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# **wtg-seal Documentation**

***Release 0.4.0.post0.dev4+gefbb454***

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A **W**eb **T**raffic **G**enerator based on **SURGE**, Statistics and Locust.



# CHAPTER 1

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## Overview

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WTG-SEAL is a web traffic generator based on a statistical approach inspired by [[SURGE](#)] and implemented using [Locust](#).

In fact, it is expected that the input files for WTG-SEAL are the output files from SURGE, although one should be able to create their own files.





### 2.1 Installing with pip

To install the latest release of WTG-SEAL, just run

```
pip install wtg-seal
```

### 2.2 Requirements

In order to generate your `locustfile.py` using WTG-SEAL, you will need of two text files formatted as follow:

#### 2.2.1 Documents Definitions

A text file where each line describes a web document, which is defined as a collection of one or more objects. For instance, a `docdef.txt` with the following content:

```
1
5 8
```

maps to a document represented by a single file `1.txt` and another document represented by the files `5.txt` and `8.txt`. Each document is identified by a sequential number (the order it appears on the file, starting from 0).

Ideally, this is the `objout.txt` file generated by SURGE.

#### 2.2.2 Documents Requests Sequence

A text file where each line contains a document identifier (*i.e* an integer) in the order they were to be requested to a web server. For instance, a `docseq.txt` with the following content:

```
0
0
1
0
```

represents requests to documents 0, 0, 1, 0. This is used by WTG-SEAL to calculate the weight of each locust task. Ideally, this is the `name.txt` file generated by SURGE.

## 2.3 Server Side

Considering the previous example, it would be necessary that files named `1.txt`, `5.txt` and `8.txt` exist on a web-server to where the requests will be made.

## 2.4 Generating web traffic

Once you have the appropriate files, just run

```
wtgseal docdef.txt docseq.txt
```

This will create a file in the current directory named `locustfile.py`.

From here, you will rely on Locust to generate the web traffic towards a web server of your choice. Just run

```
locust
```

and access the URL provided on your screen. For more information, see [Locust documentation](#).

# CHAPTER 3

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## Contributing

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For contributing or making your own modifications to the source code, run:

```
git clone https://github.com/mchoji/wtg-seal.git
cd wtg-seal
pipenv install -e .
pipenv install --dev
```

### 3.1 Pre-commit hooks

In order to make sure the hooks will run, please don't forget to install the `pre-commit` package:

```
cd wtg-seal
pipenv install --dev
pipenv run pre-commit install
# update the hooks to the latest version
pipenv run pre-commit autoupdate
```



## CHAPTER 4

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### Versioning

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## 5.3 Changelog

### 5.3.1 Current version

#### Version 0.4.0, 2020-10-23

- Mainly focused on adapt code according to changes added in Locust v1.0.0. For details, refer to <https://docs.locust.io/en/1.0/changelog.html>.

### 5.3.2 Older versions

#### Version 0.3.0, 2020-04-03

- Option to control CSV statistics interval
- Now it is possible to group requests based on document id to show in Locust's statistics

#### Version 0.2.0, 2020-04-02

- Add cli options for class weight and seed for wait time generator
- Function `setup_locust` now has positional-only and keyword-only arguments

### Version 0.1.2, 2020-03-07

- Fix nomenclatures inconsistency
- Add missing documentation

### Version 0.1.1, 2020-03-06

- Fix README.md and setup.cfg

### Version 0.1.0, 2020-03-06

- First release

## 5.4 wtgseal

### 5.4.1 wtgseal package

#### Submodules

#### wtgseal.cli module

Command-Line-Interface for wtg-seal.

This module provides a command line interface for wtg-seal. Particularly, it manages some options and defines the main function.

`wtgseal.cli.add_default_args(parser: argparse.ArgumentParser) → None`

Add default options and arguments to the CLI parser.

**Parameters** `parser` (`{argparse.ArgumentParser}`) – CLI parser object

`wtgseal.cli.main(args: List[str])`

Set main entry point for external applications.

**Parameters** `args` (`{List[str]}`) – Command line arguments.

`wtgseal.cli.parse_args(args: List[str]) → Dict[KT, VT]`

Parse command line arguments.

