OWASP
Open Web Application
Security Project

EXPLOITING SERVER SIDE TEMPLATE INJECTION WITH TPLMAP

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Outline

- Introduction
- Template Engines
- SSTI
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- Tplmap
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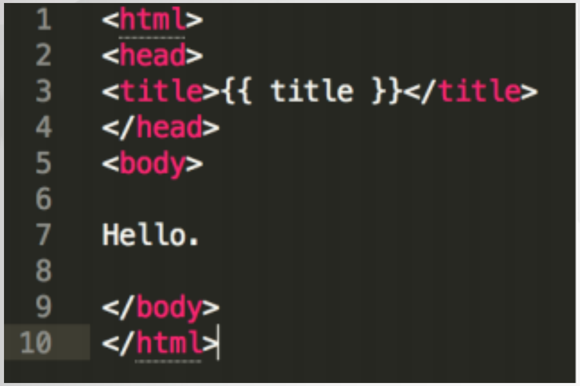
- Remediation

What is a template engine?

- Helps populate dynamic data into modern web pages
- Enables developers to separate data processing logic and presentation code
- Offers rich functionality through Wikis, CMS, blogs
- Uses:
  - Displays information about users, products, companies
  - Displays gallery of photos, videos..
  - Sends bulk emails

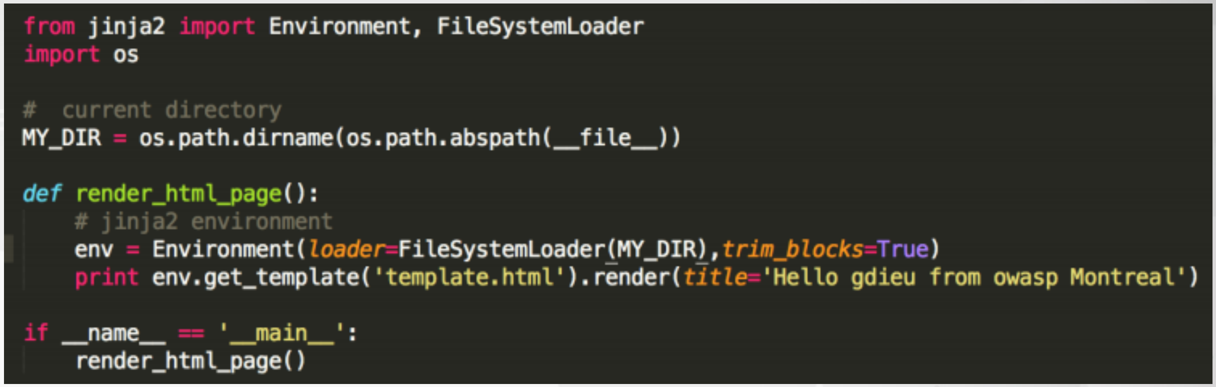
Example: jinja



```html
<html>
<head>
<title>{{ title }}</title>
</head>
<body>

Hello.

</body>
</html>
```

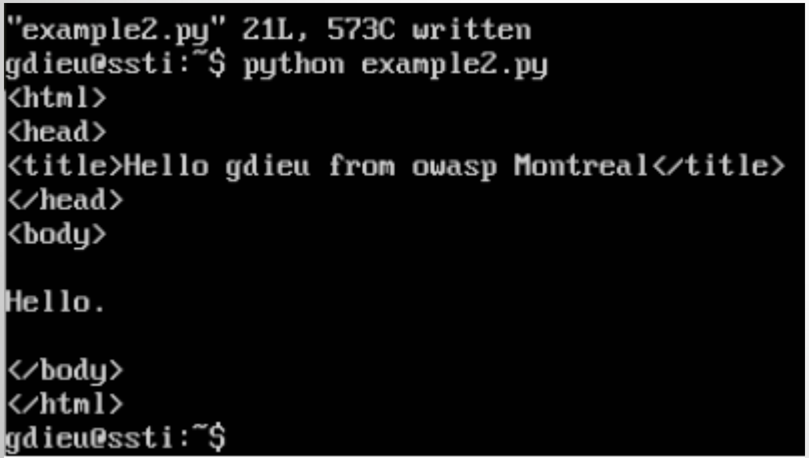


```python
from jinja2 import Environment, FileSystemLoader
import os

#  current directory
MY_DIR = os.path.dirname(os.path.abspath(__file__))

def render_html_page():
    # jinja2 environment
    env = Environment(loader=FileSystemLoader(MY_DIR),trim_blocks=True)
    print env.get_template('template.html').render(title='Hello gdieu from owasp Montreal')

if __name__ == '__main__':
    render_html_page()
```



```
"example2.py" 21L, 573C written
gdieu@ssti:~$ python example2.py
<html>
<head>
<title>Hello gdieu from owasp Montreal</title>
</head>
<body>

Hello.

</body>
</html>
gdieu@ssti:~$
```

