

# Extending MISP with Python modules

MISP - Threat Sharing

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

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MISP Training @ CIRCL  
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**MISP**  
**Threat Sharing**

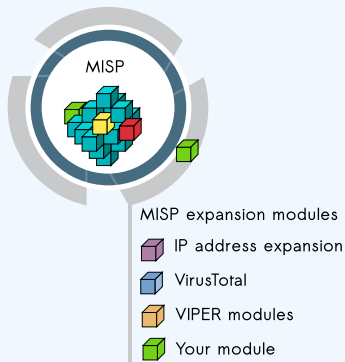
Team CIRCL

- Ways to extend MISP before modules
  - ▶ APIs (PyMISP, MISP API)
    - Works really well
    - **No integration with the UI**
  - ▶ Change the core code
    - Have to change the core of MISP, diverge from upstream
    - Needs a deep understanding of MISP internals
    - Let's not beat around the bush: **Everyone hates PHP**

# GOALS FOR THE MODULE SYSTEM

- Have a way to extend MISP without altering the core
- Get started **quickly** without a need to study the internals
- Make the **modules as light weight as possible**
  - ▶ Module developers should only have to worry about the data transformation
  - ▶ Modules should have a simple and clean skeleton
- In a friendlier language - **Python**

# MISP MODULES - EXTENDING MISP WITH PYTHON SCRIPTS



- Extending MISP with expansion modules with zero customization in MISP.
- A simple ReST API between the modules and MISP allowing auto-discovery of new modules with their features.
- Benefit from existing Python modules in Viper or any other tools.
- MISP modules functionality introduced in MISP 2.4.28.
- MISP import/export modules introduced in MISP 2.4.50.

- MISP modules can be run on the same system or on a remote server.
- Python 3 is required to run MISP modules.
  - ▶ `sudo apt-get install python3-dev python3-pip libpq5`
  - ▶ `cd /usr/local/src/`
  - ▶ `sudo git clone https://github.com/MISP/misp-modules.git`
  - ▶ `cd misp-modules`
  - ▶ `sudo pip3 install -I -r REQUIREMENTS`
  - ▶ `sudo pip3 install -I .`
  - ▶ `sudo vi /etc/rc.local`, add this line: `'sudo -u www-data misp-modules -s &'`

- <http://127.0.0.1:6666/modules> - introspection interface to get **all modules available**
  - ▶ returns a JSON with a description of each module
- <http://127.0.0.1:6666/query> - interface to **query a specific module**
  - ▶ to send a JSON to query the module
- **MISP autodiscovers** the available modules and the MISP site administrator can enable modules as they wish.
- If a configuration is required for a module, **MISP adds automatically the option** in the server settings.

# FINDING AVAILABLE MISP MODULES

■ `curl -s http://127.0.0.1:6666/modules`

```
1      {
2        "type": "expansion",
3        "name": "dns",
4        "meta": {
5          "module-type": [
6            "expansion",
7            "hover"
8          ],
9          "description": "Simple DNS expansion service
10             to resolve IP address from MISP
11             attributes",
12          "author": "Alexandre Dulaunoy",
13          "version": "0.1"
14        },
15        "mispattributes": {
16          "output": [
17            "ip-src",
18            "ip-dst"
19          ],
20          "input": [
21            "hostname",
22            "domain"
23          ]
24        }
25      }
```

## QUERYING A MODULE

- `curl -s http://127.0.0.1:6666/query -H "Content-Type: application/json" -data @body.json -X POST`

body.json

---

```
1 {"module": "dns", "hostname": "www.circl.lu"}
```

---

- and the response of the dns module:

```
1 {"results": [{"values": ["149.13.33.14"],  
2 "types": ["ip-src", "ip-dst"]}]}
```

---



# MISP MODULES - HOW IT'S INTEGRATED IN THE UI?

Filters: All File Network Financial Proposal Correlation					
Value	Comment	Related Events	IDS	Distribution	Actions
microsoft.com			No	Inherit	
google.com		25	No	Inherit	
circl.lu			No	Inherit	

Choose the enrichment module that you wish to use for the expansion

dns

Cancel

Filters: All File Network Financial Proposal Correlation						
Org	Category	Type	Value	Comment	Related Events	IDS
3	Network activity	domain	microsoft.com			No
3	Network activity	domain	google.com		25	No
3	Network activity	domain	circl.lu			No

## Enrichment Results

Below you can see the attributes that are to be created. Make sure that the categories and the types are correct, often several options will be offered based on an inconclusive automatic resolution.

