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# Hoverfly Documentation

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**SpectoLabs**

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Hoverfly is a lightweight, open source API simulation tool. Using Hoverfly, you can create realistic simulations of the APIs your application depends on.

- Replace slow, flaky API dependencies with realistic, re-usable simulations
- Simulate network latency, random failures or rate limits to test edge-cases
- Extend and customize with any programming language
- Export, share, edit and import API simulations
- CLI and native language bindings for [Java](#) and [Python](#)
- REST API
- Lightweight, high-performance, run anywhere
- Apache 2 license



# CHAPTER 1

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## Source

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The Hoverfly source code is available on [GitHub](#).

Hoverfly is developed and maintained by [SpectoLabs](#).





## Introduction

### Motivation

Developing and testing interdependent applications is difficult. Maybe you're working on a mobile application that needs to talk to a legacy API. Or a microservice that relies on two other services that are still in development.

The problem is the same: how do you develop and test against external dependencies which you cannot control?

You could use mocking libraries as substitutes for external dependencies. But mocks are intrusive, and do not allow you to test all the way to the architectural boundary of your application.

Stubbed services are better, but they often involve too much configuration or may not be transparent to your application.

Then there is the problem of managing test data. Often, to write proper tests, you need fine-grained control over the data in your mocks or stubs. Managing test data across large projects with multiple teams introduces bottlenecks that impact delivery times.

Integration testing “over the wire” is problematic too. When stubs or mocks are swapped out for real services (in a continuous integration environment for example) new variables are introduced. Network latency and random outages can cause integration tests to fail unexpectedly.

Hoverfly was designed to provide you with the means to create your own “dependency sandbox”: a simulated development and test environment that you control.

Hoverfly grew out of an effort to build “the smallest service virtualization tool possible”.

### Download and installation

Hoverfly comes with a command line interface called **hoverctl**. Archives containing the Hoverfly and **hoverctl** binaries are available for the major operating systems and architectures.

- MacOS 64bit
- Linux 32bit

- Linux 64bit
- Windows 32bit
- Windows 64bit

Download the correct archive, extract the binaries and place them in a directory on your PATH.

### Homebrew (MacOS)

If you have `homebrew`, you can install Hoverfly using the `brew` command.

```
brew install SpectoLabs/tap/hoverfly
```

To upgrade your existing hoverfly to the latest release:

```
brew upgrade hoverfly
```

To show which versions are installed in your machine:

```
brew list --version hoverfly
```

You can switch to a previously installed version as well:

```
brew switch hoverfly <version>
```

To remove old versions :

```
brew cleanup hoverfly
```

## Getting Started

### Note

It is recommended that you keep Hoverfly and `hoverctl` in the same directory. However if they are not in the same directory, `hoverctl` will look in the current directory for Hoverfly, then in other directories on the PATH.

Hoverfly is composed of two binaries: **Hoverfly** and **hoverctl**.

`hoverctl` is a command line tool that can be used to configure and control Hoverfly. It allows you to run Hoverfly as a daemon.

Hoverfly is the application that does the bulk of the work. It provides the proxy server or webserver, and the API endpoints.

Once you have extracted both Hoverfly and `hoverctl` into a directory on your PATH, you can run `hoverctl` and Hoverfly.

```
hoverctl version
hoverfly -version
```

Both of these commands should return a version number. Now you can run an instance of Hoverfly:

```
hoverctl start
```

Check whether Hoverfly is running with the following command:

```
hoverctl logs
```

The logs should contain the string `serving proxy`. This indicates that Hoverfly is running.

Finally, stop Hoverfly with:

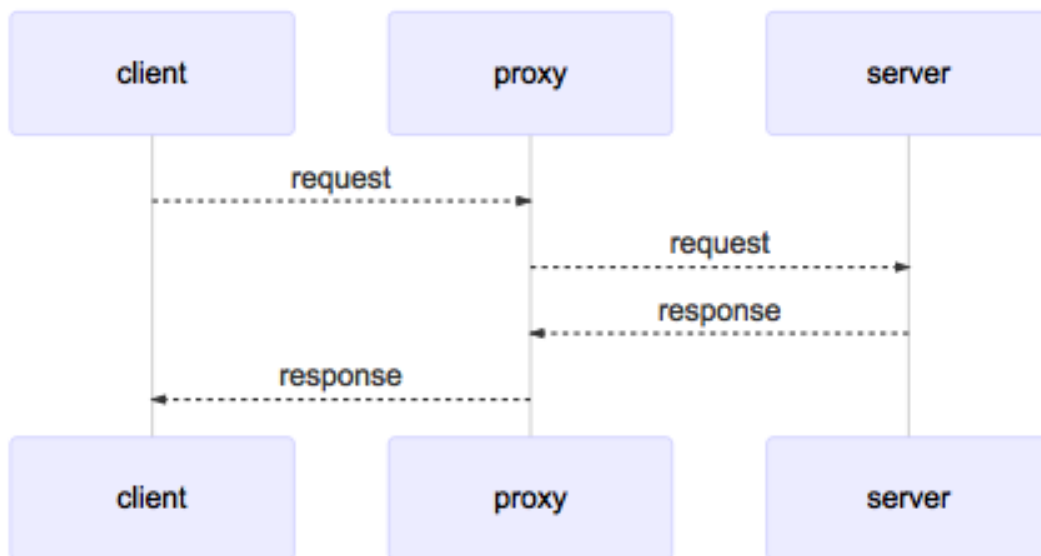
```
hoverctl stop
```

## Key Concepts

Hoverfly's functionality is quite broad. You are encouraged to take the time to understand these key concepts before jumping into the *Tutorials*.

### Hoverfly as a proxy server

A proxy server passes requests between a client and server.



It is sometimes necessary to use a proxy server to reach a network (as a security measure, for example). Because of this, all network-enabled software can be configured to use a proxy server.

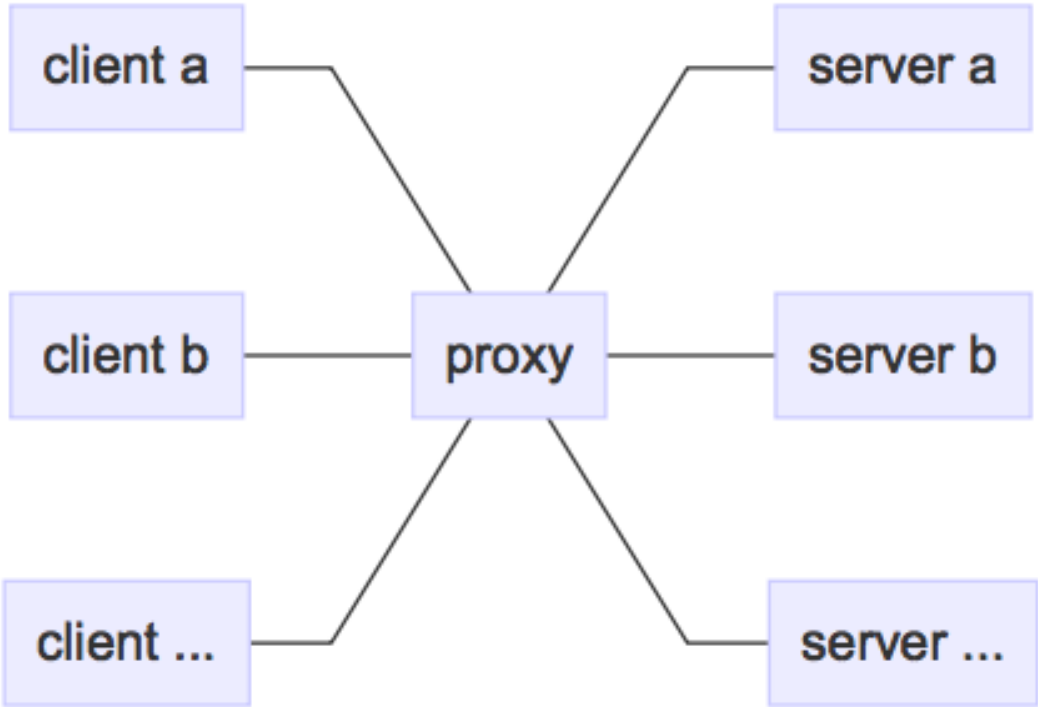
The relationship between clients and servers via a proxy server can be one-to-one, one-to-many, many-to-one, or many-to-many.

By default Hoverfly starts as a proxy server.

### Using a proxy server

Applications can usually be configured to use a proxy server by setting environment variables:

```
export HTTP_PROXY="http://proxy-address:port "  
export HTTPS_PROXY="https://proxy-address:port "
```



Launching network-enabled software within an environment containing these variables *should* make the application use the specified proxy server. The term *should* is used as not all software respects these environment variables for security reasons.

Alternatively, applications themselves can usually be configured to use a proxy. [Curl](#) can be configured to use a proxy via flags.

```
curl http://hoverfly.io --proxy http://proxy-ip:port
```

---

**Note:** The proxy configuration methods described here are intended to help you use the code examples in this documentation. The method of configuring an application or operating system to use a proxy varies depending on the environment.

- [Windows Proxy Settings Explained](#)
  - [Firefox Proxy Settings](#)
- 

## The difference between a proxy server and a webserver

A proxy server is a type of webserver. The main difference is that when a webserver receives a request from a client, it is expected to respond with whatever the intended response is (an HTML page, for example). The data it responds with is generally expected to reside on that server, or within the same network.

A proxy server is expected to pass the incoming request on to another server (the “destination”). It is also expected to set some appropriate headers along the way, such as [X-Forwarded-For](#), [X-Real-IP](#), [X-Forwarded-Proto](#) etc. Once the proxy server receives a response from the destination, it is expected to pass it back to the client.

## Hoverfly as a webserver

Sometimes you may not be able to configure your client to use a proxy, or you may want to explicitly point your application at Hoverfly. For this reason, Hoverfly can run as a webserver.

---

**Note:** When running as a webserver, Hoverfly cannot capture traffic (see [Capture mode](#)) - it can only be used to simulate and synthesize APIs (see [Simulate mode](#), [Modify mode](#) and [Synthesize mode](#)). For this reason, when you use Hoverfly as a webserver, you should have Hoverfly simulations ready to be loaded.

