1228](#))
- fix: do `post_worker_init` after `load_wsgi` ([issue 1248](#))

### Workers

- fix access logging in `gaiohttp` worker ([issue 1193](#))
- `eventlet`: handle `QUIT` in a new coroutine ([issue 1217](#))
- `gevent`: remove obsolete exception clauses in `run` ([issue 1218](#))
- `tornado`: fix extra “Server” response header ([issue 1246](#))
- fix: unblock the wait loop under python 3.5 in sync worker ([issue 1256](#))

### Logging

- fix: log message for listener reloading ([issue 1181](#))
- Let logging module handle traceback printing ([issue 1201](#))
- improvement: Allow configuring `logger_class` with `statsd_host` ([issue 1188](#))
- fix: traceback formatting ([issue 1235](#))
- fix: print error logs on `stderr` and access logs on `stdout` ([issue 1184](#))

### Documentation

- Simplify installation instructions in `gunicorn.org` ([issue 1072](#))
- Fix URL and default worker type in `example_config` ([issue 1209](#))
- update `django` doc url to 1.8 lts ([issue 1213](#))
- fix: miscellaneous wording corrections ([issue 1216](#))
- Add PSF License Agreement of `selectors.py` to NOTICE (:issue: 1226)
- document LOGGING overriding ([issue 1051](#))
- put a note that error logs are only errors from Gunicorn ([issue 1124](#))
- add a note about the requirements of the threads workers under python 2.x ([issue 1200](#))

- add access\_log\_format to config example ([issue 1251](#))

## Tests

- Use more `pytest.raises()` in `test_http.py`

### 19.4.5 / 2016/01/05

- fix: `NameError` `fileno` in `gunicorn.http.wsgi` ([issue 1178](#))

### 19.4.4 / 2016/01/04

- fix: check if a `fileobject` can be used with `sendfile(2)` ([issue 1174](#))
- doc: be more descriptive in `errorlog` option ([issue 1173](#))

## Changelog - 2015

---

**Note:** Please see *Changelog* for the latest changes.

---

### 19.4.3 / 2015/12/30

- fix: don't check if a file is writable using `os.stat` with SELINUX ([issue 1171](#))

### 19.4.2 / 2015/12/29

## Core

- improvement: handle `HaltServer` in `manage_workers` ([issue 1095](#))
- fix: Do not rely on `sendfile` sending requested count ([issue 1155](#))
- fix: clarify `-no-sendfile` default ([issue 1156](#))
- fix: `LoggingCatch` `sendfile` failure from no file descriptor ([issue 1160](#))

## Logging

- fix: Always send access log to syslog if syslog is on
- fix: check auth before trying to own a file ([issue 1157](#))

## Documentation

- fix: Fix Slowloris broken link. ([issue 1142](#))
- Tweak markup in `faq.rst`

## Testing

- fix: gaiohttp test ([issue 1164](#))

### 19.4.1 / 2015/11/25

- fix tornado worker ([issue 1154](#))

### 19.4.0 / 2015/11/20

## Core

- fix: make sure that a user is able to access to the logs after dropping a privilege ([issue 1116](#))
- improvement: inherit the *Exception* class where it needs to be ([issue 997](#))
- fix: make sure headers are always encoded as latin1 RFC 2616 ([issue 1102](#))
- improvement: reduce arbiter noise ([issue 1078](#))
- fix: don't close the unix socket when the worker exit ([issue 1088](#))
- improvement: Make last logged worker count an explicit instance var ([issue 1078](#))
- improvement: prefix config file with its type ([issue 836](#))
- improvement: pidfile handing ([issue 1042](#))
- fix: catch OSError as well as ValueError on race condition ([issue 1052](#))
- improve support of ipv6 by backporting urlparse.urlsplit from Python 2.7 to Python 2.6.
- fix: raise InvalidRequestLine when the line contains malicious data ([issue 1023](#))
- fix: fix argument to disable sendfile
- fix: add gthread to the list of supported workers ([issue 1011](#))
- improvement: retry socket binding up to five times upon EADDRNOTAVAIL ([issue 1004](#))
- **breaking change**: only honor headers that can be encoded in ascii to comply to the RFC 7230 (See [issue 1151](#)).

