

# MISP-STIX PROJECT

PYTHON LIBRARY TO CONVERT MISP <-> STIX

MISP CORE TEAM

*TLP:WHITE*

MISP PROJECT

<https://www.misp-project.org/>

MISP TRAINING



## ■ Built-in integration

- ▶ Available from the UI
- ▶ Accessible via restSearch

## ■ Export & Import features

- ▶ Export MISP data collections
- ▶ Import STIX files

## ■ Supported version

- ▶ STIX 1.1.1 & 1.2
- ▶ STIX 2.0 & 2.1

- MISP  $\longleftrightarrow$  STIX conversion
  - ▶ Used by MISP core to handle the conversion ability
  - ▶ Preserve as much content & context as possible
- Support all the STIX versions
  - ▶ **STIX 2.1 Support**
  - ▶ 1.1.1, 1.2, 2.0 Support enhanced
- **Mapping documentation**<sup>1</sup>
- Package available on PyPI<sup>2</sup>

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<sup>1</sup><https://github.com/misp/misp-stix/tree/main/documentation#readme>

<sup>2</sup><https://pypi.org/project/misp-stix/>

# HANDLING THE CONVERSION WITH A PYTHON LIBRARY

## ■ Integration in python code

### ► Automation made easier by a close coupling with PyMISP

### ■ Export content from MISP

```
In [1]: import json
...: from misp_stix_converter import MISPToSTIX21Parser
...: from pymisp import PyMISP
...: with open('tmp/config.json', 'r') as f:
...:     url, api_key, verify_cert = json.load(f)
...: misp = PyMISP(url, api_key, verify_cert)
...: misp.toggle_global_pythonify()
...: collection = misp.search(
...:     controller='attributes', page=1,
...:     type_attribute='ip-src', limit=10,
...:     tags=['tlp:white', 'tlp:clear']
...: )
...: parser = MISPToSTIX21Parser()
...: parser.parse_misp_attributes(collection)
...: print(parser.bundle.serialize())
```

```
{
  "type": "bundle",
  "id": "bundle--a421897a-cafe-45ad-97ef-58761f6fac54",
  "objects": [
    {
      "type": "identity",
      "spec version": "2.1",
      "id": "identity--55f6ea65-aa10-4c5a-bf01-4f84950d210f",
      "created": "2015-09-14T15:40:21.000Z",
      "modified": "2015-09-14T15:40:21.000Z",
      "name": "MISP",
      "identity class": "organization",
      "type": "indicator",
      "spec version": "2.1",
      "id": "indicator--e4cfe-21ac-46a7-9d82-06b3950d210b",
      "created by ref": "identity--55f6ea65-aa10-4c5a-bf01-4f84950d210f",
      "created": "2014-10-03T07:15:10.000Z",
      "modified": "2014-10-03T07:15:10.000Z",
      "pattern": "[network-traffic:src_ref.type = 'ipv4-addr' AND network-traffic:src_ref.value = '1.48.209.68']",
      "pattern type": "stix",
      "pattern version": "2.1",
      "valid from": "2014-10-03T07:15:10.000Z",
      "kill_chain_phases": [
        {
          "kill_chain name": "misp-category",
          "phase name": "Network activity",
          "labels": [
            {
              "type": "indicator",
              "spec version": "2.1",
              "id": "indicator--542e4cfe-05f4-46ab-b5b8-06b3950d210b",
              "created by ref": "identity--55f6ea65-aa10-4c5a-bf01-4f84950d210f",
              "created": "2014-10-03T07:15:10.000Z",
              "modified": "2014-10-03T07:15:10.000Z",
              "pattern": "[network-traffic:src_ref.type = 'ipv4-addr' AND network-traffic:src_ref.value = '1.73.227.172']",
              "pattern type": "stix",
              "pattern version": "2.1",
              "valid from": "2014-10-03T07:15:10.000Z",
              "kill_chain_phases": [
                {
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                  "labels": [
                    {
                      "type": "indicator",
                      "spec version": "2.1",
                      "id": "indicator--542e4cfe-81c4-45f2-9e67-06b3950d210b",
                      "created by ref": "identity--55f6ea65-aa10-4c5a-bf01-4f84950d210f",
                      "created": "2014-10-03T07:15:10.000Z",
                      "modified": "2014-10-03T07:15:10.000Z",
                      "pattern": "[network-traffic:src_ref.type = 'ipv4-addr' AND network-traffic:src_ref.value = '1.162.58.214']",
                      "pattern type": "stix",
                      "pattern version": "2.1",
                      "valid from": "2014-10-03T07:15:10.000Z",
                      "kill_chain_phases": [
                        {
                          "kill_chain name": "misp-category",
                          "phase name": "Network activity",
                          "labels": [
                            {
                              "type": "indicator",
                              "spec version": "2.1",
                              "id": "indicator--542e4cfe-81c4-45f2-9e67-06b3950d210b",
                              "created by ref": "identity--55f6ea65-aa10-4c5a-bf01-4f84950d210f",
                              "created": "2014-10-03T07:15:10.000Z",
                              "modified": "2014-10-03T07:15:10.000Z",
                              "pattern": "[network-traffic:src_ref.type = 'ipv4-addr' AND network-traffic:src_ref.value = '1.162.58.214']",
                              "pattern type": "stix",
                              "pattern version": "2.1",