Value	Category	Type	IDS <input type="checkbox"/>	Comment	Actions
23.100.122.175	Network activity	ip-src	<input type="checkbox"/>	Imported via the freetext import.	

ip-src → ip-dst

Update all comment fields

# MISP MODULES - CONFIGURATION IN THE UI

## Server settings

[Overview](#)[MISP settings \(18\)](#)[GnuPG settings \(3\)](#)[Proxy settings \(5\)](#)[Security settings \(2\)](#)[Misc settings \(1\)](#)[Plugin settings \(22\)](#)[Diagnostics](#)[Workers](#)

### Enrichment

Priority	Setting	Value	Description
Critical	Plugin.Enrichment_services_enable	true	Enable/disable the enrichment services
Recommended	Plugin.Enrichment_services_url	http://127.0.0.1	The url used to access the enrichment services
Recommended	Plugin.Enrichment_services_port	6666	The port used to access the enrichment services
Recommended	Plugin.Enrichment_cve_enabled	false	Enable or disable the cve enrichment
Recommended	Plugin.Enrichment_dns_enabled	true	Enable or disable the dns enrichment
Recommended	Plugin.Enrichment_sourcecache_enabled	false	Enable or disable the sourcecache enrichment
Recommended	Plugin.Enrichment_sourcecache_archivepath		Set this required module parameter
Recommended	Plugin.Enrichment_passivetotal_enabled	true	Enable or disable the passivetotal enrichment
Recommended	Plugin.Enrichment_passivetotal_username	alexandre.dulaunoy@circl.lu	Set this required module parameter
Recommended	Plugin.Enrichment_passivetotal_password		Set this required module parameter

- Expansion modules - enrich data that is in MISP
  - ▶ Hover type - showing the expanded values directly on the attributes
  - ▶ Expansion type - showing and adding the expanded values via a proposal form
- Import modules - import new data into MISP
- Export modules - export existing data from MISP

# CREATING YOUR EXPANSION MODULE (SKELETON)

```
import json
import dns.resolver

misperrors = {'error' : 'Error'}
mispattributes = {'input': [], 'output': []}
moduleinfo = {'version': '', 'author': '',
              'description': '', 'module-type': []}

def handler(q=False):
    if q is False:
        return False
    request = json.loads(q)
    r = {'results': [{'types': [], 'values': []}]}
    return r
def introspection():
    return mispattributes
def version():
    return moduleinfo
```

# CREATING YOUR EXPANSION MODULE (METADATA 1)

```
misperrors = {'error' : 'Error'}
mispattributes = {'input': ['hostname', 'domain'], 'output': ['ip-src', 'ip-dst']}
moduleinfo = {'version': '', 'author': '',
              'description': '', 'module-type': []}
```

# CREATING YOUR EXPANSION MODULE (METADATA 2)

```
misperrors = {'error' : 'Error'}
mispattributes = {'input': ['hostname', 'domain'], 'output': ['ip-src', 'ip-dst']}
moduleinfo = {'version': '0.1', 'author': 'Alexandre Dulaunoy',
              'description': 'Simple DNS expansion service to
                             resolve IP address from MISP attributes', 'module-type': ['expansion', 'hover']}
```

# CREATING YOUR EXPANSION MODULE (HANDLER 1)

```
def handler(q=False):  
    if q is False:  
        return False  
    request = json.loads(q)  
    # MAGIC  
    # MORE MAGIC  
    r = {'results': [  
        {'types': output_types, 'values': values},  
        {'types': output_types2, 'values': values2}  
    ]}  
    return r
```

# CREATING YOUR EXPANSION MODULE (HANDLER 2)

```
if request.get('hostname'):
    toquery = request['hostname']
elif request.get('domain'):
    toquery = request['domain']
else:
    return False
r = dns.resolver.Resolver()
r.timeout = 2
r.lifetime = 2
r.nameservers = ['8.8.8.8']
try:
    answer = r.query(toquery, 'A')
except dns.resolver.NXDOMAIN:
    misperors['error'] = "NXDOMAIN"
    return misperors
except dns.exception.Timeout:
    misperors['error'] = "Timeout"
    return misperors
except:
    misperors['error'] = "DNS_resolving_error"
    return misperors
r = {'results': [{ 'types': mispattributes['output'], 'values': [str(answer[o])]}]}
return r
```



