

MISP RESTSEARCH MODULE DEVELOPMENT

BUILDING A SIMPLE EXPORT MODULE FOR THE CORE

CIRCL / TEAM MISP PROJECT



MISP PROJECT



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MISP restSearch module development

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BUILDING A SIMPLE EXPORT MODULE FOR THE CORE

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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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SO HOW DOES RESTSEARCH WORK?

- 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

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└ So how does restSearch work?

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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
- ▶ Have a **closing segment** for the returned data, based on the format's conventions

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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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- **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

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SUPPORTED TYPES

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

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└ Supported types

SUPPORTED TYPES

- IP
- Domain
- Hostname
- MD5
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- Filename

SUPPORTED VALUES

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

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└ 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

MAPPING THE TYPES TO MISP

- 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

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└ Mapping the types to MISP

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- ip-dst :: IP
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- filename|md5 :: Filename, MD5
- malware-sample :: Filename, MD5
- filename|sha1 :: Filename, SHA1
- filename|sha256 :: Filename, SHA256

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() {}
}
```

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└─ Export module skeleton

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() {}
}
```

ADDITIONAL PARAMETERS

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

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└─ Additional parameters

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

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')
);
```

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└ Adding our mapping

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')
);
```


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')
    );
}
```

└ 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?

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

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 '';
}
```

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└─ The actual legwork, the handler

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, $separator)
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    } else {
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    }
    // return 1 or 2 lines, separated by separator()
    return implode($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|%s',
    $this->__escapeSpecialChars($attribute['value']),
    $this->__mapping[$attribute['type']],
    $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|%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|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|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);
}
```

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|s',
                $this->__escapeSpecialChars($attribute['value'][$part]),
                $this->__mapping[$attribute['type']][$part],
                /events/view/ . $event['uuid'],
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                $this->__decideOnAction($attribute['AttributeTag'])
            );
        }
    } else {
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            $this->__decideOnAction($attribute['AttributeTag'])
        );
    }
}

return implode($this->separator(), $result);
}
```


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';
}
```

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└ 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;
}
```

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

```
private function __escapeSpecialChars($value)
{
    $value = preg_replace(
        "/\r|\n/", "##LINEBREAK##", $value
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    $value = preg_replace(
        "/", "##COMMA##", $value
    );
    $value = preg_replace(
        "/\|/", "##PIPE##", $value
    );
    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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- └─ Modifying the MISP core to know about the export module

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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')`

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

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└─ Let us test the module!

LET US TEST THE MODULE!

- Use the **rest client** to test it conveniently
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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