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                                  "phase name": "Network activity",
                                  "labels": [
                                    {
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                                      "spec version": "2.1",
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                                      "created by ref": "identity--55f6ea65-aa10-4c5a-bf01-4f84950d210f",
                                      "created": "2014-10-03T07:15:10.000Z",
                                      "modified": "2014-10-03T07:15:10.000Z",
                                      "pattern": "[network-traffic:src_ref.type = 'ipv4-addr' AND network-traffic:src_ref.value = '1.162.58.214']",
                                      "pattern type": "stix",
                                      "pattern version": "2.1",
                                      "valid from": "2014-10-03T07:15:10.000Z",
                                      "kill_chain_phases": [
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                                          "phase name": "Network activity",
                                          "labels": [
                                            {
                                              "type": "indicator",
                                              "spec version": "2.1",
                                              "id": "indicator--542e4cfe-81c4-45f2-9e67-06b3950d210b",
                                              "created by ref": "identity--55f6ea65-aa10-4c5a-bf01-4f84950d210f",
                                              "created": "2014-10-03T07:15:10.000Z",
                                              "modified": "2014-10-03T07:15:10.000Z",
                                              "pattern": "[network-traffic:src_ref.type = 'ipv4-addr' AND network-traffic:src_ref.value = '1.162.58.214']",
                                              "pattern type": "stix",
                                              "pattern version": "2.1",
                                              "valid from": "2014-10-03T07:15:10.000Z",
                                              "kill_chain_phases": [
                                                {
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                                                  "phase name": "Network activity",
                                                  "labels": [
                                                    {
                                                      "type": "indicator",
                                                      "spec version": "2.1",
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                                                      "created by ref": "identity--55f6ea65-aa10-4c5a-bf01-4f84950d210f",
                                                      "created": "2014-10-03T07:15:10.000Z",
                                                      "modified": "2014-10-03T07:15:10.000Z",
                                                      "pattern": "[network-traffic:src_ref.type = 'ipv4-addr' AND network-traffic:src_ref.value = '1.162.58.214']",
                                                      "pattern type": "stix",
                                                      "pattern version": "2.1",
                                                      "valid from": "2014-10-03T07:15:10.000Z",
                                                      "kill_chain_phases": [
                                                        {
                                                          "kill_chain name": "misp-category",
                                                          "phase name": "Network activity",
                                                          "labels": [
                                                            {
                                                              "type": "indicator",
                                                              "spec version": "2.1",
                                                              "id": "indicator--542e4cfe-81c4-45f2-9e67-06b3950d210b",
                                                              "created by ref": "identity--55f6ea65-aa10-4c5a-bf01-4f84950d210f",
                                                              "created": "2014-10-03T07:15:10.000Z",
                                                              "modified": "2014-10-03T07:15:10.000Z",
                                                              "pattern": "[network-traffic:src_ref.type = 'ipv4-addr' AND network-traffic:src_ref.value = '1.162.58.214']",
                                                              "pattern type": "stix",
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                                                              "valid from": "2014-10-03T07:15:10.000Z",
                                                              "kill_chain_phases": [