**Parameters** `args` (`{List[str]}`) – Command line arguments as list of strings.

**Returns** Command line arguments as dictionary.

**Return type** Dict

`wtgseal.cli.run()`

Entry point for console script.

`wtgseal.cli.run_wtgseal(opts: Dict[KT, VT]) → None`

Create a locust file.

Call the python API to create a locust file, according to the inputs provided.

**Parameters** `opts` (`{Dict}`) – Command line arguments as a dictionary.

**Raises** `FileExistsError` – If output file exists and option `--force` was not given.

`wtgseal.cli.validate_file` (*path: pathlib.Path*) → None

Validate a given file path.

Validate if a given path exists and it is a file, throwing an exception otherwise.

**Parameters** `path` (*{Path}*) – The file represented as a Path object.

**Raises** `FileNotFoundError` – If file does not exist or it is not a file.

## wtgseal.make module

Functions to generate locust code.

This module contains functions to generate locust code, *i.e.* it defines tasks, tasksets and users.

`wtgseal.make.cmddef_to_str` (*cmddef: Tuple[int, str]*, *indentby: str = ' '*) → str

Convert a command definition into a string.

`wtgseal.make.setup_blank_line` (*n: int = 1*) → List[Tuple[int, str]]

Generate representation for a given number of blank lines.

`wtgseal.make.setup_csv_stats_interval` (*t: int*) → List[Tuple[int, str]]

Generate import and settings for CSV stats interval.

Generate code to import locust.stats module and set the property `CSV_STATS_INTERVAL_SEC`.

**Parameters** `t` (*{int}*) – How frequently (in seconds) CSV data are to be written. This has only effect when `-csv-full-history` is passed to locust run.

**Returns** A list of code representation, where each item represents a line of import.

**Return type** BlockDef

`wtgseal.make.setup_header` (*\**, *dist: str = 'wtg-seal'*, *version: str = '0.4.0.post0.dev4+gefbb454'*,  
*url: str = 'https://github.com/mchoji/wtg-seal'*) → List[Tuple[int, str]]

Generate a simple header with dist, version and url information.

Generate a program header citing the distribution name from where it was generated, the current version and the url where one can find further information.

`wtgseal.make.setup_import` () → List[Tuple[int, str]]

Generate the import lines for a locust file.

Generate code to import the modules needed for running a locust file.

**Returns** A list of code representation, where each item represents a line of import.

**Return type** BlockDef

`wtgseal.make.setup_task` (*name: str = 'task0'*, *uri: List[str] = ['/']*, *\**, *weight: int = 1*, *group\_name: str = None*, *indlevel: int = 0*) → List[Tuple[int, str]]

Generate code to define a locust task.

Generate code to define a locust task according to the given parameters.

### Parameters

- **name** (*{str}*, *optional*) – The name for the task to be generated (the default is 'task0')
- **weight** (*{int}*, *optional*) – The weight for the generated task (the default is 1)
- **uri** (*{List[str] = ["/", ]}*) – A list of URIs, each starting with a backslash like `"/index.html"`

- **group\_name** (*str*) – Group URLs together in Locust’s statistics using this name (the default is None, which leads to calculate statistics for each URL separately)
- **indlevel** (*{int}*, *optional*) – The indentation level where the task definition should begin (the default is 0, which leads to code beginning at the left margin)

**Returns** A list where each item represents a line of code to be generated. Each Tuple[int, str] consists of the indentation level for the code and the code itself. *None* is returned in case *uri* is not an iterable.

**Return type** List[Tuple[int, str]]

`wtgseal.maker.setup_taskset(name: str = 'MyTaskSet') → List[Tuple[int, str]]`

Generate representation of TaskSet subclass definition.

`wtgseal.maker.setup_user(name: str = 'MyUser', taskset: str = 'MyTaskSet', *, wait_seed: int = 1, weight: int = 1, indlevel: int = 0) → List[Tuple[int, str]]`

Generate a model for user behaviour.

Generate a representation for a User subclass, which represents an user behaviour. The representation contains the class name, taskset, and a wait time based on a Pareto distribution.