---

When running as a webserver, Hoverfly strips the domain from the endpoint URL. For example, if you made requests to the following URL while capturing traffic with Hoverfly running as a proxy:

```
http://echo.jsontest.com/key/value
```

And Hoverfly is running in simulate mode as a webserver on:

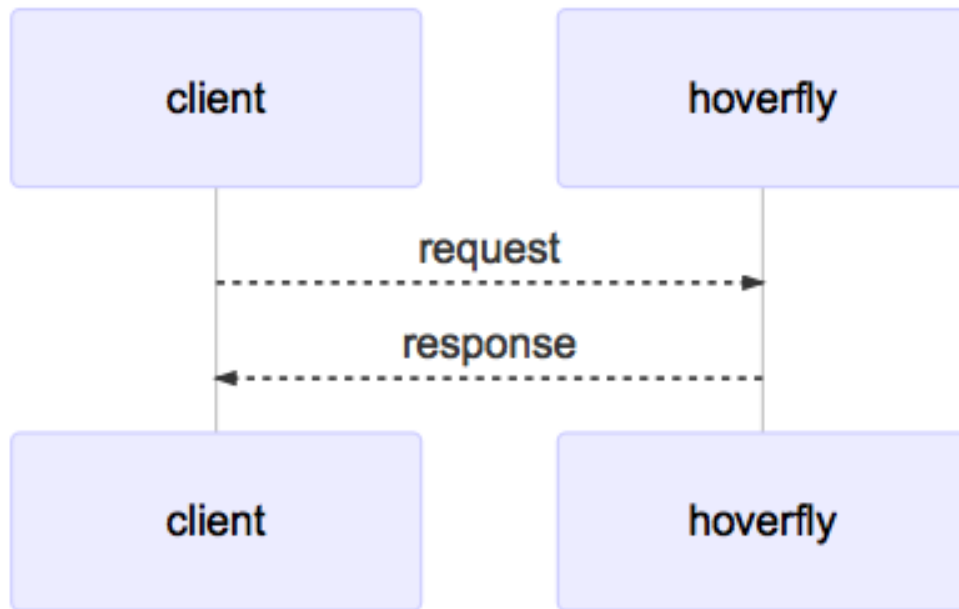
```
http://localhost:8888
```

Then the URL you would use to retrieve the data from Hoverfly would be:

```
http://localhost:8500/key/value
```

### See also:

Please refer to the [Running Hoverfly as a webserver](#) tutorial for a step-by-step example.

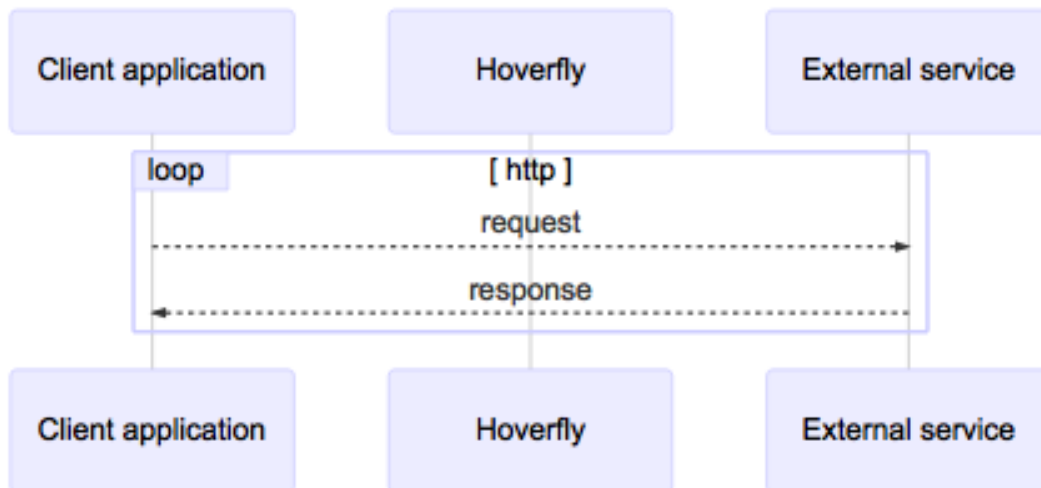


## Hoverfly modes

Hoverfly has four different modes. It can only run in one mode at any one time.

### Capture mode

Capture mode is used for creating API simulations.



In Capture mode, Hoverfly (running as a proxy server - see *Hoverfly as a proxy server*) intercepts communication between the client application and the external service. It transparently records outgoing requests from the client and the incoming responses from the service API.

Most commonly, requests to the external service API are triggered by running automated tests against the application that consumes the API. During subsequent test runs, Hoverfly can be set to run in *Simulate mode*, removing the dependency on the real external service API. Alternatively, requests can be generated using a manual process.

Usually, Capture mode is used as the starting point in the process of creating an API simulation. Captured data is then exported and modified before being re-imported into Hoverfly for use as a simulation.

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**Note:** Hoverfly cannot be set to Capture mode when running as a webserver (see *Hoverfly as a webserver*).

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### Simulate mode

In this mode, Hoverfly uses its simulation data in order to simulate external APIs. Each time Hoverfly receives a request, rather than forwarding it on to the real API, it will respond instead. No network traffic will ever reach the real external API.



The simulation can be produced automatically via by running Hoverfly in *Capture mode*, or created manually. See *Simulations* for information.

### Synthesize mode

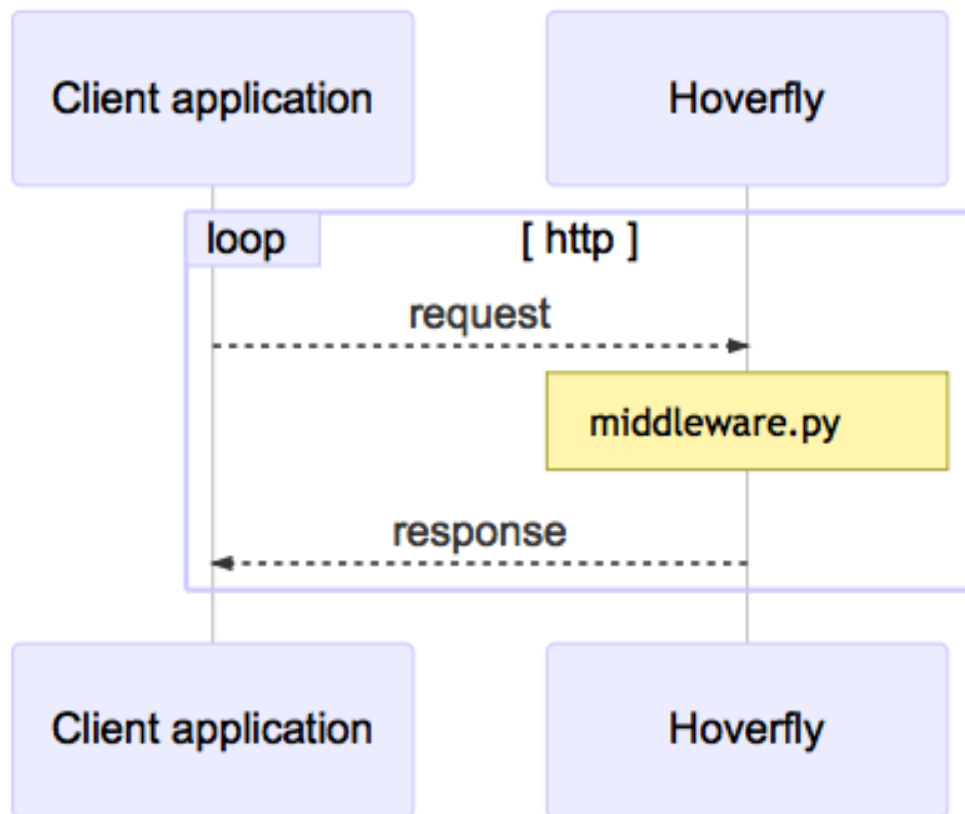
This mode is similar to *Simulate mode*, but instead of looking for a response in stored simulation data, the request is passed directly to a user-supplied executable file. These files are known as *Middleware*.

In Synthesize mode, the middleware executable is expected to generate a response to the incoming request “on the fly”. Hoverfly will then return the generated response to the application. For Hoverfly to operate in Synthesize mode, a middleware executable must be specified.

---

**Note:** You might use this mode to simulate an API that may be too difficult to record correctly via *Capture mode*. An example would be an API that uses state to change the responses. You could create middleware that manages this state and produces the desired response based on the data in the request.

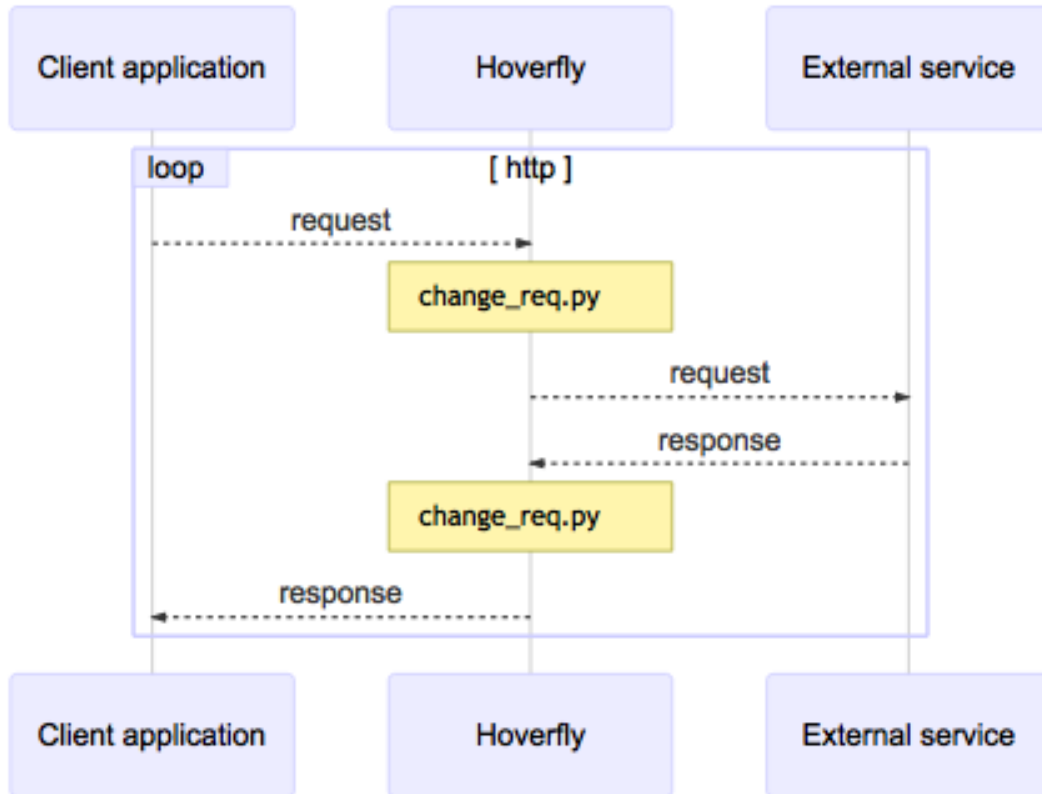
---





## Modify mode

Modify mode is similar to *Capture mode*, except it **does not save the requests and responses**. In Modify mode, Hoverfly will pass each request to a *Middleware* executable before forwarding it to the destination. Responses will also be passed to middleware before being returned to the client.