                                                                {
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                                                                  "phase name": "Network activity",
                                                                  "labels": [
                                                                    {
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                                                                      "spec version": "2.1",
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                                                                      "created": "2014-10-03T07:15:10.000Z",
                                                                      "modified": "2014-10-03T07:15:10.000Z",
                                                                      "pattern": "[network-traffic:src_ref.type = 'ipv4-addr' AND network-traffic:src_ref.value = '1.162.58.214']",
                                                                      "pattern type": "stix",
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                                                                      "valid from": "2014-10-03T07:15:10.000Z",
                                                                      "kill_chain_phases": [
                                                                        {
                                                                          "kill_chain name": "misp-category",
                                                                          "phase name": "Network activity",
                                                                          "labels": [
                                                                            {
                                                                              "type": "indicator",
                                                                              "spec version": "2.1",
                                                                              "id": "indicator--542e4cfe-81c4-45f2-9e67-06b3950d210b",
                                                                              "created by ref": "identity--55f6ea65-aa10-4c5a-bf01-4f84950d210f",
                                                                              "created": "2014-10-03T07:15:10.000Z",
                                                                              "modified": "2014-10-03T07:15:10.000Z",
                                                                              "pattern": "[network-traffic:src_ref.type = 'ipv4-addr' AND network-traffic:src_ref.value = '1.162.58.214']",
                                                                              "pattern type": "stix",
                                                                              "pattern version": "2.1",
                                                                              "valid from": "2014-10-03T07:15:10.000Z",
                                                                              "kill_chain_phases": [
                                                                                {
                                                                                  "kill_chain name": "misp-category",
                                                                                  "phase name": "Network activity",
                                                                                  "labels": [
                                                                                    {
                                                                                      "type": "indicator",
                                                                                      "spec version": "2.1",
                                                                                      "id": "indicator--542e4cfe-81c4-45f2-9e67-06b3950d210b",
                                                                                      "created by ref": "identity--55f6ea65-aa10-4c5a-bf01-4f84950d210f",
                                                                                      "created": "2014-10-03T07:15:10.000Z",
                                                                                      "modified": "2014-10-03T07:15:10.000Z",
                                                                                      "pattern": "[network-traffic:src_ref.type = 'ipv4-addr' AND network-traffic:src_ref.value = '1.162.58.214']",
                                                                                      "pattern type": "stix",
                                                                                      "pattern version": "2.1",
                                                                                      "valid from": "2014-10-03T07:15:10.000Z",
                                                                                      "kill_chain_phases": [
                                                                                      ...