Popular Template Engines

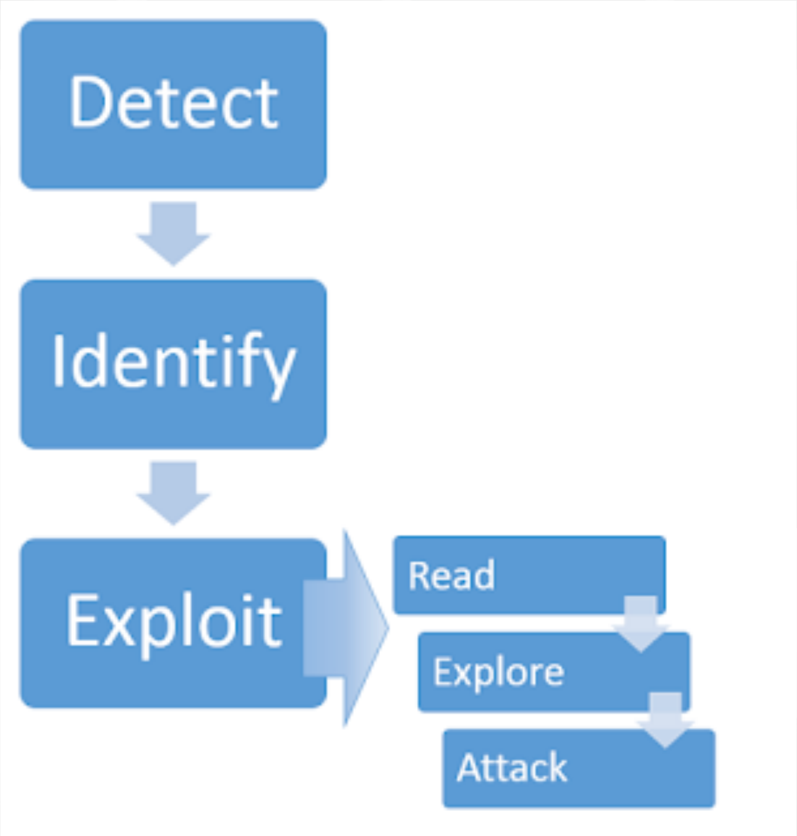
- PHP – Smarty, Twigs
- JAVA – Velocity, Freemaker
- Python – JINJA, Mako, Tornado
- JavaScript – Jade, Rage
- Ruby - Liquid

What is template injection?

What is template injection?

- Occurs when invalid user input is embedded into the template engine
- Often XSS attack occurs but SSTI can be missed
- Can lead to a remote code execution (RCE)
- Developer error or intentional exposure

Methodology (based on James Kettle's research)

