

# MISP RESTSEARCH MODULE DEVELOPMENT

BUILDING A SIMPLE EXPORT MODULE FOR THE CORE

CIRCL / TEAM MISP PROJECT



MISP PROJECT



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- Similar in scope to an **export module** of the MISP modules system
- Pros:
  - ▶ Can be used for composited data coming from a **filtered query**
  - ▶ Fast, **native approach**
  - ▶ Can be built to support **several scopes** (events, attributes, sightings)
- Cons...

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### └ Building a native restSearch export

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## MISP restSearch module development

### └ Building a native restSearch export

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- Standardised way of collecting **parameters**
- Using the parameters, a loop is started to **chunk and gradually build** our export data
- The chunk size depends on memory envelopes
- Each chunk is **converted piece by piece...**
- ... and subsequently are concatenated into a temporary file
- Once no more elements are left, the file is sent in the response

└─ So how does restSearch work?

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- Each chunk is **converted piece by piece...**
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## ■ The export modules handle 5 tasks:

- ▶ Pass **meta-information** back to restSearch on the export format itself
- ▶ Add a **start segment** to the exported data
- ▶ Do the actual **conversion** from MISP's internal format to the desired export format
- ▶ Provide a **separator** for data chunks
- ▶ Have a **closing segment** for the returned data, based on the format's conventions

└─ Where does the module system come into play?

- The export modules handle 5 tasks:
  - ▶ Pass **meta-information** back to restSearch on the export format itself
  - ▶ Add a **start segment** to the exported data
  - ▶ Do the actual **conversion** from MISP's internal format to the desired export format
  - ▶ Provide a **separator** for data chunks
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# OUR LITTLE TRAINING MODULE: NIBBLER, THE EVER HUNGRY IDS/IPS



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└ Our little training module: Nibbler, the ever hungry IDS/IPS



- Simplistic tool with its **own proprietary format**
- Meant to mimic a typical **in-house tool**
- Lightweight scope, for simplicity's sake
- **pipe separated values**
- VALUE | TYPE | DESCRIPTION | REFERENCE | ACTION

└ Nibbler

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- Meant to mimic a typical **in-house tool**
- Lightweight scope, for simplicity's sake
- **pipe separated values**
- VALUE | TYPE | DESCRIPTION | REFERENCE | ACTION

- Rules can be prepended by comments, each comment line starting with #
- Some characters have to be escaped in some custom, crazy ways
  - ▶ linebreaks: ##LINEBREAK##
  - ▶ commas: ##COMMA##
  - ▶ pipes: ##PIPE##

### └─ Nibbler format - caveats

- Rules can be prepended by comments, each comment line starting with #
- Some characters have to be escaped in some custom, crazy ways
  - ▶ linebreaks: ##LINEBREAK##
  - ▶ commas: ##COMMA##
  - ▶ pipes: ##PIPE##



- **Value:** The actual indicator value
- **Type:** The format of the indicator
- **Description:** A quick description for analysts investigating the alert, why is this relevant
- **Reference:** A backreference that the analyst can use to find out more about the alert
- **Action:** What should Nibbler do if it trips over the value?

### └─ Nibbler format

- **Value:** The actual indicator value
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- **Description:** A quick description for analysts investigating the alert, why is this relevant
- **Reference:** A backreference that the analyst can use to find out more about the alert
- **Action:** What should Nibbler do if it trips over the value?

- IP
- Domain
- Hostname
- MD5
- SHA1
- SHA256
- Filename

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## MISP restSearch module development

└ Supported types

- IP
- Domain
- Hostname
- MD5
- SHA1
- SHA256
- Filename

- ALERT - default behaviour, create an alert.
- BLOCK - block the action outright. Only set if the tag nibbler:block is present

### Supported values

- ALERT - default behaviour, create an alert.
- BLOCK - block the action outright. Only set if the tag nibbler:block is present

- Though we have types to map from MISP, in some cases several types map to a Nibbler type
- We've created a rough **mapping** (this is probably the most difficult task) in advance
- Some MISP types map to a Nibbler type directly
- **Composite** MISP types map to **2 Nibbler types** each