```

## HANDLING THE CONVERSION WITH A PYTHON LIBRARY

- Integration in python code

- ▶ Automation made easier by a close coupling with PyMISP
  - Export content from MISP
  - Using the STIX return format directly

```
In [2]: import json
...: from pymisp_stix_converter import MISPToSTIX21Parser
...: from pymisp import PyMISP
...: with open('tmp/config.json', 'r') as f:
...:     url, api_key, verify_cert = json.load(f)
...:     misp = PyMISP(url, api_key, verify_cert)
...:     misp.toggle_global_pythonify()
...:     body = {
...:         'returnFormat': 'stix2', 'stix-version': '2.1',
...:         'type': 'ip-src', 'tags': {'tlp:white', 'tlp:clear'},
...:         'page': 1, 'limit': 10
...:     }
...:     print(misp.direct_call('/attributes/restSearch', body))
{'type': 'bundle', 'id': 'bundle--b8a39b06-219a-4f49-b46a-lba30051a9bc', 'objects': [{'type': 'identity', 'spec ve
', 'id': 'identity--55f6ea65-aal0-4c5a-bf01-4f84950d210f', 'created': '2015-09-14T15:40:21.000Z', 'modified': '2015
21.000Z', 'name': 'MISP', 'identity_class': 'organization'}, {'type': 'indicator', 'spec version': '2.1', 'id': 'in
e4cfce-21ac-46a7-9d82-06b3950d210b', 'created by ref': 'identity--55f6ea65-aal0-4c5a-bf01-4f84950d210f', 'created':
07:15:10.000Z', 'modified': '2014-10-03T07:15:10.000Z', 'pattern': "[network-traffic:src_ref.type = 'ipv4-addr' AND
fic:src_ref.value = '1.48.209.68']", 'pattern_type': 'stix', 'pattern_version': '2.1', 'valid_from': '2014-10-03T
kill_chain_phases': [{'kill chain name': 'misp-category', 'phase_name': 'Network activity'}], 'labels': ['misp:type
'misp:category="Network activity"', 'misp:to_ids="True"']}, {'type': 'indicator', 'spec version': '2.1', 'id': 'in
4cfe-05f4-46ab-b5b8-06b3950d210b', 'created by ref': 'identity--55f6ea65-aal0-4c5a-bf01-4f84950d210f', 'created':
7:15:10.000Z', 'modified': '2014-10-03T07:15:10.000Z', 'pattern': "[network-traffic:src_ref.type = 'ipv4-addr' AND
fic:src_ref.value = '1.73.227.172']", 'pattern_type': 'stix', 'pattern_version': '2.1', 'valid_from': '2014-10-03T
kill_chain_phases': [{'kill chain name': 'misp-category', 'phase_name': 'Network activity'}], 'labels': ['misp:type
'misp:category="Network activity"', 'misp:to_ids="True"']}, {'type': 'indicator', 'spec version': '2.1', 'id': 'in
4cfe-81c4-45f2-9e67-06b3950d210b', 'created by ref': 'identity--55f6ea65-aal0-4c5a-bf01-4f84950d210f', 'created':
7:15:10.000Z', 'modified': '2014-10-03T07:15:10.000Z', 'pattern': "[network-traffic:src_ref.type = 'ipv4-addr' AND
fic:src_ref.value = '1.162.58.214']", 'pattern_type': 'stix', 'pattern_version': '2.1', 'valid_from': '2014-10-03T
kill_chain_phases': [{'kill chain name': 'misp-category', 'phase_name': 'Network activity'}], 'labels': ['misp:type
'misp:category="Network activity"', 'misp:to_ids="True"']}, {'type': 'indicator', 'spec version': '2.1', 'id': 'in
4cfe-81c4-45f2-9e67-06b3950d210b', 'created by ref': 'identity--55f6ea65-aal0-4c5a-bf01-4f84950d210f', 'created':
7:15:10.000Z', 'modified': '2014-10-03T07:15:10.000Z', 'pattern': "[network-traffic:src_ref.type = 'ipv4-ad
```

# HANDLING THE CONVERSION WITH A PYTHON LIBRARY

## ■ Integration in python code

- ▶ Automation made easier by a close coupling with PyMISP
  - Converting STIX content and adding the resulting Event

```
In [1]: import json
...: from misp_stix_converter import ExternalSTIX2toMISPParser
...: from pathlib import Path
...: from pymisp import PyMISP
...: with open('tmp/config.json', 'r') as f:
...:     url, api_key, verify_cert = json.load(f)
...: misp = PyMISP(url, api_key, verify_cert)
...: misp.toggle_global_pythonify()
...: parser = ExternalSTIX2toMISPParser()
...: parser.parse_stix_content(
...:     'tmp/AA23-263A_#StopRansomware_Snatch_Ransomware.stix21.json'
...: )
...: event = misp.add_event(parser.misp_event)
...: event.id
Out[1]: 1424
```