## Logging

- add new parameters to access log ([issue 1132](#))
- fix: make sure that files handles are correctly reopened on HUP ([issue 627](#))
- include request URL in error message ([issue 1071](#))
- get username in access logs ([issue 1069](#))
- fix statsd logging support on Python 3 ([issue 1010](#))

## Testing

- use last version of mock.
- many fixes in Travis CI support
- miscellaneous improvements in tests

## Thread worker

- fix: Fix self.nr usage in ThreadedWorker so that auto restart works as expected ([issue 1031](#))

## Gevent worker

- fix quit signal handling ([issue 1128](#))
- add support for Python 3 ([issue 1066](#))
- fix: make graceful shutdown thread-safe ([issue 1032](#))

## Tornado worker

- fix ssl options ([issue 1146](#), [issue 1135](#))
- don't check timeout when stopping gracefully ([issue 1106](#))

## AIOHttp worker

- add SSL support ([issue 1105](#))

## Documentation

- fix link to proc name setting ([issue 1144](#))
- fix worker class documentation ([issue 1141](#), [issue 1104](#))
- clarify graceful timeout documentation ([issue 1137](#))
- don't duplicate NGINX config files examples ([issue 1050](#), [issue 1048](#))
- add *web.py* framework example ([issue 1117](#))
- update Debian/Ubuntu installations instructions ([issue 1112](#))
- clarify *pythonpath* setting description ([issue 1080](#))
- tweak some example for python3
- clarify *sendfile* documentation
- miscellaneous typos in source code comments (thanks!)
- clarify why REMOTE\_ADD may not be the user's IP address ([issue 1037](#))

## Misc

- fix: reloader should survive `SyntaxError` ([issue 994](#))
- fix: expose the reloader class to the worker.

## 19.3.0 / 2015/03/06

### Core

- fix: [issue 978](#) make sure a listener is inheritable
- add `check_config` class method to workers
- fix: [issue 983](#) fix select timeout in sync worker with multiple connections
- allows workers to access to the reloader. close [issue 984](#)
- raise `TypeError` instead of `AssertionError`

### Logging

- make `Logger.loglevel` a class attribute

### Documentation

- fix: [issue 988](#) fix syntax errors in `examples/gunicorn_rc`

## 19.2.1 / 2015/02/4

### Logging

- expose `loglevel` in the `Logger` class

### AsyncIO worker (gaiohttp)

- fix [issue 977](#) fix initial crash

### Documentation

- document security mailing-list in the contributing page.

## 19.2 / 2015/01/30

### Core

- optimize the sync workers when listening on a single interface
- add `--sendfile` settings to enable/disable sendfile. fix [issue 856](#) .



- add the selectors module to the code base. [issue 886](#)
- add `--max-requests-jitter` setting to set the maximum jitter to add to the max-requests setting.
- fix [issue 899](#) propagate proxy\_protocol\_info to keep-alive requests
- fix [issue 863](#) worker timeout: dynamic timeout has been removed
- fix: Avoid world writable file

## Logging

- fix [issue 941](#) set logconfig default to paster more trivially
- add statsd-prefix config setting: set the prefix to use when emitting statsd metrics
- [issue 832](#) log to console by default

## Thread Worker

- fix [issue 908](#) make sure the worker can continue to accept requests

## Eventlet Worker

- fix [issue 867](#) Fix eventlet shutdown to actively shut down the workers.

## Documentation

Many improvements and fixes have been done, see the detailed changelog for more information.

## Changelog - 2014

---

**Note:** Please see [Changelog](#) for the latest changes.

---

### 19.1.1 / 2014-08-16

## Changes

### Core

- fix [issue 835](#): display correct pid of already running instance
- fix [pull request 833](#): fix *PyTest* class in setup.py.