You could use this mode to “man in the middle” your own requests and responses. For example, you could change the API key you are using to authenticate against a third-party API.

## Simulations

The core functionality of Hoverfly is to capture HTTP(S) traffic to create API simulations which can be used in testing. Hoverfly stores captured traffic as *simulations*.

Simulation JSON can be exported, edited and imported in and out of Hoverfly, and can be shared among Hoverfly users or instances. Simulation JSON files must adhere to the Hoverfly *Simulation schema*.

Simulations consist of **Request Matchers and Responses, Delays and Metadata** (“Meta”).

## Request Responses Pairs

Hoverfly simulates APIs by matching **incoming requests** from the client to **stored requests**. Stored requests have an associated **stored response** which is returned to the client if the match is successful.

The matching logic that Hoverfly uses to compare incoming requests with stored requests can be configured using **Request Matchers**.

### Request Matchers

When Hoverfly captures a request, it creates a Request Matcher for each field in the request. A Request Matcher consists of the request field name, the type of match which will be used to compare the field in the incoming request to the field in the stored request, and the request field value.

By default, Hoverfly will set the type of match to `exactMatch` for each field.

#### See also:

There are many types of Request Matcher. Please refer to [Request matchers](#) for a list of the types available, and examples of how to use them.

There are also two different matching strategies: **strongest match** (default) and **first match** (legacy). Please refer to [Matching strategies](#) for more information.

An example Request Matcher Set might look like this:

Field	Matcher Type	Value
scheme	exactMatch	“https”
method	exactMatch	“GET”
destination	exactMatch	“docs.hoverfly.io”
path	exactMatch	“/pages/keyconcepts/templates.html”
query	exactMatch	“query=true”
body	exactMatch	“”
headers	exactMatch	

In the Hoverfly simulation JSON file, this Request Matcher Set would be represented like this:

```
1      "request": {
2          "scheme": {
3              "exactMatch": "http"
4          },
5          "method": {
6              "exactMatch": "GET"
7          },
8          "destination": {
9              "exactMatch": "docs.hoverfly.io"
10         },
11         "path": {
12             "exactMatch": "/pages/keyconcepts/templates.html"
13         },
14         "query": {
15             "exactMatch": "query=true"
16         },
17         "body": {
18             "exactMatch": ""
19         },
20         "headers": {}
21     },
```

[View entire simulation file](#)

The matching logic that Hoverfly uses to compare an incoming request to a stored request can be changed by editing the Request Matchers in the simulation JSON file.

It is not necessary to have a Request Matcher for every request field. By omitting Request Matchers, it is possible to implement **partial matching** - meaning that Hoverfly will return one stored response for multiple incoming requests.

For example, this Request Matcher will match any incoming request to the `docs.hoverfly.io` destination:

```

1     "request": {
2         "destination": {
3             "exactMatch": "docs.hoverfly.io"
4         }
5     },

```

[View entire simulation file](#)

In the example below, the `globMatch` Request Matcher type is used to match any subdomain of `hoverfly.io`:

```

1     "request": {
2         "destination": {
3             "globMatch": "*.hoverfly.io"
4         }
5     },

```

[View entire simulation file](#)

It is also possible to use more than one Request Matcher for each field.

In the example below, a `regexMatch` **and** a `globMatch` are used on the `destination` field.

This will match on any subdomain of `hoverfly.io` which begins with the letter `d`. This means that incoming requests to `docs.hoverfly.io` and `dogs.hoverfly.io` will be matched, but requests to `cats.hoverfly.io` will not be matched.

```

1     "request": {
2         "destination": {
3             "regexMatch": "(\\Ad)",
4             "globMatch": "*.hoverfly.io"
5         }
6     },

```

[View entire simulation file](#)

### See also:

There are many types of Request Matcher. Please refer to [Request matchers](#) for a list of the types available, and examples of how to use them.

For a practical example of how to use a Request Matcher, please refer to [Loose request matching using a Request Matcher](#) in the tutorials section.

There are also two different matching strategies: **strongest match** (default) and **first match** (legacy). Please refer to [Matching strategies](#) for more information.

## Responses

Each Request Matcher Set has a response associated with it. If the request match is successful, Hoverfly will return the response to the client.

```

1     "response": {
2         "status": 200,
3         "body": "Response from docs.hoverfly.io/pages/keyconcepts/templates.
↳html",

```

```
4     "encodedBody": false,  
5     "headers": {  
6         "Hoverfly": ["Was-Here"]  
7     }  
8 }
```

[View entire simulation file](#)

Editing the fields in response, combined with editing the Request Matcher set, makes it possible to configure complex request/response logic.

### Binary data in responses

Since JSON does not support binary data, binary responses are base64 encoded. This is denoted by the `encodedBody` field. Hoverfly automatically encodes and decodes the data during the export and import phases.

```
1     "body": "YmFzZTY0IGVuY29kZWQ=",  
2     "encodedBody": true,
```

[View entire simulation file](#)

### Delays

Once you have created a simulated service by capturing traffic between your application and an external service, you may wish to make the simulation more “realistic” by applying latency to the responses returned by Hoverfly.

Hoverfly can be configured to apply delays to responses based on URL pattern matching or HTTP method. This is done using a regular expression to match against the URL, a delay value in milliseconds, and an optional HTTP method value.

#### See also:

This functionality is best understood via a practical example: see [Adding delays to a simulation](#) in the *Tutorials* section.

You can also apply delays to simulations using [Middleware](#) (see the [Using middleware to simulate network latency](#) tutorial). Using middleware to apply delays sacrifices performance for flexibility.

### Meta

The last part of the simulation schema is the meta object. Its purpose is to store metadata that is relevant to your simulation. This includes the simulation schema version, the version of Hoverfly used to export the simulation and the date and time at which the simulation was exported.

```
1     "meta": {  
2         "schemaVersion": "v2",  
3         "hoverflyVersion": "v0.11.0",  
4         "timeExported": "2016-11-11T11:53:52Z"  
5     }
```

#### See also:

For a hands-on tutorial of creating and editing simulations, see [Creating and exporting a simulation](#).

## Matching strategies

Hoverfly has two matching strategies. Each has advantages and trade-offs.

**Note:** In order to fully understand Hoverfly’s matching strategies, it is recommended that you read the *Simulations* section first.

### Strongest Match

This is the default matching strategy for Hoverfly. If Hoverfly finds multiple Request Response Pairs that match an incoming request, it will return the Response from the pair which has the highest **matching score**.

To set “strongest” as the matching strategy, simply run:

```
hoverctl mode simulate
```

Or to be explicit run:

```
hoverctl mode simulate --matching-strategy=strongest
```

### Matching scores

This example shows how matching scores are calculated.

Let’s assume Hoverfly is running in simulate mode, and the simulation data contains four *Request Responses Pairs*. Each Request Response Pair contains one or more *Request Matchers*.

Hoverfly then receives a GET request to the destination `www.destination.com`. The incoming request contains the following fields.

#### Request

Field	Value
method	GET
destination	www.destination.com

#### Request Response Pair 1

Field	Matcher Type	Value	Score	Total Score	Matched?
method	exactMatch	DELETE	+0	1	false
destination	exactMatch	www.destination.com	+1		

This pair contains two Request Matchers. The **method** value in the incoming request (GET) does not match the value for the **method** matcher (DELETE). However the **destination** value does match.

This gives the Request Response Pair a total score of 1, but since one match failed, it is treated as unmatched (**Matched?** = `false`).

#### Request Response Pair 2

Field	Matcher Type	Value	Score	Total Score	Matched?
method	exactMatch	GET	+1	1	true

This pair contains one Request Matcher. The **method** value in the incoming request (GET) matches the value for the **method** matcher. This gives the pair a total score of 1, and since no matches failed, it is treated as matched.

#### Request Response Pair 3

Field	Matcher Type	Value	Score	Total Score	Matched?
method	exactMatch	GET	+1	2	true
destination	exactMatch	www.destination.com	+1		

In this pair, the **method** and **destination** values in the incoming request both match the corresponding Request Matcher values. This gives the pair a total score of 2, and it treated as matched.

### Request Response Pair 4

Field	Matcher Type	Value	Score	Total Score	Matched?
method	exactMatch	GET	+1	1	false
destination	exactMatch	www.miss.com	+0		

This pair is treated as unmatched because the **destination** matcher failed.

Request Response Pair 3 has the highest score, and is therefore the **strongest match**.

This means that Hoverfly will return the Response contained within Request Response Pair 3.

---

**Note:** If there is more than one strongest match, Hoverfly will pick the first one that appears in the simulation file.

---

The strongest match strategy makes it much easier to identify why Hoverfly has not returned a Response to an incoming Request. If Hoverfly is not able to match an incoming Request to a Request Response Pair, it will return the closest match. For more information see [Troubleshooting](#).

However, the additional logic required to calculate matching scores does affect Hoverfly's performance.