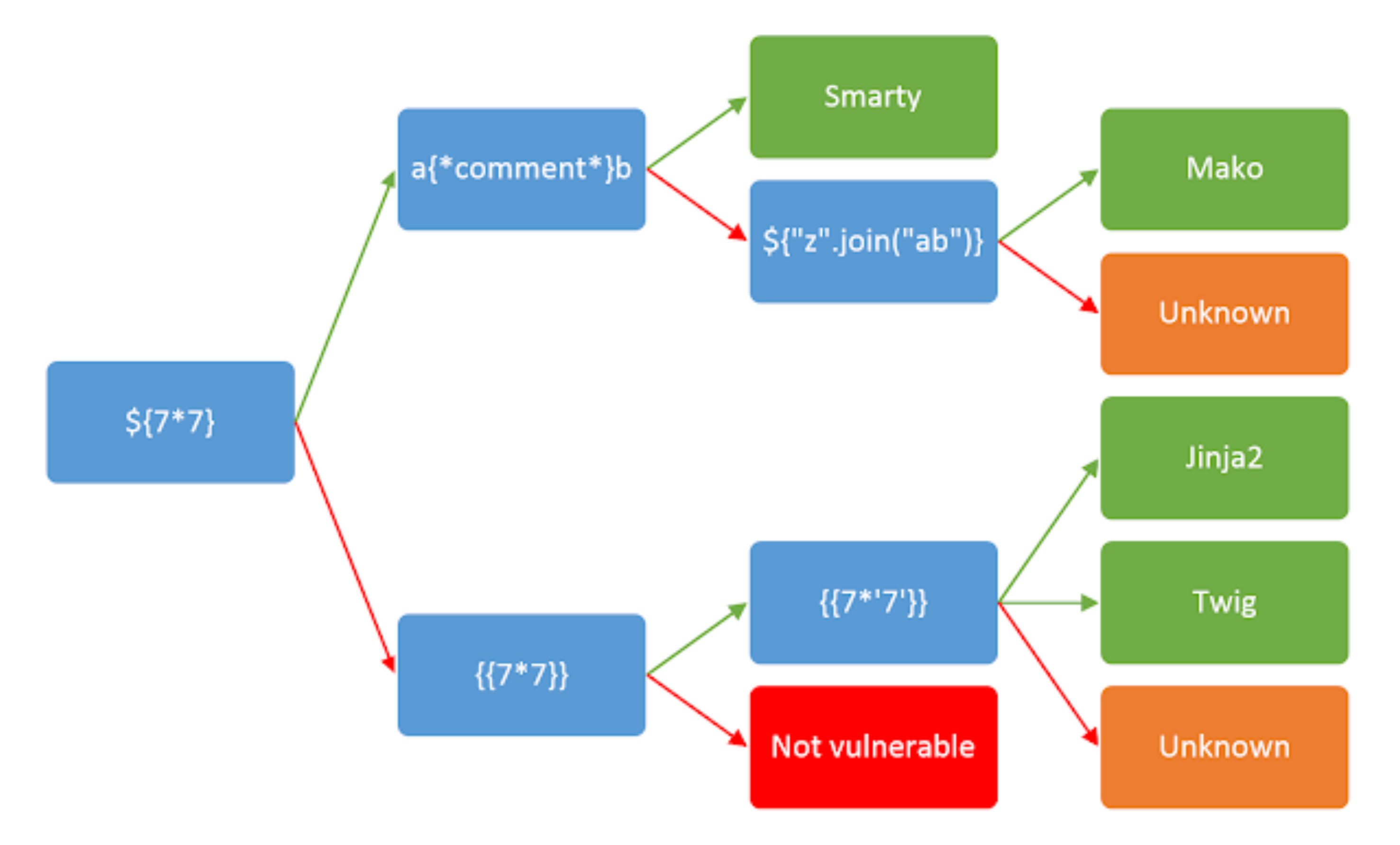


https://portswigger.net/blog/server-side-template-injection

Detect

- Wappalyzer + builtwith + vulners scanner
- Test fuzzing – Tips:
  - Trying a basic XSS
  - Trying a math expression {{2*2}}

Identify



${7*7}

a{*comment*}b

{{7*7}}

Smarty

${"z".join("ab")}

{{7*'7'}}

Not vulnerable

Mako

Unknown

Jinja2

Twig

Unknown

Exploit

- Read
- Explore
- Attack

Tplmap

- Tplmap assists the exploitation of Code Injection and Server-Side Template Injection vulnerabilities with a number of sandbox escape techniques to get access to the underlying operating system.
- The tool and its test suite are developed to research the SSTI vulnerability class and to be used as offensive security tool during web application penetration tests.

https://github.com/epinna/tplmap

Demo - Tplmap

DEMO

Remediation

- Sanitization
  - Sanitize user input before passing it into the templates
- Complementary approach
  - Use a sandbox within a safe environment

Q&A

References

- https://portswigger.net/blog/server-side-template-injection
- https://github.com/epinna/tplmap
- https://www.okiok.com/server-side-template-injection-from-detection-to-remote-shell/
- https://www.we45.com/blog/server-side-template-injection-a-crash-course-