### └ Mapping the types to MISP

- Though we have types to map from MISP, in some cases several types map to a Nibbler type
- We've created a rough **mapping** (this is probably the most difficult task) in advance
- Some MISP types map to a Nibbler type directly
- **Composite** MISP types map to **2 Nibbler types** each

- ip-dst :: IP
- ip-src :: IP
- domain :: Domain
- domain|ip :: Domain, IP
- hostname :: Hostname
- md5 :: MD5
- sha1 :: SHA1
- sha256 :: SHA256
- filename|md5 :: Filename, MD5
- malware-sample :: Filename, MD5
- filename|sha1 :: Filename, SHA1
- filename|sha256 :: Filename, SHA256

### └ Mapping the types to MISP

- ip-dst : IP
- ip-src : IP
- domain : Domain
- domain|ip : Domain, IP
- hostname : Hostname
- md5 : MD5
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- filename|md5 : Filename, MD5
- malware-sample : Filename, MD5
- filename|sha1 : Filename, SHA1
- filename|sha256 : Filename, SHA256

```
<?php
class NibblerExport
{
    public $additional_params = array();
    public function handler(
        $data, $options = array()
    ) {}
    public function header(
        $options = array()
    ) {}
    public function footer() {}
    public function separator() {}
}
```

## Export module skeleton

```
<?php
class NibblerExport
{
    public $additional_params = array();
    public function handler(
        $data, $options = array()
    ) {}
    public function header(
        $options = array()
    ) {}
    public function footer() {}
    public function separator() {}
}
```

```
public $additional_params = array(  
    'flatten' => 1  
);
```

└─ Additional parameters

```
public $additional_params = array(  
    'flatten' => 1  
);
```

```
private $__mapping = array(  
  'ip-dst' => 'IP',  
  'ip-src' => 'IP',  
  'domain' => 'Domain',  
  'domain|ip' => ['Domain', 'IP'],  
  'hostname' => 'Hostname',  
  'md5' => 'MD5',  
  'sha1' => 'SHA1',  
  'sha256' => 'SHA256',  
  'filename|md5' => array('Filename', 'MD5'),  
  'malware-sample' => array('Filename', 'MD5'),  
  'filename|sha1' => array('Filename', 'SHA1'),  
  'filename|sha256' => array('Filename', 'SHA256')  
);
```

### └ Adding our mapping

```
private $_mapping = array(  
  'ip-dst' => 'IP',  
  'ip-src' => 'IP',  
  'domain' => 'Domain',  
  'domain|ip' => ['Domain', 'IP'],  
  'hostname' => 'Hostname',  
  'md5' => 'MD5',  
  'sha1' => 'SHA1',  
  'sha256' => 'SHA256',  
  'filename|md5' => array('Filename', 'MD5'),  
  'malware-sample' => array('Filename', 'MD5'),  
  'filename|sha1' => array('Filename', 'SHA1'),  
  'filename|sha256' => array('Filename', 'SHA256')  
);
```



```
public function header($options = array())
{
    return sprintf(
        "# Nibbler rules generated by MISP at %s\n",
        date('Y-m-d H:i:s')
    );
}
```

### └ Writing the start of the output

```
public function header($options = array())
{
    return sprintf(
        "# Nibbler rules generated by MISP at %s\n",
        date('Y-m-d H:i:s')
    );
}
```

```
public function footer()  
{  
    return "\n";  
}
```

└ Footer function - how should the output end?

```
public function footer()  
{  
    return "\n";  
}
```

# WHAT SEPARATES THE CHUNKS?

```
public function separator()  
{  
    return "\n";  
}
```

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└─What separates the chunks?