### First Match

**First match** is the alternative (legacy) mechanism of matching. There is no scoring, and Hoverfly simply returns the first match it finds in the simulation data.

To set first match as the matching strategy, run:

```
hoverctl mode simulate --matching-strategy=first
```

The main advantage of this strategy is performance - although it makes debugging matching errors harder.

## Caching

In *Simulate mode*, Hoverfly uses caching in order to retain strong performance characteristics, even in the event of complex matching. The cache is a key-value store of request hashes (hash of all the request excluding headers) to responses.

### Caching matches

When Hoverfly receives a request in simulate mode, it will first hash it and then look for it in the cache. If a cache entry is found, it will send the cached response back to Hoverfly. If it is not found, it will look for a match in the list of matchers. Whenever a new match is found, it will be added to the cache.

### Caches misses

Hoverfly also caches misses. This means that repeating a request which was not matched will return a cached miss, avoiding the need to perform matching. The closest miss is also cached, so Hoverfly will not lose any useful information about which matchers came closest.

## Header caching

Currently, headers are not included in the hash for a request. This is because headers tend to change across time and clients, impacting ordinary and eager caching respectively.

## Eager caching

The cache is automatically pre-populated whenever switching to simulate mode. This only works on certain matchers (such as matchers where every field is an “exactMatch”), but it means the initial cache population does not happen **during** simulate mode.

## Cache invalidation

Cache invalidation is a straightforward process in Hoverfly. It only occurs when a simulation is modified.

## Destination filtering

By default, Hoverfly will process every request it receives. However, you may wish to control which URLs Hoverfly processes.

This is done by *filtering* the *destination* URLs using either a string or a regular expression. The *destination* string or regular expression will be compared against the host and the path of a URL.

For example, specifying `hoverfly.io` as the destination value will tell Hoverfly to process only URLs on the `hoverfly.io` host.

```
hoverctl destination "hoverfly.io"
```

Specifying `api` as the *destination* value during *Capture mode* will tell Hoverfly to capture only URLs that contain the string `api`. This would include both `api.hoverfly.io/endpoint` and `hoverfly.io/api/endpoint`.

### See also:

This functionality is best understood via a practical example: see *Capturing or simulating specific URLs* in the *Tutorials* section.

---

**Note:** The destination setting applies to all Hoverfly modes. If a destination value is set while Hoverfly is running in *Simulate mode*, requests that are excluded by the destination setting will be passed through to the real URLs. This makes it possible to return both real and simulated responses.

---

## Middleware

Middleware intercepts traffic between the client and the API (whether real or simulated), and allowing you to manipulate it.

You can use middleware to manipulate data in simulated responses, or to inject unpredictable performance characteristics into your simulation.

Middleware works differently depending on the Hoverfly mode.

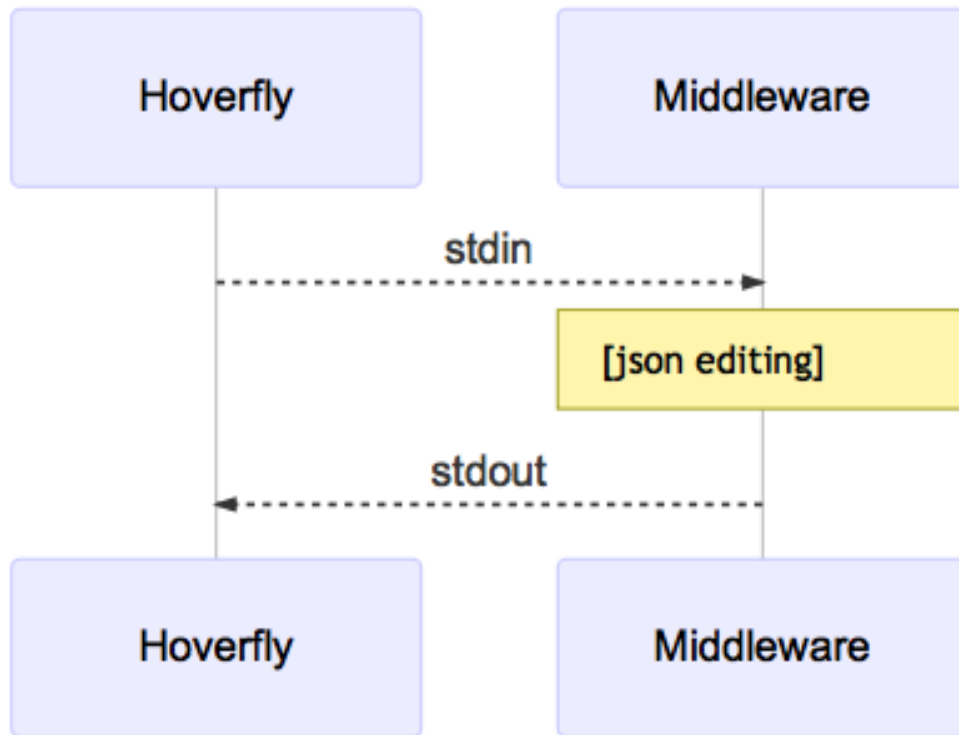
- Capture mode: middleware affects only **outgoing requests**
- Simulate mode: middleware affects only **incoming responses** (cache contents remain untouched)

- Synthesize mode: middleware **creates responses**
- Modify mode: middleware affects **requests and responses**

You can write middleware in any language as long as it can be executed by the shell on the Hoverfly host. Middleware could be a binary file, or a script.

### Middleware Interface

When middleware is called by Hoverfly, it expects to receive and return JSON (see *Simulation schema*). Middleware can be used to modify the values in the JSON but **must not** modify the schema itself.



Hoverfly will send the JSON object to middleware via the standard input stream. Hoverfly will then listen to the standard output stream and wait for the JSON object to be returned.

#### See also:

Middleware examples are covered in the tutorials section. See *Using middleware to simulate network latency* and *Using middleware to modify response payload and status code*.

### Hoverctl

Hoverctl is a command line utility that is shipped with Hoverfly. Its purpose is to make it easier to interact with Hoverfly APIs and your local filesystem, while also providing a way to start and stop instances of Hoverfly.

Hoverctl also has the ability to work with multiple instances of Hoverfly, through the use of the target option. Configuration is stored against each target meaning it is possible to start an instance of Hoverfly locally and remotely and still be able to interact with each separately.



**See also:**

Please refer to *hoverctl commands* for more information about hoverctl.

**See also:**

Please refer to the *Controlling a remote Hoverfly instance with hoverctl* tutorial for a step by step example of using targets.

## Native language bindings

Native language bindings are available for Hoverfly to make it easy to integrate into different environments.

### HoverPy

To get started:

```
sudo pip install hoverpy
python
```

And in Python you can simply get started with:

```
import hoverpy
import requests

# capture mode
with hoverpy.HoverPy(capture=True) as hp:
    data = requests.get("http://time.jsontest.com/").json()

# simulation mode
with hoverpy.HoverPy() as hp:
    simData = requests.get("http://time.jsontest.com/").json()
    print(simData)

assert(data["milliseconds_since_epoch"] == simData["milliseconds_since_epoch"])
```

For more information, read the [HoverPy documentation](#).

### Hoverfly Java

- Strict or loose HTTP request matching based on URL, method, body and header combinations
- Fluent and expressive DSL for easy generation of simulated APIs
- Automatic marshalling of objects into JSON during request/response body generation
- HTTPS automatically supported, no extra configuration required
- Download via Maven or Gradle

To get started, read the [Hoverfly Java documentation](#).

## Tutorials

In these examples, we will use the `hoverctl` (CLI tool for Hoverfly) to interact with Hoverfly.

Hoverfly can also be controlled via its *REST API*, or via *Native language bindings*.

### Basic tutorials

#### Creating and exporting a simulation

---

**Note:** If you are running Hoverfly on a machine that accesses the internet via a proxy (for example if you are on a corporate network), please follow the *Using Hoverfly behind a proxy* tutorial before proceeding.

---

Start Hoverfly and set it to Capture mode

```
hoverctl start
hoverctl mode capture
```

Make a request with cURL, using Hoverfly as a proxy server:

```
curl --proxy http://localhost:8500 http://time.jsontest.com
```

View the Hoverfly logs

```
hoverctl logs
```

Export the simulation to a JSON file

```
hoverctl export simulation.json
```

Stop hoverfly

```
hoverctl stop
```

You'll now see a `simulation.json` file in your current working directory, which contains all your simulation data.

In case you are curious, the sequence diagram for this process looks like this:

#### Importing and using a simulation

In this tutorial we are going to import the simulation we created in the previous tutorial.

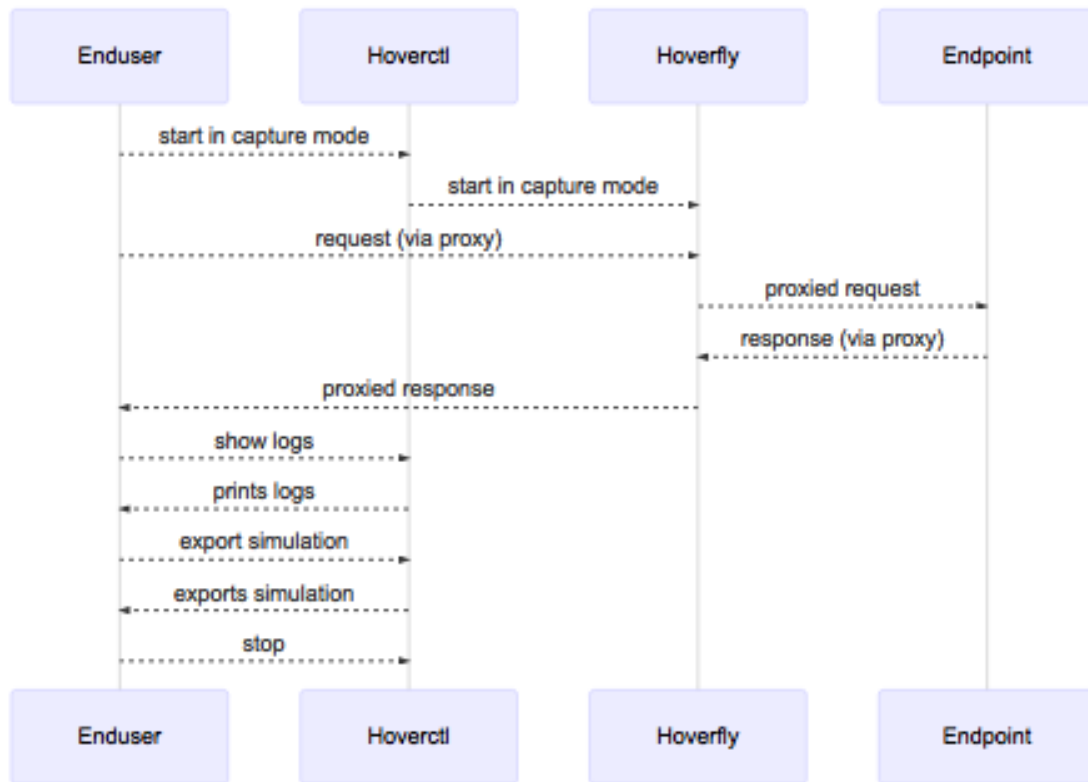
```
hoverctl start
hoverctl import simulation.json
```