## Logging

- fix [issue 838](#): statsd logger, send statsd timing metrics in milliseconds
- fix [issue 839](#): statsd logger, allows for empty log message while pushing metrics and restore worker number in DEBUG logs
- fix [issue 850](#): add timezone to logging
- fix [issue 853](#): Respect logger\_class setting unless statsd is on

## AioHttp worker

- fix [issue 830](#) make sure gaiohttp worker is shipped with gunicorn.

## 19.1 / 2014-07-26

## Changes

### Core

- fix [issue 785](#): handle binary type address given to a client socket address
- fix graceful shutdown. make sure QUIT and TERMS signals are switched everywhere.
- [issue 799](#): fix support loading config from module
- [issue 805](#): fix check for file-like objects
- fix [issue 815](#): args validation in WSGIApplication.init
- fix [issue 787](#): check if we load a pyc file or not.

### Tornado worker

- fix [issue 771](#): support tornado 4.0
- fix [issue 783](#): x\_headers error. The x-forwarded-headers option has been removed in [c4873681299212d6082cd9902740eef18c2f14f1](#). The discussion is available on [pull request 633](#).

### AioHttp worker

- fix: fetch all body in input. fix [issue 803](#)
- fix: don't install the worker if python < 3.3
- fix [issue 822](#): Support UNIX sockets in gaiohttp worker

### Async worker

- fix [issue 790](#): StopIteration shouldn't be caught at this level.

## Logging

- add statsd logging handler fix [issue 748](#)

## Paster

- fix [issue 809](#): Set global logging configuration from a Paste config.

## Extra

- fix RuntimeError in gunicorn.reloader ([issue 807](#))

## Documentation

- update faq: put a note on how [watch logs in the console](#) since many people asked for it.

## 19.0 / 2014-06-12

Gunicorn 19.0 is a major release with new features and fixes. This version improve a lot the usage of Gunicorn with python 3 by adding [two new workers](#) to it: *gthread* a fully threaded async worker using futures and *gaiohttp* a worker using asyncio.

## Breaking Changes

### Switch QUIT and TERM signals

With this change, when gunicorn receives a QUIT all the workers are killed immediately and exit and TERM is used for the graceful shutdown.

Note: the old behaviour was based on the NGINX but the new one is more correct according the following doc:

[https://www.gnu.org/software/libc/manual/html\\_node/Termination-Signals.html](https://www.gnu.org/software/libc/manual/html_node/Termination-Signals.html)

also it is complying with the way the signals are sent by heroku:

<https://devcenter.heroku.com/articles/python-faq#what-constraints-exist-when-developing-applications-on-heroku>

## Deprecations

*run\_gunicorn*, *gunicorn\_django* and *gunicorn\_paster* are now completely deprecated and will be removed in the next release. Use the *gunicorn* command instead.

## Changes

### core

- add aiohttp worker named *gaiohttp* using asyncio. Full async worker on python 3.
- fix HTTP-violating excess whitespace in *write\_error* output

- fix: try to log what happened in the worker after a timeout, add a *worker\_abort* hook on SIGABRT signal.
- fix: save listener socket name in workers so we can handle buffered keep-alive requests after the listener has closed.
- add on\_exit hook called just before exiting gunicorn.
- add support for python 3.4
- fix: do not swallow unexpected errors when reaping
- fix: remove incompatible SSL option with python 2.6
- add new async gthread worker and *-threads* options allows to set multiple threads to listen on connection
- deprecate *gunicorn\_django* and *gunicorn\_paster*
- switch QUIT and TERM signal
- reap workers in SIGCHLD handler
- add universal wheel support
- use *email.utils.formatdate* in gunicorn.util.http\_date
- deprecate the *-debug* option
- fix: log exceptions that occur after response start ...
- allows loading of applications from .pyc files (#693)
- fix: issue #691, raw\_env config file parsing
- use a dynamic timeout to wait for the optimal time. (Reduce power usage)
- fix python3 support when notifying the arbiter
- add: honor \$WEB\_CONCURRENCY environment variable. Useful for heroku setups.
- add: include tz offset in access log
- add: include access logs in the syslog handler.
- add *-reload* option for code reloading
- add the capability to load *gunicorn.base.Application* without the loading of the arguments of the command line. It allows you to *embed gunicorn in your own application*.
- improve: set wsgi.multithread to True for async workers
- fix logging: make sure to redirect wsgi.errors when needed
- add: syslog logging can now be done to a unix socket
- fix logging: don't try to redirect stdout/stderr to the logfile.
- fix logging: don't propagate log
- improve logging: file option can be overridden by the gunicorn options *-error-logfile* and *-access-logfile* if they are given.
- fix: don't override SERVER\_\* by the Host header
- fix: handle\_error
- add more option to configure SSL
- fix: sendfile with SSL
- add: worker\_int callback (to react on SIGTERM)