WHAT SEPARATES THE CHUNKS?

```
public function separator()  
{  
    return "\n";  
}
```

```
public function handler($data, $options = array())
{
    if ($options['scope'] === 'Attribute') {
        $data['Attribute']['AttributeTag'] = $data['AttributeTag'];
        return $this->__convertAttribute($data['Attribute'], $data['Event']);
    }
    if ($options['scope'] === 'Event') {
        $result = array();
        foreach ($data['Attribute'] as $attribute) {
            $temp = $this->__convertAttribute($attribute, $data['Event']);
            if ($temp) $result[] = $temp;
        }
        return implode($this->separator(), $result);
    }
    return '';
}
```

└─ The actual legwork, the handler

```
public function handler($data, $options = array())
{
    if ($options['scope'] === 'Attribute') {
        $data['Attribute']['AttributeTag'] = $data['AttributeTag'];
        return $this->__convertAttribute($data['Attribute'], $data['Event']);
    }
    if ($options['scope'] === 'Event') {
        $result = array();
        foreach ($data['Attribute'] as $attribute) {
            $temp = $this->__convertAttribute($attribute, $data['Event']);
            if ($temp) $result[] = $temp;
        }
        return implode($this->separator(), $result);
    }
    return '';
}
```

# BUILDING AN OPTIONAL INTERNAL CONVERTER FUNCTION

```
private function __convertAttribute($attribute, $separator)
{
    if (empty($this->__mapping[$attribute['type']])) {
        // mapping not found – invalid type for nibbler
        return '';
    }
    if (is_array($this->__mapping[$attribute['type']])) {
        // handle mappings for composites – slide
    } else {
        // handle simple mappings – slide
    }
    // return 1 or 2 lines, separated by separator()
    return implode($this->separator(), $result);
}
```

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### └ Building an optional internal converter function

```
BUILDING AN OPTIONAL INTERNAL CONVERTER FUNCTION
private function __convertAttribute($attribute, $separator)
{
    if (empty($this->__mapping[$attribute['type']])) {
        // mapping not found – invalid type for nibbler
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    }
    if (is_array($this->__mapping[$attribute['type']])) {
        // handle mappings for composites – slide
    } else {
        // handle simple mappings – slide
    }
    // return 1 or 2 lines, separated by separator()
    return implode($this->separator(), $result);
}
```

```
$result[] = sprintf(  
    '%s|%s|%s|%s|%s',  
    $this->__escapeSpecialChars($attribute['value']),  
    $this->__mapping[$attribute['type']],  
    $event['uuid'],  
    $this->__escapeSpecialChars($event['info']),  
    'ALERT'  
);
```

### └ Handling the simple case

```
$result[] = sprintf(  
    "%s|%s|%s|%s",  
    $this->__escapeSpecialChars($attribute['value']),  
    $this->__mapping[$attribute['type']],  
    $event['uuid'],  
    $this->__escapeSpecialChars($event['info']),  
    'ALERT'  
);
```

```
$attribute['value'] = explode(
    '|', $attribute['value']
);
foreach (array(0,1) as $part) {
    $result[] = sprintf(
        '%s|%s|%s|%s|%s',
        $this->__escapeSpecialChars(
            $attribute['value'][$part]
        ),
        $this->__mapping[$attribute['type']][$part],
        $event['uuid'],
        $this->__escapeSpecialChars($event['info']),
        'ALERT'
    );
}
```

### └ Handling the case for composites

```
$attribute['value'] = explode(
    '|', $attribute['value']
);
foreach (array(0,1) as $part) {
    $result[] = sprintf(
        '%s|%s|%s|%s',
        $this->__escapeSpecialChars(
            $attribute['value'][$part]
        ),
        $this->__mapping[$attribute['type']][$part],
        $event['uuid'],
        $this->__escapeSpecialChars($event['info'])
    );
}
```