Hoverfly can also import simulation data that is stored on a remote host via HTTP:

```
hoverctl import https://example.com/example.json
```

Make a request with cURL, using Hoverfly as a proxy.

```
curl --proxy localhost:8500 http://time.jsontest.com
```



This outputs the time at the time the request was captured.

```

{
  "time": "02:07:28 PM",
  "milliseconds_since_epoch": 1482242848562,
  "date": "12-20-2016"
}

```

Stop Hoverfly:

```
hoverctl stop
```

### Adding delays to a simulation

Simulating API latency during development allows you to write code that will deal with it gracefully.

In Hoverfly, this is done by applying “delays” to responses in a simulation.

Delays are applied by editing the Hoverfly simulation JSON file. Delays can be applied selectively according to request URL pattern and/or HTTP method.

### Applying a delay to all responses

Let’s apply a 2 second delay to all responses. First, we need to create and export a simulation.

```
hoverctl start
hoverctl mode capture
curl --proxy localhost:8500 http://time.jsontest.com
curl --proxy localhost:8500 http://date.jsontest.com
hoverctl export simulation.json
hoverctl stop
```

Take a look at the "globalActions" property within the simulation.json file you exported. It should look like this:

```
1     "globalActions": {
2         "delays": [
3
4         ]
5     }
```

Edit the file so the "globalActions" property looks like this:

```
1     "globalActions": {
2         "delays": [{
3             "urlPattern": ".",
4             "delay": 2000
5         }]
6     }
```

Hoverfly will apply a delay of 2000ms to all URLs that match the "urlPattern" value. We want the delay to be applied to **all URLs**, so we set the "urlPattern" value to the regular expression ".".

Now import the edited simulation.json file, switch Hoverfly to Simulate mode and make the requests again.

```
hoverctl start
hoverctl import simulation.json
curl --proxy localhost:8500 http://time.jsontest.com
curl --proxy localhost:8500 http://date.jsontest.com
hoverctl stop
```

The responses to both requests are delayed by 2 seconds.

### Applying different delays based on host

Now let's apply a delay of 1 second on responses from time.jsontest.com and a delay of 2 seconds on responses from date.jsontest.com.

Run the following to create and export a simulation.

```
hoverctl start
hoverctl mode capture
curl --proxy localhost:8500 http://time.jsontest.com
curl --proxy localhost:8500 http://date.jsontest.com
hoverctl export simulation.json
hoverctl stop
```

Edit the simulation.json file so that the "globalActions" property looks like this:

```
1     "globalActions": {
2         "delays": [{
3             "urlPattern": "time\\.jsontest\\.com",
```

```

4         "delay": 1000
5     },
6     {
7         "urlPattern": "date\\.jstest\\.com",
8         "delay": 2000
9     }
10 ]
11 }

```

Now run the following to import the edited `simulation.json` file and run the simulation:

```

hoverctl start
hoverctl import simulation.json
curl --proxy localhost:8500 http://time.jstest.com
curl --proxy localhost:8500 http://date.jstest.com
hoverctl stop

```

You should notice a 1 second delay on responses from `time.jstest.com`, and a 2 second delay on responses from `date.jstest.com`.

---

**Note:** You can easily get into a situation where your request URL has multiple matches. In this case, the first successful match wins.

---

### Applying different delays based on URI

Now let's apply different delays based on location. Run the following to create and export a simulation.

```

hoverctl start
hoverctl mode capture
curl --proxy localhost:8500 http://echo.jstest.com/a/b
curl --proxy localhost:8500 http://echo.jstest.com/b/c
curl --proxy localhost:8500 http://echo.jstest.com/c/d
hoverctl export simulation.json
hoverctl stop

```

Edit the `simulation.json` file so that the `"globalActions"` property looks like this:

```

1     "globalActions": {
2         "delays": [{
3             "urlPattern": "echo\\.jstest\\.com\\/a\\/b",
4             "delay": 2000
5         },
6         {
7             "urlPattern": "echo\\.jstest\\.com\\/b\\/c",
8             "delay": 2000
9         },
10        {
11            "urlPattern": "echo\\.jstest\\.com\\/c\\/d",
12            "delay": 3000
13        }
14    ]
15 }

```

Now run the following to import the edited `simulation.json` file and run the simulation:

```
hoverctl start
hoverctl import simulation.json
hoverctl mode simulate
curl --proxy localhost:8500 http://echo.jsontest.com/a/b
curl --proxy localhost:8500 http://echo.jsontest.com/b/c
curl --proxy localhost:8500 http://echo.jsontest.com/c/d
hoverctl stop
```

You should notice a 2 second delay on responses from `echo.jsontest.com/a/b` and `echo.jsontest.com/b/c`, and a 3 second delay on the response from `echo.jsontest.com/c/d`.

### Applying different delays based on HTTP method

Let's apply a delay of 2 seconds on responses to **GET requests only** made to `echo.jsontest.com/b/c`.

Run the following to create and export a simulation.

```
hoverctl start
hoverctl mode capture
curl --proxy localhost:8500 http://echo.jsontest.com/b/c
curl --proxy localhost:8500 -X POST http://echo.jsontest.com/b/c
hoverctl export simulation.json
hoverctl stop
```

Edit the `simulation.json` file so that the "globalActions" property looks like this:

```
1     "globalActions": {
2         "delays": [{
3             "urlPattern": "echo\\.jsontest\\.com\\/b\\/c",
4             "delay": 2000,
5             "httpMethod": "GET"
6         }]
7     }
```

Now run the following to import the edited `simulation.json` file and run the simulation:

```
hoverctl start
hoverctl import simulation.json
curl --proxy localhost:8500 http://echo.jsontest.com/b/c
curl -X POST --proxy localhost:8500 http://echo.jsontest.com/b/c
hoverctl stop
```

You should notice a 2 second delay on the response to the GET request and no delay on the response to the POST request.

### Loose request matching using a Request Matcher

#### See also:

Please carefully read through *Request Responses Pairs* alongside this tutorial to gain a high-level understanding of what we are about to cover.

In some cases you may want Hoverfly to return the same stored response for more than one incoming request. This can be done using Request Matchers.

Let's begin by capturing some traffic and exporting a simulation. This step saves us having to manually create a simulation ourselves and gives us a request to work with.

```
hoverctl start
hoverctl mode capture
curl --proxy http://localhost:8500 http://echo.jsonstest.com/foo/baz/bar/spam
hoverctl export simulation.json
hoverctl stop
```

If you take a look at your `simulation.json` you should notice these lines in your request.

```
"path": {
  "exactMatch": "/foo/baz/bar/spam"
},
```

Modify them to:

```
"path": {
  "globMatch": "/foo/*/bar/spam"
},
```

Save the file as `simulationimport.json` and run the following command to import it and cURL the simulated endpoint:

```
hoverctl start
hoverctl mode simulate
hoverctl import simulationimport.json
curl --proxy http://localhost:8500 http://echo.jsonstest.com/foo/QUX/bar/spam
hoverctl stop
```

The same response is returned, even though we created our simulation with a request to `http://echo.jsonstest.com/foo/baz/bar/spam` in Capture mode and then sent a request to `http://echo.jsonstest.com/foo/QUX/bar/spam` in Simulate mode.

#### See also:

In this example we used the `globMatch` Request Matcher type. For a list of other Request Matcher types and examples of how to use them, please see the [Request matchers](#) section.

---

#### Note: Key points:

- To change how incoming requests are matched to stored responses, capture a simulation, export it, edit it
  - While editing, choose a request field to match on, select a Request Matcher type and a matcher value
  - Re-import the simulation
  - Requests can be manually added without capturing the request
- 

## Using middleware to simulate network latency

#### See also:

Please carefully read through [Middleware](#) alongside these tutorials to gain a high-level understanding of what we are about to cover.

We will use a Python script to apply a random delay of less than one second to every response in a simulation.

Before you proceed, please ensure that you have Python installed.

Let's begin by writing our middleware. Save the following as `middleware.py`:

```
#!/usr/bin/env python
import sys
import logging
import random
from time import sleep

logging.basicConfig(filename='random_delay_middleware.log', level=logging.DEBUG)
logging.debug('Random delay middleware is called')

# set delay to random value less than one second

SLEEP_SECS = random.random()

def main():

    data = sys.stdin.readlines()
    # this is a json string in one line so we are interested in that one line
    payload = data[0]
    logging.debug("sleeping for %s seconds" % SLEEP_SECS)
    sleep(SLEEP_SECS)

    # do not modifying payload, returning same one
    print(payload)

if __name__ == "__main__":
    main()
```

The middleware script delays each response by a random value of less than one second.

```
hoverctl start
hoverctl mode capture
curl --proxy http://localhost:8500 http://time.jsontest.com
hoverctl mode simulate
hoverctl middleware --binary python --script middleware.py
curl --proxy http://localhost:8500 http://time.jsontest.com
hoverctl stop
```

Middleware gives you control over the behaviour of a simulation, as well as the data.

---

**Note:** Middleware gives you flexibility when simulating network latency - allowing you to randomize the delay value for example - but a new process is spawned every time the middleware script is executed. This can impact Hoverfly's performance under load.