- fix: don't depend on entry point for internal classes, now absolute modules path can be given.
- fix: Error messages are now encoded in latin1
- fix: request line length check
- improvement: proxy\_allow\_ips: Allow proxy protocol if "\*" specified
- fix: run worker's *setup* method before setting num\_workers
- fix: FileWrapper inherit from *object* now
- fix: Error messages are now encoded in latin1
- fix: don't spam the console on SIGWINCH.
- fix: logging -don't stringify T and D logging atoms (#621)
- add support for the latest django version
- deprecate *run\_gunicorn* django option
- fix: sys imported twice

### gevent worker

- fix: make sure to stop all listeners
- fix: monkey patching is now done in the worker
- fix: "global name 'hub' is not defined"
- fix: reinit *hub* on old versions of gevent
- support gevent 1.0
- fix: add subprocess in monkey patching
- fix: add support for multiple listener

### eventlet worker

- fix: merge duplicate EventletWorker.init\_process method (fixes #657)
- fix: missing errno import for eventlet sendfile patch
- fix: add support for multiple listener

### tornado worker

- add graceful stop support

## Changelog - 2013

### 18.0 / 2013-08-26

- new: add *-e/--env* command line argument to pass an environment variables to gunicorn
- new: add *--chdir* command line argument to specified directory before apps loading. - new: add *wsgi.file\_wrapper* support in async workers

- new: add `--paste` command line argument to set the paster config file
- deprecated: the command `gunicorn_django` is now deprecated. You should now run your application with the WSGI interface installed with your project (see <https://docs.djangoproject.com/en/1.4/howto/deployment/wsgi/gunicorn/>) for more infos.
- deprecated: the command `gunicorn_paste` is deprecated. You now should use the new `--paste` argument to set the configuration file of your paster application.
- fix: Removes unmatched leading quote from the beginning of the default access log format string
- fix: null timeout
- fix: gevent worker
- fix: don't reload the paster app when using pserve
- fix: after closing for error do not keep alive the connection
- fix: responses 1xx, 204 and 304 should not force the connection to be closed

### 17.5 / 2013-07-03

- new: add signals documentation
- new: add `post_worker_init` hook for workers
- new: try to use `gunicorn.conf.py` in current folder as the default config file.
- fix graceful timeout with the Eventlet worker
- fix: don't raise an error when closing the socket if already closed
- fix: fix `--settings` parameter for django application and try to find the django settings when using the `gunicorn` command.
- fix: give the initial `global_conf` to paster application
- fix: fix 'Expect: 100-continue' support on Python 3

### New versionning:

With this release, the versionning of Gunicorn is changing. Gunicorn is stable since a long time and there is no point to release a "1.0" now. It should have been done since a long time. 0.17 really meant it was the 17th stable version. From the beginning we have only 2 kind of releases:

major release: releases with major changes or huge features added  
services releases: fixes and minor features added  
So from now we will apply the following versionning `<major>.<service>`. For example 17.5 is a service release.