## ■ Using the API endpoint directly

```
In [2]: params = {'galaxies_as_tags': 0, 'debug': 1}
...: response = misp.upload_stix(
...:     'tmp/AA23-187A.stix21.json', kw_params=params
...: )
...: response.json()['Event']['id']
Out[2]: '1425'
```

# HANDLING THE CONVERSION WITH A PYTHON LIBRARY

## ■ Addressing the limitations of a MISP built-in integration

### ► Export & import features available as a command-line application

```
oui chris3d ~/git/MISP/MISP-STIX-Converter
$ (git::dev) poetry run misp_stix_converter export -h
usage: misp_stix_converter export [-h] -f FILE [FILE ...] -v {1.1.1,1.2,2.0,2.1} [-s] [-m] [--output_dir OUTPUT_DIR] [-o OUTPUT_NAME] [--level {attribute,event}]
                                   [--format {json,xml}] [-n NAMESPACE] [-org ORG]

options:
  -h, --help            show this help message and exit
  -f FILE [FILE ...], --file FILE [FILE ...]
                        Path to the file(s) to convert.
  -v {1.1.1,1.2,2.0,2.1}, --version {1.1.1,1.2,2.0,2.1}
                        STIX specific version.
  -s, --single_output   Produce only one result file (in case of multiple input file).
  -m, --in_memory       Store result in memory (in case of multiple result files) instead of storing it in tmp files.
  --output_dir OUTPUT_DIR
                        Output path - used in the case of multiple input files when the 'single_output' argument is not used.
  -o OUTPUT_NAME, --output_name OUTPUT_NAME
                        Output file name - used in the case of a single input file or when the 'single_output' argument is used.

STIX 1 specific arguments:
  --level {attribute,event}
                        MISP data structure level.
  --format {json,xml}    STIX 1 format.
  -n NAMESPACE, --namespace NAMESPACE
                        Namespace to be used in the STIX 1 header.
  -org ORG               Organisation name to be used in the STIX 1 header.
oui chris3d ~/git/MISP/MISP-STIX-Converter
$ (git::dev) poetry run misp_stix_converter import -h
usage: misp_stix_converter import [-h] -f FILE [FILE ...] -v {1,2} [-s] [-o OUTPUT_NAME] [--output_dir OUTPUT_DIR] [-d DISTRIBUTION] [-sg SHARING_GROUP] [--galaxies_as_tags]

options:
  -h, --help            show this help message and exit
  -f FILE [FILE ...], --file FILE [FILE ...]
                        Path to the file(s) to convert.
  -v {1,2}, --version {1,2}
                        STIX major version.
  -s, --single_output   Produce only one MISP event per STIX file(in case of multiple Report, Grouping or Incident objects).
  -o OUTPUT_NAME, --output_name OUTPUT_NAME
                        Output file name - used in the case of a single input file or when the 'single_output' argument is used.
  --output_dir OUTPUT_DIR
                        Output path - used in the case of multiple input files when the 'single_output' argument is not used.
  -d DISTRIBUTION, --distribution DISTRIBUTION
                        Distribution level for the imported MIPS content.
  -sg SHARING_GROUP, --sharing_group SHARING_GROUP
                        Sharing group ID when distribution is 4.
  --galaxies_as_tags    Import MISP Galaxies as tag names instead of the standard Galaxy format.
oui chris3d ~/git/MISP/MISP-STIX-Converter
$ (git::dev) []
```