If you need to simulate latency during a load test, it is recommended that you use Hoverfly's native *Delays* functionality to simulate network latency (see [Adding delays to a simulation](#)) instead of writing middleware. The delays functionality sacrifices flexibility for performance.

---

## Using middleware to modify response payload and status code

### See also:

Please carefully read through *Middleware* alongside these tutorials to gain a high-level understanding of what we are about to cover.

We will use a python script to modify the body of a response and randomly change the status code.



Let's begin by writing our middleware. Save the following as `middleware.py`:

```
#!/usr/bin/env python

import sys
import json
import logging
import random

logging.basicConfig(filename='middleware.log', level=logging.DEBUG)
logging.debug('Middleware "modify_request" called')

def main():
    payload = sys.stdin.readlines()[0]

    logging.debug(payload)

    payload_dict = json.loads(payload)
    payload_dict['response']['status'] = random.choice([200, 201])

    if "response" in payload_dict and "body" in payload_dict["response"]:
        payload_dict["response"]["body"] = '{"foo': 'baz'}\n"

    print(json.dumps(payload_dict))

if __name__ == "__main__":
    main()
```

The middleware script randomly toggles the status code between 200 and 201, and changes the response body to a dictionary containing `{'foo': 'baz'}`.

```
hoverctl start
hoverctl mode capture
curl --proxy http://localhost:8500 http://time.jsontest.com
hoverctl mode simulate
hoverctl middleware --binary python --script middleware.py
curl --proxy http://localhost:8500 http://time.jsontest.com
hoverctl stop
```

As you can see, middleware allows you to completely modify the content of a simulated HTTP response.

## Simulating HTTPS APIs

To capture HTTPS traffic, you need to use Hoverfly's SSL certificate.

First, download the certificate:

```
wget https://raw.githubusercontent.com/SpectoLabs/hoverfly/master/core/cert.pem
```

We can now run Hoverfly with the standard capture then simulate workflow.

```
hoverctl start
hoverctl mode capture
curl --proxy https://localhost:8500 https://example.com --cacert cert.pem
hoverctl mode simulate
curl --proxy https://localhost:8500 https://example.com --cacert cert.pem
hoverctl stop
```

Curl was able to make the HTTPS request using an HTTPS proxy because we provided it with Hoverfly's SSL certificate.

---

**Note:** This example uses cURL. If you are using Hoverfly in another environment, you will need to add the certificate to your trust store. This is done automatically by the Hoverfly Java library (see [Hoverfly Java](#)).

---

### See also:

This example uses Hoverfly's default SSL certificate. Alternatively, you can use Hoverfly to generate a new certificate. For more information, see [Configuring SSL in Hoverfly](#).

## Running Hoverfly as a webserver

### See also:

Please carefully read through [Hoverfly as a webserver](#) alongside this tutorial to gain a high-level understanding of what we are about to cover.

Below is a complete example how to capture data with Hoverfly running as a proxy, and how to save it in a simulation file.

```
hoverctl start
hoverctl mode capture
curl --proxy http://localhost:8500 http://echo.jsonstest.com/a/b
hoverctl export simulation.json
hoverctl stop
```

Now we can use Hoverfly as a **webserver** in Simulate mode.

```
hoverctl start webserver
hoverctl import simulation.json
curl http://localhost:8500/a/b
hoverctl stop
```

Hoverfly returned a response to our request while running as a webserver, not as a proxy.

Notice that we issued a cURL command to `http://localhost:8500/a/b` instead of `http://echo.jsonstest.com/a/b`. This is because when running as a webserver, Hoverfly strips the domain from the endpoint URL in the simulation.

This is explained in more detail in the [Hoverfly as a webserver](#) section.

---

**Note:** Hoverfly starts in Simulate mode by default.

---

## Capturing or simulating specific URLs

We can use the `hoverctl destination` command to specify which URLs to capture or simulate. The destination setting can be tested using the `--dry-run` flag. This makes it easy to check whether the destination setting will filter out URLs as required.

```
hoverctl start
hoverctl destination "ip" --dry-run http://ip.jsonstest.com
hoverctl destination "ip" --dry-run http://time.jsonstest.com
hoverctl stop
```

This tells us that setting the destination to `ip` will allow the URL `http://ip.jsontest.com` to be captured or simulated, while the URL `http://time.jsontest.com` will be ignored.

Now we have checked the destination setting, we can apply it to filter out the URLs we don't want to capture.

```
hoverctl start
hoverctl destination "ip"
hoverctl mode capture
curl --proxy http://localhost:8500 http://ip.jsontest.com
curl --proxy http://localhost:8500 http://time.jsontest.com
hoverctl logs
hoverctl export simulation.json
hoverctl stop
```

If we examine the logs and the `simulation.json` file, we can see that *only* a request response pair to the `http://ip.jsontest.com` URL has been captured.

The destination setting can be either a string or a regular expression.

```
hoverctl start
hoverctl destination "^.*api.*com" --dry-run https://api.github.com
hoverctl destination "^.*api.*com" --dry-run https://api.slack.com
hoverctl destination "^.*api.*com" --dry-run https://github.com
hoverctl stop
```

Here, we can see that setting the destination to `^.*api.*com` will allow the `https://api.github.com` and `https://api.slack.com` URLs to be captured or simulated, while the `https://github.com` URL will be ignored.

## Advanced tutorials

### Using Hoverfly behind a proxy

In some environments, you may only be able to access the internet via a proxy. For example, your organization may route all traffic through a proxy for security reasons.

If this is the case, you will need to configure Hoverfly to work with the 'upstream' proxy.

This configuration value can be easily set when starting an instance of Hoverfly.

For example, if the 'upstream' proxy is running on port 8080 on host `corp.proxy`:

```
hoverctl start --upstream-proxy http://corp.proxy:8080
```

### Upstream proxy authentication

If the proxy you are using uses HTTP basic authentication, you can provide the authentication credentials as part of the upstream proxy configuration setting.

For example:

```
hoverctl start --upstream-proxy http://my-user:my-pass@corp.proxy:8080
```

Currently, HTTP basic authentication is the only supported authentication method for an authenticated proxy.

### Controlling a remote Hoverfly instance with hoverctl

So far, the tutorials have shown how `hoverctl` can be used to control an instance of Hoverfly running on the same machine.

In some cases, you may wish to use `hoverctl` to control an instance of Hoverfly running on a remote host. With `hoverctl`, you can do this using the **targets** feature.

In this example, we assume that the remote host is reachable at `hoverfly.example.com`, and that ports 8880 and 8555 are available. We will also assume that the Hoverfly binary is installed on the remote host.

On the **remote host**, start Hoverfly using flags to override the default admin port (`-ap`) and proxy port (`-pp`).

```
hoverfly -ap 8880 -pp 8555
```

#### See also:

For a full list of all Hoverfly flags, please refer to *Hoverfly commands* in the *Reference* section.

On your **local machine**, you can create a **target** named `remote` using `hoverctl`. This target will be configured to communicate with Hoverfly.

```
hoverctl targets create remote \  
  --host hoverfly.example.com \  
  --admin-port 8880 \  
  --proxy-port 8555
```

Now that `hoverctl` knows the location of the `remote` Hoverfly instance, run the following commands **on your local machine** to capture and simulate a URL using this instance:

```
hoverctl -t remote mode capture  
curl --proxy http://hoverfly.example.com:8555 http://ip.jsontest.com  
hoverctl -t remote mode simulate  
curl --proxy http://hoverfly.example.com:8555 http://ip.jsontest.com
```

You will now need to specify the `remote` target every time you want to interact with this Hoverfly instance. If you are only working with this remote instance, you can set it to be the default target instance for `hoverctl`.

```
hoverctl targets default remote
```

---

**Note:** The `--host` value of the `hoverctl` target allows `hoverctl` to interact with the **admin API** of the remote Hoverfly instance.

The application that is making the request (in this case, `cURL`), **also** needs to be configured to use the remote Hoverfly instance as a proxy. In this example, it is done using `cURL`'s `--proxy` flag.

---

If you are running Hoverfly on a remote host, you may wish to enable authentication on the Hoverfly proxy and admin API. This is described in the *Enabling authentication for the Hoverfly proxy and API* tutorial.

### Enabling authentication for the Hoverfly proxy and API

Sometimes, you may need authentication on Hoverfly. An example use case would be when running Hoverfly on a remote host.

Hoverfly can provide authentication for both the admin API (using a JWT token) and the proxy (using HTTP basic auth).

## Setting Hoverfly authentication credentials

To start a Hoverfly instance with authentication enabled, you need to run the `hoverctl start` command with the authentication (`--auth`) flag.

```
hoverctl start --auth
```

Running this command will prompt you to set a username and password for the Hoverfly instance.

This can be bypassed by providing the `--username` and `--password` flags, although **this will leave credentials in your terminal history**.

**Warning:** By default, `hoverctl` will start Hoverfly with authentication disabled. If you require authentication you must make sure the `--auth` flag are supplied every time Hoverfly is started.

## Logging in to a Hoverfly instance with hoverctl

Now that a Hoverfly instance has started with authentication enabled, you will need to **login** to the instance using `hoverctl`.

```
hoverctl login
```

Running this command will prompt you to enter the username and password you set for the Hoverfly instance. Again, this can be bypassed by providing the `--username` and `--password` flags.

There may be situations in which you need to log into to a Hoverfly instance that is already running. In this case, it is best practice to create a new **target** for the instance (please see *Controlling a remote Hoverfly instance with hoverctl* for more information on **targets**). You can do this using the `--new-target` flag.

In this example, a remote Hoverfly instance is already running on the host `hoverfly.example.com`, with the ports set to 8880 and 8555 and authentication enabled (the example from *Controlling a remote Hoverfly instance with hoverctl*). You will need to create a new target (named `remote`) for the instance and log in with it.

```
hoverctl login --new-target remote \  
  --host hoverfly.example.io \  
  --admin-port 8880 \  
  --proxy-port 8550
```

You will be prompted to enter the username and password for the instance.