### 0.17.4 / 2013-04-24

- fix unix socket address parsing

### 0.17.3 / 2013-04-23

- add systemd sockets support
- add `python -m gunicorn.app.wsgiapp` support

- improve logger class inheritance
- exit when the config file isn't found
- add the -R option to enable stdio inheritance in daemon mode
- don't close file descriptors > 3 in daemon mode
- improve STDOUT/STDERR logging
- fix pythonpath option
- fix pidfile creation on Python 3
- fix gevent worker exit
- fix ipv6 detection when the platform isn't supporting it

### **0.17.2 / 2013-01-07**

- optimize readline
- make imports errors more visible when loading an app or a logging class
- fix tornado worker: don't pass ssl options if there are none
- fix PEP3333: accept only bytetrings in the response body
- fix support on CYGWIN platforms

### **0.17.1 / 2013-01-05**

- add syslog facility name setting
- fix `--version` command line argument
- fix wsgi url\_scheme for https

## **Changelog - 2012**

### **0.17.0 / 2012-12-25**

- allows gunicorn to bind to multiple address
- add SSL support
- add syslog support
- add `nworkers_changed` hook
- add `response` arg for `post_request` hook
- parse command line with `argparse` (replace deprecated `optparse`)
- fix PWD detection in `arbiter`
- miscellaneous PEP8 fixes

### 0.16.1 / 2012-11-19

- Fix packaging

### 0.16.0 / 2012-11-19

- **Added support for Python 3.2 & 3.3**
- Expose `--pythonpath` command to all gunicorn commands
- Honor `$PORT` environment variable, useful for deployment on heroku
- Removed support for Python 2.5
- Make sure we reopen the logs on the console
- Fix django settings module detection from path
- Reverted timeout for client socket. Fix issue on blocking issues.
- Fixed gevent worker

### 0.15.0 / 2012-10-18

- new documentation site on <http://docs.gunicorn.org>
- new website on <http://gunicorn.org>
- add **haproxy PROXY** protocol support
- add `ForwardedAllowIPS` option: allows to filter Front-end's IPs allowed to handle `X-Forwarded-*` headers.
- add callable hooks for paster config
- add `x-forwarded-proto` as secure scheme default (Heroku is using this)
- allows gunicorn to load a pre-compiled application
- support file reopening & reexec for all loggers
- initialize the logging config file with defaults.
- set timeout for client socket (slow client DoS).
- `NoMoreData`, `ChunkMissingTerminator`, `InvalidChunkSize` are now `IOError` exceptions
- fix graceful shutdown in gevent
- fix limit request line check

### 0.14.6 / 2012-07-26

- fix gevent & subprocesses
- fix request line length check
- fix `keepalive = 0`
- fix tornado worker



#### 0.14.5 / 2012-06-24

- fix logging during daemonisation

#### 0.14.4 / 2012-06-24

- new `--graceful-timeout` option
- fix multiple issues with request limit
- more fixes in django settings resolutions
- fix `gevent.core` import
- fix `keepalive=0` in eventlet worker
- fix `handle_error` display with the unix worker
- fix `tornado.wsgi.WSGIApplication` calling error
- **breaking change**: take the control on graceful reload back. `graceful` can't be overrided anymore using the `on_reload` function.

#### 0.14.3 / 2012-05-15

- improvement: performance of `http.body.Body.readline()`
- improvement: log HTTP errors in access log like Apache
- improvement: display traceback when the worker fails to boot
- improvement: makes gunicorn work with gevent 1.0
- examples: websocket example now supports hybi13
- fix: reopen log files after initialization
- fix: websockets support
- fix: django1.4 support
- fix: only load the paster application 1 time

#### 0.14.2 / 2012-03-16

- add `validate_class` validator: allows to use a class or a method to initialize the app during in-code configuration
- add support for `max_requests` in tornado worker
- add support for disabling `x_forwarded_for_header` in tornado worker
- `gevent_wsgi` is now an alias of `gevent_pywsgi`
- Fix `gevent_pywsgi` worker

#### 0.14.1 / 2012-03-02

- fixing source archive, reducing its size

### 0.14.0 / 2012-02-27

- check if Request line is too large: You can now pass the parameter `--limit-request-line` or set the `limit_request_line` in your configuration file to set the max size of the request line in bytes.
- limit the number of headers fields and their size. Add `--limit-request-field` and `limit-request-field-size` settings
- add `p` variable to the log access format to log pidfile
- add `{HeaderName}o` variable to the log access format to log the response header `HeaderName`
- request header is now logged with the variable `{HeaderName}i` in the access log file
- improve error logging
- support `logging.configFile`
- support django 1.4 in both `gunicorn_django` & `run_gunicorn` command
- improve reload in `django run_gunicorn` command (should just work now)
- allows people to set the `X-Forwarded-For` header key and disable it by setting an empty string.
- fix support of Tornado
- many other fixes.