# CREATING YOUR MODULE - FINISHED DNS MODULE

```
import json
import dns.resolver
misperrors = {'error': 'Error'}
mispattributes = {'input': ['hostname', 'domain'], 'output': ['ip-src', 'ip-dst']}
moduleinfo = {'version': '0.1', 'author': 'Alexandre_Dulaunoy',
              'description': 'Simple_DNS_expansion_service_to_resolve_IP_address_from_MISP_attributes', 'module-type': ['expansion', 'hover']}

def handler(q=False):
    if q is False:
        return False
    request = json.loads(q)
    if request.get('hostname'):
        toquery = request['hostname']
    elif request.get('domain'):
        toquery = request['domain']
    else:
        return False
    r = dns.resolver.Resolver()
    r.timeout = 2
    r.lifetime = 2
    r.nameservers = ['8.8.8.8']
    try:
        answer = r.query(toquery, 'A')
    except dns.resolver.NXDOMAIN:
        misperrors['error'] = "NXDOMAIN"
        return misperrors
    except dns.exception.Timeout:
        misperrors['error'] = "Timeout"
        return misperrors
    except:
        misperrors['error'] = "DNS_resolving_error"
        return misperrors
    r = {'results': [{ 'types': mispattributes['output'], 'values': [str(answer[o])]}]}
    return r

def introspection():
    return mispattributes

def version():
    return moduleinfo
```

- Copy your module `dns.py` in `modules/expansion/`
- Restart the server `misp-modules.py`

```
[adulau:~/git/misp-modules/bin]$ python3 misp-modules.py
2016-03-20 19:25:43,748 - misp-modules - INFO - MISP modules passivetotal imported
2016-03-20 19:25:43,787 - misp-modules - INFO - MISP modules sourcecache imported
2016-03-20 19:25:43,789 - misp-modules - INFO - MISP modules cve imported
2016-03-20 19:25:43,790 - misp-modules - INFO - MISP modules dns imported
2016-03-20 19:25:43,797 - misp-modules - INFO - MISP modules server started on TCP port 6666
```

- Check if your module is present in the introspection
- `curl -s http://127.0.0.1:6666/modules`
- If yes, test it directly with MISP or via `curl`

# CODE SAMPLES (CONFIGURATION)

```
# Configuration at the top
moduleconfig = ['username', 'password']
# Code block in the handler
    if request.get('config'):
        if (request['config'].get('username') is None) or (request['config'].get('password') is None):
            misperors['error'] = 'CIRCL_Passive_SSL_authentication_is_missing'
            return misperors

x = pypssl.PySSL(basic_auth=(request['config']['username'], request['config']['password']))
```

## DEFAULT EXPANSION MODULE SET

- asn history
- CIRCL Passive DNS
- CIRCL Passive SSL
- Country code lookup
- CVE information expansion
- DNS resolver
- DomainTools
- eupi (checking url in phishing database)
- IntelMQ (experimental)
- ipasn
- PassiveTotal -  
<http://blog.passivetotal.org/misp-sharing-done-differently>
- sourcecache
- Virustotal
- Whois

- Similar to expansion modules
- Input is a file upload or a text paste
- Output is a list of parsed attributes to be editend and verified by the user
- System is still new but some modules already exist
  - ▶ Cuckoo JSON import
  - ▶ email import
  - ▶ OCR module
  - ▶ Simple STIX import module
- Many ideas for future modules (OpenIOC import, connector to sandboxes, STIX 2.0, etc)