Now run the following commands to capture and simulate a URL using the remote Hoverfly:

```
hoverctl -t remote mode capture  
curl --proxy http://my-user:my-pass@hoverfly.example.com:8555 http://ip.jsonstest.com  
hoverctl -t remote mode simulate  
curl --proxy http://my-user:my-pass@hoverfly.example.com:8555 http://ip.jsonstest.com
```

## Configuring SSL in Hoverfly

In some cases, you may not wish to use Hoverfly's default SSL certificate. Hoverfly allows you to generate a new certificate and key.

The following command will start a Hoverfly process and create new `cert.pem` and `key.pem` files in the current working directory. These newly-created files will be loaded into the running Hoverfly instance.

```
hoverfly -generate-ca-cert
```

Optionally, you can provide a custom certificate name and authority:

```
hoverfly -generate-ca-cert -cert-name tutorial.cert -cert-org "Tutorial Certificate_  
↳Authority"
```

Once you have generated `cert.pem` and `key.pem` files with Hoverfly, you can use `hoverctl` to start an instance of Hoverfly using these files.

```
hoverctl start --certificate cert.pem --key key.pem
```

---

**Note:** Both a certificate and a key file must be supplied. The files must be in unencrypted PEM format.

---

## Troubleshooting

### Why isn't Hoverfly matching my request?

When Hoverfly cannot match a response to an incoming request, it will return information on the closest match:

```
Hoverfly Error!  
  
There was an error when matching  
  
Got error: Could not find a match for request, create or record a valid matcher first!  
  
The following request was made, but was not matched by Hoverfly:  
  
{  
  "Path": "/closest-miss",  
  "Method": "GET",  
  "Destination": "destination.com",  
  "Scheme": "http",  
  "Query": "",  
  "Body": "",  
  "Headers": {  
    "Accept-Encoding": [  
      "gzip"  
    ],  
    "User-Agent": [  
      "Go-http-client/1.1"  
    ]  
  }  
}  
  
The matcher which came closest was:  
  
{  
  "path": {  
    "exactMatch": "/closest-miss"  
  },  
  "destination": {  
    "exactMatch": "destination.com"  
  }  
}
```

```

    },
    "body": {
      "exactMatch": "body"
    }
  }
}

```

But it did not match on the following fields:

```
[body]
```

Which if hit would have given the following response:

```

{
  "status": 200,
  "body": "",
  "encodedBody": false,
  "headers": null
}
`

```

Here, you can see which fields did not match. In this case, it was the `body`. You can also view this information by running `hoverctl logs`.

## Why isn't Hoverfly returning the closest match when it cannot match a request?

Hoverfly will only provide this information when the matching strategy is set to **strongest match** (the default). If you are using the **first match** matching strategy, the closet match information will not be returned.

## How can I view the Hoverfly logs?

```
hoverctl logs
```

## Reference

These reference documents contain information regarding invoking the `hoverctl` command, `hoverfly` command, and interacting with the APIs.

### hoverctl commands

This page contains the output of:

```
hoverctl --help
```

The command's help content has been placed here for convenience.

```

hoverctl is the command line tool for Hoverfly

Usage:
  hoverctl [command]

Available Commands:
  config      Show hoverctl configuration information

```

```
delete      Delete Hoverfly simulation
destination Get and set Hoverfly destination
export      Export a simulation from Hoverfly
flush       Flush the internal cache in Hoverfly
import      Import a simulation into Hoverfly
login       Login to Hoverfly
logs        Get the logs from Hoverfly
middleware  Get and set Hoverfly middleware
mode        Get and set the Hoverfly mode
start       Start Hoverfly
stop        Stop Hoverfly
targets     Get the current targets registered with hoverctl
version     Get the version of hoverctl
```

### Flags:

```
--admin-port int    A port number for the Hoverfly API/GUI. Overrides the
↳default Hoverfly admin port (8888)
-f, --force         Bypass any confirmation when using hoverctl
-h, --help          help for hoverctl
--host string       A host on which a Hoverfly instance is running. Overrides
↳the default Hoverfly host (localhost)
--proxy-port int    A port number for the Hoverfly proxy. Overrides the default
↳Hoverfly proxy port (8500)
--set-default       Sets the current target as the default target for hoverctl
-t, --target string A name for an instance of Hoverfly you are trying to
↳communicate with. Overrides the default target (default)
-v, --verbose       Verbose logging from hoverctl
```

Use "hoverctl [command] --help" for more information about a command.

## Hoverfly commands

This page contains the output of:

```
hoverfly --help
```

The command's help content has been placed here for convenience.

```
Usage of hoverfly:
-add
    add new user '-add -username hfadmin -password hfpass'
-admin
    supply '-admin false' to make this non admin user (defaults to 'true')
↳(default true)
-ap string
    admin port - run admin interface on another port (i.e. '-ap 1234' to run
↳admin UI on port 1234)
-auth
    enable authentication, currently it is disabled by default
-capture
    start Hoverfly in capture mode - transparently intercepts and saves requests/
↳response
-cert string
    CA certificate used to sign MITM certificates
-cert-name string
    cert name (default "hoverfly.proxy")
```



```

-cert-org string
    organisation name for new cert (default "Hoverfly Authority")
-db string
    Persistence storage to use - 'boltdb' or 'memory' which will not write
↳anything to disk (default "boltdb")
    -db-path string
        database location - supply it to provide specific database location (will be
↳created there if it doesn't exist)
    -dest value
        specify which hosts to process (i.e. '-dest fooservice.org -dest barservice.
↳org -dest catservice.org') - other hosts will be ignored will passthrough'
    -destination string
        destination URI to catch (default ".")
    -dev
        supply -dev flag to serve directly from ./static/dist instead from statik
↳binary
    -generate-ca-cert
        generate CA certificate and private key for MITM
    -httpptest.serve string
        if non-empty, httpptest.NewServer serves on this address and blocks
    -import value
        import from file or from URL (i.e. '-import my_service.json' or '-import
↳http://mypage.com/service_x.json'
    -key string
        private key of the CA used to sign MITM certificates
    -metrics
        supply -metrics flag to enable metrics logging to stdout
    -middleware string
        should proxy use middleware
    -modify
        start Hoverfly in modify mode - applies middleware (required) to both
↳outgoing and incomming HTTP traffic
    -password string
        password for new user
    -pp string
        proxy port - run proxy on another port (i.e. '-pp 9999' to run proxy on port
↳9999)
    -synthesize
        start Hoverfly in synthesize mode (middleware is required)
    -test.bench string
        regular expression per path component to select benchmarks to run
    -test.benchmem
        print memory allocations for benchmarks
    -test.benchtme duration
        approximate run time for each benchmark (default 1s)
    -test.blockprofile string
        write a goroutine blocking profile to the named file after execution
    -test.blockprofilerate int
        if >= 0, calls runtime.SetBlockProfileRate() (default 1)
    -test.count n
        run tests and benchmarks n times (default 1)
    -test.coverprofile string
        write a coverage profile to the named file after execution
    -test.cpu string
        comma-separated list of number of CPUs to use for each test
    -test.cpubprofile string
        write a cpu profile to the named file during execution
    -test.memprofile string

```

```
    write a memory profile to the named file after execution
-test.memprofilerate int
    if >=0, sets runtime.MemProfileRate
-test.outputdir string
    directory in which to write profiles
-test.parallel int
    maximum test parallelism (default 8)
-test.run string
    regular expression to select tests and examples to run
-test.short
    run smaller test suite to save time
-test.timeout duration
    if positive, sets an aggregate time limit for all tests
-test.trace string
    write an execution trace to the named file after execution
-test.v
    verbose: print additional output
-tls-verification
    turn on/off tls verification for outgoing requests (will not try to verify_
↪certificates) - defaults to true (default true)
-username string
    username for new user
-v
    should every proxy request be logged to stdout
-version
    get the version of hoverfly
-webserver
    start Hoverfly in webserver mode (simulate mode)
```

## Request matchers

A Request Matcher is used to define the desired value for a specific request field when matching against incoming requests. Given a **matcher value** and **string to match**, each matcher will transform and compare the values in a different way.

### Exact matcher

Evaluates the equality of the matcher value and the string to match. There are no transformations. This is the default Request Matcher type which is set by Hoverfly when requests and responses are captured.

### Example

```
"exactMatch": "?"
```

### Glob matcher

Allows wildcard matching (similar to BASH) using the \* character.

### Example

```
"globMatch": "?"
```

### Regex matcher

Parses the matcher value as a regular expression which is then executed against the string to match. This will pass only if the regular expression successfully returns a result.

### Example

```
"regexMatch": "?"
```

### XML matcher

Transforms both the matcher value and string to match into XML objects and then evaluates their equality.

### Example

```
"xmlMatch": "?"
```

### XPath matcher

Parses the matcher value as an XPath expression, transforms the string to match into an XML object and then executes the expression against it. This will pass only if the expression successfully returns a result.

### Example

```
"xpathMatch": "?"
```

## JSON matcher

Transforms both the matcher value and string to match into JSON objects and then evaluates their equality.

### Example

```
"jsonMatch": "?"
```

## JSONPath matcher

Parses the matcher value as a JSONPath expression, transforms the string to match into a JSON object and then executes the expression against it. This will pass only if the expression successfully returns a result.

### Example

```
"jsonPathMatch": "?"
```

## REST API

### GET /api/v2/simulation

Gets all simulation data. The simulation JSON contains all the information Hoverfly can hold; this includes recordings, templates, delays and metadata.