### Changelog - 2011

#### 0.13.4 / 2011-09-23

- fix `util.closerange` function used to prevent leaking fds on python 2.5 (typo)

#### 0.13.3 / 2011-09-19

- refactor `gevent` worker
- prevent leaking fds on `reexec`
- fix inverted `request_time` computation

#### 0.13.2 / 2011-09-17

- Add support for Tornado 2.0 in `tornado` worker
- Improve access logs: allows customisation of the log format & add request time
- `Logger` module is now pluggable
- Improve graceful shutdown in Python versions `>= 2.6`
- Fix `post_request` root arity for compatibility
- Fix `sendfile` support
- Fix Django reloading

### 0.13.1 / 2011-08-22

- Fix unix socket. log argument was missing.

### 0.13.0 / 2011-08-22

- Improve logging: allows file-reopening and add access log file compatible with the [apache combined log format](#)
- Add the possibility to set custom SSL headers. X-Forwarded-Protocol and X-Forwarded-SSL are still the default
- New *on\_reload* hook to customize how gunicorn spawn new workers on SIGHUP
- Handle projects with relative path in `django_gunicorn` command
- Preserve path parameters in `PATH_INFO`
- `post_request` hook now accepts the `environ` as argument.
- When stopping the arbiter, close the listener asap.
- Fix Django command *run\_gunicorn* in settings reloading
- Fix [Tornado](#) worker exiting
- Fix the use of `sendfile` in `wsgi.file_wrapper`

### 0.12.2 / 2011-05-18

- Add `wsgi.file_wrapper` optimised for FreeBSD, Linux & MacOSX (use `sendfile` if available)
- Fix `django run_gunicorn` command. Make sure we reload the application code.
- Fix `django` localisation
- Compatible with `gevent 0.14dev`

### 0.12.1 / 2011-03-23

- Add “`on_starting`” hook. This hook can be used to set anything before the arbiter really start
- Support `bdist_rpm` in `setup`
- Improve content-length handling (pep 3333)
- Improve Django support
- Fix daemonizing (#142)
- Fix `ipv6` handling

## Changelog - 2010

### 0.12.0 / 2010-12-22

- Add support for logging configuration using a ini file. It uses the standard Python logging’s module `Configuration` file format and allows anyone to use his custom file handler
- Add `IPV6` support

- Add multidomain application example
- Improve gunicorn\_django command when importing settings module using DJANGO\_SETTINGS\_MODULE environment variable
- Send appropriate error status on http parsing
- Fix pidfile, set permissions so other user can read it and use it.
- Fix temporary file leaking
- Fix setpgrp issue, can now be launched via ubuntu upstart
- Set the number of workers to zero on WINCH

### 0.11.2 / 2010-10-30

- Add SERVER\_SOFTWARE to the os.environ
- Add support for django settings environment variable
- Add support for logging configuration in Paster ini-files
- Improve arbiter notification in asynchronous workers
- Display the right error when a worker can't be used
- Fix Django support
- Fix HUP with Paster applications
- Fix readline in wsgi.input

### 0.11.1 / 2010-09-02

- Implement max-requests feature to prevent memory leaks.
- Added 'worker\_exit' server hook.
- Reseed the random number generator after fork().
- Improve Eventlet worker.
- Fix Django command *run\_gunicorn*.
- Fix the default proc name internal setting.
- Workaround to prevent Gevent worker to segfault on MacOSX.