#### Parameters

- **name** (*{str}*, *optional*) – The new class name (the default is 'MyUser').
- **taskset** (*{str}*, *optional*) – The tasksets this class will use (the default is 'MyTaskSet').
- **wait\_seed** (*{int}*, *optional*) – The seed to be used for the Pareto distribution from where the wait times are retrieved (the default is 1).
- **weight** (*{int}*, *optional*) – The weight for this class. The greater this value, the greater the chances this class will be spawned. Only important in case you have more than one User subclass and with they be spawned at different rates.
- **indlevel** (*{int}*, *optional*) – The indentation level where the task definition should begin (the default is 0, which leads to code beginning at the left margin).

**Returns** A list where each item represents a line of code to be generated. Each Tuple[int, str] consists of the indentation level for the code and the code itself.

**Return type** List[Tuple[int, str]]

#### Notes

An OFF time is defined in this class by the *wait\_time* attribute. This attribute defines how long a locust will wait after each task. Here, we define it as a pareto distribution with shape 1.4 and scale 1.0, based on SURGE implementation [\[1\]](#).

#### References

##### See also:

`locust.Locust()`

`wtgseal.maker.write_locust(path: pathlib.Path, filedef: List[Tuple[int, str]], indentby: str = ' ') → None`

Write python code to file.

Convert blocks of code definition and generate the actual code, writing it into a file.

### Parameters

- **path** (*{Path}*) – The file to be written.
- **filedef** (*{BlockDef}*) – The representation of the code to be written.
- **indentby** (*{str}*, *optional*) – The indentation to be adopted (the default is ‘ ‘ \* 4)

## wtgseal.utils module

Utilities for wtg-seal.

This module offers utilities function for wtg-seal, mainly focused on file parsing.

`wtgseal.utils.calc_weights(freqs: Counter[T]) → Counter[T]`

Calculate weights for locust tasks.

Calculate locust task weights based on the frequency that each document was requested, as given by *freqs*.

**Parameters** **freqs** (*{Counter}*) – The number of requests for each document.

**Returns** The weight for each document when mapped as a locust task.

**Return type** Counter

`wtgseal.utils.count_requests(file: TextIO) → Counter[T]`

Count the number of requests for each document.

Count the number of requests made for each document based on a given sequence of document requests.

**Parameters** **file** (*{TextIO}*) – A file containing a sequence of integers representing indexes of documents in a web server.

**Returns** A *collection.Counter* with the frequencies for each document.

**Return type** Frequency

`wtgseal.utils.parse_documents(file: TextIO) → Generator[List[str], None, None]`

Parse a text file containing documents definitions into lists.

Read a file containing web documents representations and generates lists of URIs related to each object.

**Parameters** **file** (*{TextIO}*) – A file handler to the file to be parsed. The file should contain one or more lines, which being a space-separated list of integers. Each line represents a document to be retrieved from a web server. A document is made of one or more files, given by the integers.

**Yields** *List[str]* – The representation of the next document, *i.e.* the URIs of the files that compose the document.

## Notes

Ideally, *file* is the file *objout.txt* generated by the program *objects*, part of SURGE [\[1\]](#).

## References

`wtgseal.utils.parse_requests(file: TextIO) → Generator[int, None, None]`

Parse a text file containing a sequence of documents requests.

Read a file containing a sequence of documents identifiers which was to be requested to a web server.

**Parameters** **file** (*{TextIO}*) – A file handler to the file to be parsed. The file should contain one or more lines with an integer in each of them.

**Yields** *int* – The index of the next document to be requested.

## Notes

Ideally, *file* is the file *name.txt* generated by the program *lru*, part of SURGE [1].

## References

### Module contents

A Web Traffic Generator based on SURGE, Statistics and Locust.

WTG-SEAL is a web traffic generator based on a statistical approach inspired by SURGE and implemented using Locust.





## CHAPTER 6

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### Indices and tables

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- `genindex`
- `modindex`
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## CHAPTER 7

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## Bibliography

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- [SURGE] Barford, P., & Crovella, M. (1998, June). Generating representative web workloads for network and server performance evaluation. In *Proceedings of the 1998 ACM SIGMETRICS joint international conference on Measurement and modeling of computer systems* (pp. 151-160).



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