# PUTTING IT TOGETHER

```
private function __convertAttribute($attribute, $event) {
    if (empty($this->__mapping[$attribute['type']])) return '';
    $result = array();
    $attributes = array();
    if (is_array($this->__mapping[$attribute['type']])) {
        $attribute['value'] = explode('|', $attribute['value']);
        foreach (array(0,1) as $part) {
            $result[] = sprintf(
                '%s|%s|%s|%s|%s',
                $this->__escapeSpecialChars($attribute['value'][$part]),
                $this->__mapping[$attribute['type']][$part],
                /events/view/ . $event['uuid'],
                $this->__escapeSpecialChars($event['info']),
                $this->__decideOnAction($attribute['AttributeTag'])
            );
        }
    } else {
        $result[] = sprintf(
            '%s|%s|%s|%s|%s',
            $this->__escapeSpecialChars($attribute['value']),
            $this->__mapping[$attribute['type']],
            /events/view/ . $event['uuid'],
            $this->__escapeSpecialChars($event['info']),
            $this->__decideOnAction($attribute['AttributeTag'])
        );
    }
    return implode($this->separator(), $result);
}
```

# MISP restSearch module development

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## Putting it together

PUTTING IT TOGETHER

```
private function __convertAttribute($attribute, $event) {
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        $attribute['value'] = explode('|', $attribute['value']);
        foreach (array(0,1) as $part) {
            $result[] = sprintf(
                '%s|%s|%s|%s|%s',
                $this->__escapeSpecialChars($attribute['value'][$part]),
                $this->__mapping[$attribute['type']][$part],
                /events/view/ . $event['uuid'],
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        }
    } else {
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            $this->__escapeSpecialChars($event['info']),
            $this->__decideOnAction($attribute['AttributeTag'])
        );
    }
    return implode($this->separator(), $result);
}
```



```
private function __decideOnAction($attributeTags)
{
    foreach($attributeTags as $attributeTag) {
        if (
            $attributeTag['Tag']['name'] ===
            'nibbler:block'
        ) {
            return 'BLOCK';
        }
    }
    return 'ALERT';
}
```

└─ Adding the function that decides on the action

```
private function __decideOnAction($attributeTags)
{
    foreach($attributeTags as $attributeTag) {
        if (
            $attributeTag['Tag']['name'] ===
            'nibbler:block'
        ) {
            return 'BLOCK';
        }
    }
    return 'ALERT';
}
```

## FINALISING THE EXPORT MODULE... THE ESCAPING FUNCTION

```
private function __escapeSpecialChars($value)
{
    $value = preg_replace(
        "/\r|\n/", "##LINEBREAK##", $value
    );
    $value = preg_replace(
        "/,/," "##COMMA##", $value
    );
    $value = preg_replace(
        "/\|/," "##PIPE##", $value
    );
    return $value;
}
```

## MISP restSearch module development

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└─ Finalising the export module... The escaping function

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    );
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    );
    return $value;
}
```

# MODIFYING THE MISP CORE TO KNOW ABOUT THE EXPORT MODULE

- The **models** that we are targeting by scope (Event, Attribute) **need to be updated**
- They are located in `/var/www/MISP/app/Model/`
- The global variable `$validFormats` houses all mappings
- Simply add a new line such as the following:
- `'nibbler' => array('nibbler', 'NibblerExport', 'nibbler')`

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- The global variable `$validFormats` houses all mappings
- Simply add a new line such as the following:
- `'nibbler' => array('nibbler', 'NibblerExport', 'nibbler')`

- Use the **rest client** to test it conveniently
- Both the event and attribute level restSearch function should work
- Simply set the **returnFormat** to nibbler, which should also show up as a valid export format

└─ Let us test the module!

- Use the **rest client** to test it conveniently
- Both the event and attribute level restSearch function should work
- Simply set the **returnFormat** to nibbler, which should also show up as a valid export format

HTTP method to use

POST

Relative path to query

/events/restSearch

- Use full path - disclose my apikey  Bookmark query  
 Show result  Skip SSL validation

HTTP headers

Authorization: ArSxnHf20foSapnOSyxfrijMdl9oLDnvmqvHK97q  
Accept: application/json  
Content-Type: application/json

HTTP body

```
{  
  "returnFormat": "nibbler",  
  "page": 1,  
  "limit": 4,  
  "type": ["ip-dst", "ip-src", "domain|ip", "hostname", "domain"]  
}
```

Run query

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REST client