### 0.11.0 / 2010-08-12

- Improve dramatically performances of Gevent and Eventlet workers
- Optimize HTTP parsing
- Drop Server and Date headers in start\_response when provided.
- Fix latency issue in async workers

### 0.10.1 / 2010-08-06

- Improve gevent's workers. Add "egg:gunicorn#gevent\_wsgi" worker using [gevent.wsgi](#) and "egg:gunicorn#gevent\_pywsgi" worker using [gevent.pywsgi](#). "egg:gunicorn#gevent" using our own HTTP parser is still here and is **recommended** for normal uses. Use the "gevent.wsgi" parser if you need really fast connections and don't need streaming, keepalive or ssl.
- Add pre/post request hooks
- Exit more quietly
- Fix gevent dns issue

### 0.10.0 / 2010-07-08

- New HTTP parser.
- New HUP behaviour. Re-reads the configuration and then reloads all worker processes without changing the master process id. Helpful for code reloading and monitoring applications like supervisord and runit.
- Added a preload configuration parameter. By default, application code is now loaded after a worker forks. This couple with the new HUP handling can be used for dev servers to do hot code reloading. Using the preload flag can help a bit in small memory VM's.
- Allow people to pass command line arguments to WSGI applications. See: [examples/alt\\_spec.py](#)
- Added an example gevent reloader configuration: [examples/example\\_gevent\\_reloader.py](#).
- New gevent worker "egg:gunicorn#gevent2", working with gevent.wsgi.
- Internal refactoring and various bug fixes.
- New documentation website.

### 0.9.1 / 2010-05-26

- Support https via X-Forwarded-Protocol or X-Forwarded-Ssl headers
- Fix configuration
- Remove -d options which was used instead of -D for daemon.
- Fix umask in unix socket

### 0.9.0 / 2010-05-24

- Added *when\_ready* hook. Called just after the server is started
- Added *preload* setting. Load application code before the worker processes are forked.
- Refactored Config
- Fix pidfile
- Fix QUIT/HUP in async workers
- Fix reexec
- Documentation improvements

### 0.8.1 / 2010-04-29

- Fix builtins import in config
- Fix installation with pip
- Fix Tornado WSGI support
- Delay application loading until after processing all configuration

### 0.8.0 / 2010-04-22

- Refactored Worker management for better async support. Now use the -k option to set the type of request processing to use
- Added support for [Tornado](#)

### 0.7.2 / 2010-04-15

- Added -spew option to help debugging (installs a system trace hook)
- Some fixes in async arbiters
- Fix a bug in start\_response on error

### 0.7.1 / 2010-04-01

- Fix bug when responses have no body.

### 0.7.0 / 2010-03-26

- Added support for [Eventlet](#) and [Gevent](#) based workers.
- Added [Websockets](#) support
- Fix Chunked Encoding
- Fix SIGWINCH on [OpenBSD](#)
- Fix [PEP 333](#) compliance for the write callable.

### 0.6.5 / 2010-03-11

- Fix pidfile handling
- Fix Exception Error

### 0.6.4 / 2010-03-08

- Use cStringIO for performance when possible.
- Fix worker freeze when a remote connection closes unexpectedly.

### 0.6.3 / 2010-03-07

- Make HTTP parsing faster.
- Various bug fixes

### 0.6.2 / 2010-03-01

- Added support for chunked response.
- Added `proc_name` option to the config file.
- Improved the HTTP parser. It now uses buffers instead of strings to store temporary data.
- Improved performance when sending responses.
- Workers are now murdered by age (the oldest is killed first).

### 0.6.1 / 2010-02-24

- Added gunicorn config file support for Django admin command
- Fix gunicorn config file. `-c` was broken.
- Removed TTIN/TTOU from workers which blocked other signals.

### 0.6.0 / 2010-02-22

- Added `setproctitle` support
- Change privilege switch behavior. We now work like NGINX, master keeps the permissions, new uid/gid permissions are only set for workers.

### 0.5.1 / 2010-02-22

- Fix `umask`
- Added Debian packaging

### 0.5.0 / 2010-02-20

- Added `configuration file` handler.
- Added support for pre/post fork hooks
- Added support for `before_exec` hook
- Added support for unix sockets
- Added launch of workers processes under different user/group
- Added `umask` option
- Added `SCRIPT_NAME` support
- Better support of some exotic settings for Django projects

- Better support of Paste-compatible applications
- Some refactoring to make the code easier to hack
- Allow multiple keys in request and response headers



## R

RFC

RFC 3875, 31