Example response body:

```
{
  "data": {
    "pairs": [
      {
        "response": {
          "status": 200,
          "body": "<h1>Matched on recording</h1>",
          "encodedBody": false,
          "headers": {
            "Content-Type": [
              "text/html; charset=utf-8"
            ]
          }
        },
        "request": {
          "path": {
            "exactMatch": "/"
          }
        }
      }
    ]
  }
}
```

```

    },
    "method": {
      "exactMatch": "GET"
    },
    "destination": {
      "exactMatch": "myhost.io"
    },
    "scheme": {
      "exactMatch": "https"
    },
    "query": {
      "exactMatch": ""
    },
    "body": {
      "exactMatch": ""
    },
    "headers": {
      "Accept": [
        ↪q=0.8"
        "text/html,application/xhtml+xml,application/xml;q=0.9,image/webp,*/*;
        ],
      "Content-Type": [
        "text/plain; charset=utf-8"
      ],
      "User-Agent": [
        ↪(KHTML, like Gecko) Chrome/52.0.2743.116 Safari/537.36"
        "Mozilla/5.0 (Macintosh; Intel Mac OS X 10_11_6) AppleWebKit/537.36_
      ]
    }
  },
  {
    "response": {
      "status": 200,
      "body": "<h1>Matched on template</h1>",
      "encodedBody": false,
      "headers": {
        "Content-Type": [
          "text/html; charset=utf-8"
        ]
      }
    },
    "request": {
      "path": {
        "exactMatch": "/template"
      }
    }
  }
],
"globalActions": {
  "delays": []
},
"meta": {
  "schemaVersion": "v2",
  "hoverflyVersion": "v0.11.0",
  "timeExported": "2016-11-11T11:53:52Z"
}

```

```
}

```

## PUT /api/v2/simulation

This puts the supplied simulation JSON into Hoverfly, overwriting any existing simulation data.

Example request body:

```
{
  "data": {
    "pairs": [
      {
        "response": {
          "status": 200,
          "body": "<h1>Matched on recording</h1>",
          "encodedBody": false,
          "headers": {
            "Content-Type": [
              "text/html; charset=utf-8"
            ]
          }
        },
        "request": {
          "path": {
            "exactMatch": "/"
          },
          "method": {
            "exactMatch": "GET"
          },
          "destination": {
            "exactMatch": "myhost.io"
          },
          "scheme": {
            "exactMatch": "https"
          },
          "query": {
            "exactMatch": ""
          },
          "body": {
            "exactMatch": ""
          },
          "headers": {
            "Accept": [
              "text/html,application/xhtml+xml,application/xml;q=0.9,image/webp,*/*;
↪q=0.8"
            ],
            "Content-Type": [
              "text/plain; charset=utf-8"
            ],
            "User-Agent": [
              "Mozilla/5.0 (Macintosh; Intel Mac OS X 10_11_6) AppleWebKit/537.36_
↪(KHTML, like Gecko) Chrome/52.0.2743.116 Safari/537.36"
            ]
          }
        }
      }
    ]
  }
}
```

```

    "response": {
      "status": 200,
      "body": "<h1>Matched on template</h1>",
      "encodedBody": false,
      "headers": {
        "Content-Type": [
          "text/html; charset=utf-8"
        ]
      }
    },
    "request": {
      "path": {
        "exactMatch": "/template"
      }
    }
  }
],
"globalActions": {
  "delays": []
}
},
"meta": {
  "schemaVersion": "v2",
  "hoverflyVersion": "v0.11.0",
  "timeExported": "2016-11-11T11:53:52Z"
}
}

```

### GET /api/v2/simulation/schema

Gets the JSON Schema used to validate the simulation JSON.

### GET /api/v2/hoverfly

Gets configuration information from the running instance of Hoverfly.

Example response body:

```

{
  "destination": ".",
  "middleware": {
    "binary": "python",
    "script": "# a python script would go here",
    "remote": ""
  },
  "mode": "simulate",
  "usage": {
    "counters": {
      "capture": 0,
      "modify": 0,
      "simulate": 0,
      "synthesize": 0
    }
  }
}

```

```
}
  }
}
```

---

### GET /api/v2/hoverfly/destination

Gets the current destination setting for the running instance of Hoverfly.

Example response body:

```
{
  destination: "."
}
```

### PUT /api/v2/hoverfly/destination

Sets a new destination for the running instance of Hoverfly, overwriting the existing destination setting.

Example request body:

```
{
  destination: "new-destination"
}
```

---

### GET /api/v2/hoverfly/middleware

Gets the middleware settings for the running instance of Hoverfly. This could be either an executable binary, a script that can be executed with a binary or a URL to remote middleware.

Example response body:

```
{
  "binary": "python",
  "script": "#python code goes here",
  "remote": ""
}
```

### PUT /api/v2/hoverfly/middleware

Sets new middleware, overwriting the existing middleware for the running instance of Hoverfly. The middleware being set can be either an executable binary located on the host, a script and the binary to execute it or the URL to a remote middleware.

Example request body:

```
{
  "binary": "python",
  "script": "#python code goes here",
  "remote": ""
}
```



### GET /api/v2/hoverfly/mode

Gets the mode for the running instance of Hoverfly.

Example response body:

```
{
  mode: "simulate"
}
```

---

### PUT /api/v2/hoverfly/mode

Changes the mode of the running instance of Hoverfly.

Example request body:

```
{
  mode: "simulate"
}
```

---

### GET /api/v2/hoverfly/usage

Gets metrics information for the running instance of Hoverfly.

Example response body:

```
{
  "metrics": {
    "counters": {
      "capture": 0,
      "modify": 0,
      "simulate": 0,
      "synthesize": 0
    }
  }
}
```

---

### GET /api/v2/hoverfly/version

Gets the version of Hoverfly.

Example response body:

```
{
  "version": "v0.10.1"
}
```

---

### GET /api/v2/hoverfly/upstream-proxy

Gets the upstream proxy configured for Hoverfly.

Example response body:

```
{
  "upstream-proxy": "proxy.corp.big-it-company.org:8080"
}
```

---

### GET /api/v2/cache

Gets the requests and responses stored in the cache.

```
{
  "cache": [
    {
      "key": "2fc8afceec1b6bcf99ff1f547c1f5b11",
      "matchingPair": {
        "request": {
          "path": {
            "exactMatch": "hoverfly.io"
          }
        },
        "response": {
          "status": 200,
          "body": "response body",
          "encodedBody": false,
          "headers": {
            "Hoverfly": [
              "Was-Here"
            ]
          }
        }
      },
      "headerMatch": false
    }
  ]
}
```

---

### DELETE /api/v2/cache

Delete all requests and responses stored in the cache.

---

### GET /api/v2/logs

Gets the logs from Hoverfly.

```
{
  "logs": [
    {
      "level": "info",
      "msg": "serving proxy",
      "time": "2017-03-13T12:22:39Z"
    },
    {
      "destination": ".",
      "level": "info",
      "mode": "simulate",
      "msg": "current proxy configuration",
      "port": "8500",
      "time": "2017-03-13T12:22:39Z"
    },
    {
      "destination": ".",
      "Mode": "simulate",
      "ProxyPort": "8500",
      "level": "info",
      "msg": "Proxy prepared...",
      "time": "2017-03-13T12:22:39Z"
    }
  ]
}
```

## Simulation schema

This is the JSON schema for v2 Hoverfly simulations.

```
{
  "additionalProperties": false,
  "definitions": {
    "delay": {
      "properties": {
        "delay": {
          "type": "integer"
        },
        "httpMethod": {
          "type": "string"
        },
        "urlPattern": {
          "type": "string"
        }
      }
    },
    "type": "object"
  },
  "field-matchers": {
    "properties": {
      "exactMatch": {
        "type": "string"
      },
      "globMatch": {
        "type": "string"
      },
      "jsonMatch": {
```

```
    "type": "string"
  },
  "regexMatch": {
    "type": "string"
  },
  "xpathMatch": {
    "type": "string"
  }
},
"type": "object"
},
"headers": {
  "additionalProperties": {
    "items": {
      "type": "string"
    },
    "type": "array"
  },
  "type": "object"
},
"meta": {
  "properties": {
    "hoverflyVersion": {
      "type": "string"
    },
    "schemaVersion": {
      "type": "string"
    },
    "timeExported": {
      "type": "string"
    }
  },
  "required": [
    "schemaVersion"
  ],
  "type": "object"
},
"request": {
  "properties": {
    "body": {
      "$ref": "#/definitions/field-matchers"
    },
    "destination": {
      "$ref": "#/definitions/field-matchers"
    },
    "headers": {
      "$ref": "#/definitions/headers"
    },
    "path": {
      "$ref": "#/definitions/field-matchers"
    },
    "query": {
      "$ref": "#/definitions/field-matchers"
    },
    "scheme": {
      "$ref": "#/definitions/field-matchers"
    }
  },
}
```

```

    "type": "object"
  },
  "request-response-pair": {
    "properties": {
      "request": {
        "$ref": "#/definitions/request"
      },
      "response": {
        "$ref": "#/definitions/response"
      }
    },
    "required": [
      "request",
      "response"
    ],
    "type": "object"
  },
  "response": {
    "properties": {
      "body": {
        "type": "string"
      },
      "encodedBody": {
        "type": "boolean"
      },
      "headers": {
        "$ref": "#/definitions/headers"
      },
      "status": {
        "type": "integer"
      }
    },
    "type": "object"
  }
},
"description": "Hoverfly simulation schema",
"properties": {
  "data": {
    "properties": {
      "globalActions": {
        "properties": {
          "delays": {
            "items": {
              "$ref": "#/definitions/delay"
            },
            "type": "array"
          }
        },
        "type": "object"
      },
      "pairs": {
        "items": {
          "$ref": "#/definitions/request-response-pair"
        },
        "type": "array"
      }
    },
    "type": "object"
  }
}

```

```
    },
    "meta": {
      "$ref": "#/definitions/meta"
    }
  },
  "required": [
    "data",
    "meta"
  ],
  "type": "object"
}
```

## Contributing

Contributions are welcome! To contribute, please:

1. Fork the repository
2. Create a feature branch on your fork
3. Commit your changes, and create a pull request against Hoverfly's master branch

In your pull request, please include details regarding your change (why you made the change, how to test it etc).

Learn more about the [forking workflow here](#).

## Building, running & testing

You will need [Go 1.8](#) . Instructions on how to set up your Go environment can be [found here](#).

```
cd $GOPATH/src
mkdir -p github.com/SpectoLabs/
cd github.com/SpectoLabs/
git clone https://github.com/SpectoLabs/hoverfly.git
# or: git clone https://github.com/<your_username>/hoverfly.git
cd hoverfly
make build
```

Notice the binaries are in the `target` directory.

Finally, to test your build:

```
make test
```

## Community

- Chat on the [Hoverfly Gitter channel](#)
- [Joining the Hoverfly mailing list](#)
- [Raise a GitHub Issue](#)
- [Get in touch with SpectoLabs on Twitter](#)