# HANDLING THE CONVERSION WITH A PYTHON LIBRARY

- Addressing the limitations of a MISP built-in integration
  - Export & import features available as a command-line application

```
oui chrisr3d ~/git/MISP/MISP-STIX-Converter
```

```
$ (git::dev) poetry run misp stix converter import -v 2 -f tmp/debug/STIX/playbook_json/*.json
```

```
Failed parsing the following - and the related error message:
```

```
- tmp/debug/STIX/playbook_json/automated-libra.json - Invalid value for Indicator 'pattern': FAIL: Error found at line 1:0. input is missing brackets
```

```
Successfully processed your files. Results available in:
```

```
- tmp/debug/STIX/playbook_json/adept-libra.json.out
- tmp/debug/STIX/playbook_json/agedlibra.json.out
- tmp/debug/STIX/playbook_json/agent-tesla.json.out
- tmp/debug/STIX/playbook_json/alloytaurus.json.out
- tmp/debug/STIX/playbook_json/api-hammering-technique.json.out
- tmp/debug/STIX/playbook_json/atlassian-confluence-CVE-2022-26134.json.out
- tmp/debug/STIX/playbook_json/avoslocker-ransomware.json.out
- tmp/debug/STIX/playbook_json/blackbasta-ransomware.json.out
- tmp/debug/STIX/playbook_json/blackcat-ransomware.json.out
- tmp/debug/STIX/playbook_json/bluesky-ransomware.json.out
- tmp/debug/STIX/playbook_json/boggyserpens.json.out
- tmp/debug/STIX/playbook_json/brute-ratel.json.out
- tmp/debug/STIX/playbook_json/chromeloader.json.out
- tmp/debug/STIX/playbook_json/clean-ursa.json.out
- tmp/debug/STIX/playbook_json/cloaked-ursa.json.out
- tmp/debug/STIX/playbook_json/clop-ransomware.json.out
- tmp/debug/STIX/playbook_json/conti-ransomware.json.out
- tmp/debug/STIX/playbook_json/crawling-taurus.json.out
- tmp/debug/STIX/playbook_json/crooked-pisces.json.out
- tmp/debug/STIX/playbook_json/darkside-ransomware.json.out
- tmp/debug/STIX/playbook_json/dearcry-ransomware.json.out
- tmp/debug/STIX/playbook_json/egregor-ransomware.json.out
- tmp/debug/STIX/playbook_json/ekans-ransomware.json.out
- tmp/debug/STIX/playbook_json/emotet.json.out
- tmp/debug/STIX/playbook_json/evasive-serpens.json.out
- tmp/debug/STIX/playbook_json/f5-big-ip-cve-2022-1388.json.out
- tmp/debug/STIX/playbook_json/fighting-ursa.json.out
- tmp/debug/STIX/playbook_json/golfing-taurus.json.out
- tmp/debug/STIX/playbook_json/granite-taurus.json.out
- tmp/debug/STIX/playbook_json/hellokitty-ransomware.json.out
- tmp/debug/STIX/playbook_json/hermeticwiper.json.out
- tmp/debug/STIX/playbook_json/hive-ransomware.json.out
```



## ■ Improve the import feature

- ▶ Handle different content design from different sources
- ▶ Support of existing STIX objects libraries<sup>3</sup>
- ▶ Support custom STIX format
- ▶ **Handle validation issues**

## ■ Continuous MISP $\longleftrightarrow$ STIX mapping improvement

## ■ More tests to avoid edge case issues

## ■ Participating in Oasis CTI TC



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<sup>3</sup><https://github.com/mitre/cti>

# HOW TO REPORT BUGS/ISSUES

- Github issues

- ▶ <https://github.com/MISP/misp-stix/issues>
- ▶ <https://github.com/MISP/MISP/issues>

- Please provide details

- ▶ How did the issue happen
- ▶ **Recommendation:** provide samples

- Any feedback welcome

## TO GET IN TOUCH WITH US

- <https://github.com/MISP/misp-stix>
- <https://github.com/MISP/misp-stix/tree/main/documentation>
- <https://github.com/MISP>
- <https://www.misp-project.org/>
- <https://twitter.com/MISPProject>
- [https://twitter.com/chrisred\\_68](https://twitter.com/chrisred_68)