# CREATING YOUR IMPORT MODULE (SKELETON)

```
import json

misperrors = {'error' : 'Error'}
userConfig = {
    'number1': {
        'type': 'Integer',
        'regex': '/^[0-4]$/i',
        'errorMessage': 'Expected_a_number_in_range_[0-4]',
        'message': 'Column_number_used_for_value'
    }
};
inputSource = ['file', 'paste']
moduleinfo = {'version': '', 'author': '',
              'description': '', 'module-type': ['import']}
moduleconfig=[]

def handler(q=False):
    if q is False:
        return False
    request = json.loads(q)
    request["data"] = base64.b64decode(request["data"])
    r = {'results': [{'categories': [], 'types': [], 'values': []}]}
    return r

def introspection():
    return {'userConfig': userConfig, 'inputSource': inputSource, 'moduleConfig': moduleConfig}

def version():
    return moduleinfo
```

# CREATING YOUR IMPORT MODULE (USERCONFIG AND INPUTSOURCE)

```
userConfig = {
  'number1': {
    'type': 'Integer',
    'regex': '/^[0-4]$/i',
    'errorMessage': 'Expected_a_number_in_range_[0-4]',
    'message': 'Column_number_used_for_value'
  }
};
inputSource = ['file', 'paste']
```

# CREATING YOUR IMPORT MODULE (HANDLER)

```
def handler(q=False):  
    if q is False:  
        return False  
    request = json.loads(q)  
    request["data"] = base64.b64decode(request["data"])  
    r = {'results': [{'categories': [], 'types': [], 'values':[]}]}  
    return r
```



# CREATING YOUR IMPORT MODULE (INTROSPECTION)

```
def introspection():  
    modulesetup = {}  
    try:  
        userConfig  
        modulesetup['userConfig'] = userConfig  
    except NameError:  
        pass  
    try:  
        moduleConfig  
        modulesetup['moduleConfig'] = moduleConfig  
    except NameError:  
        pass  
    try:  
        inputSource  
        modulesetup['inputSource'] = inputSource  
    except NameError:  
        pass  
    return modulesetup
```

- Input is currently only a single event
- Dynamic settings
- Later on to be expanded to event collections / attribute collections
- Output is a file in the export format served back to the user
- Export modules was recently introduced but a CEF export module already available
- Lots of ideas for upcoming modules and including interaction with misp-darwin

# CREATING YOUR EXPORT MODULE (SKELETON)

```
import json
inputSource = ['event']
outputFileExtension = 'txt'
responseType = 'application/txt'
moduleinfo = {'version': '0.1', 'author': 'Andras_Iklody',
              'description': 'Skeleton_export_module',
              'module-type': ['export']}

def handler(q=False):
    if q is False:
        return False
    request = json.loads(q)
    # insert your magic here!
    output = my_magic(request["data"])
    r = {"data": base64.b64encode(output.encode('utf-8')).decode('utf-8')}
    return r

def introspection():
    return {'userConfig': userConfig, 'inputSource': inputSource, 'moduleConfig': moduleConfig, 'outputFileExtension': outputFileExtension}

def version():
    return moduleinfo
```

```
inputSource = ['event']  
outputFileExtension = 'txt'  
responseType = 'application/txt'
```

# CREATING YOUR EXPORT MODULE (HANDLER)

```
def handler(q=False):  
    if q is False:  
        return False  
    request = json.loads(q)  
    # insert your magic here!  
    output = my_magic(request["data"])  
    r = {"data": base64.b64encode(output.encode('utf-8')).decode('utf-8')}  
    return r
```

# CREATING YOUR EXPORT MODULE (INTROSPECTION)

```
def introspection():  
    modulesetup = {}  
    try:  
        responseType  
        modulesetup['responseType'] = responseType  
    except NameError:  
        pass  
    try:  
        userConfig  
        modulesetup['userConfig'] = userConfig  
    except NameError:  
        pass  
    try:  
        moduleConfig  
        modulesetup['moduleConfig'] = moduleConfig  
    except NameError:  
        pass  
    try:  
        outputFileExtension  
        modulesetup['outputFileExtension'] = outputFileExtension  
    except NameError:  
        pass  
    try:  
        inputSource  
        modulesetup['inputSource'] = inputSource  
    except NameError:
```

# UPCOMING ADDITIONS TO THE MODULE SYSTEM - GENERAL

- Expose the modules to the APIs
- Move the modules to background processes with a messaging system
- Difficulty is dealing with uncertain results on import (without the user having final say)



- <https://github.com/MISP/misp-modules>
- <https://github.com/MISP/>
- We welcome new modules and pull requests.
- MISP modules can be designed as standalone application.