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DOM-based XSS Filter

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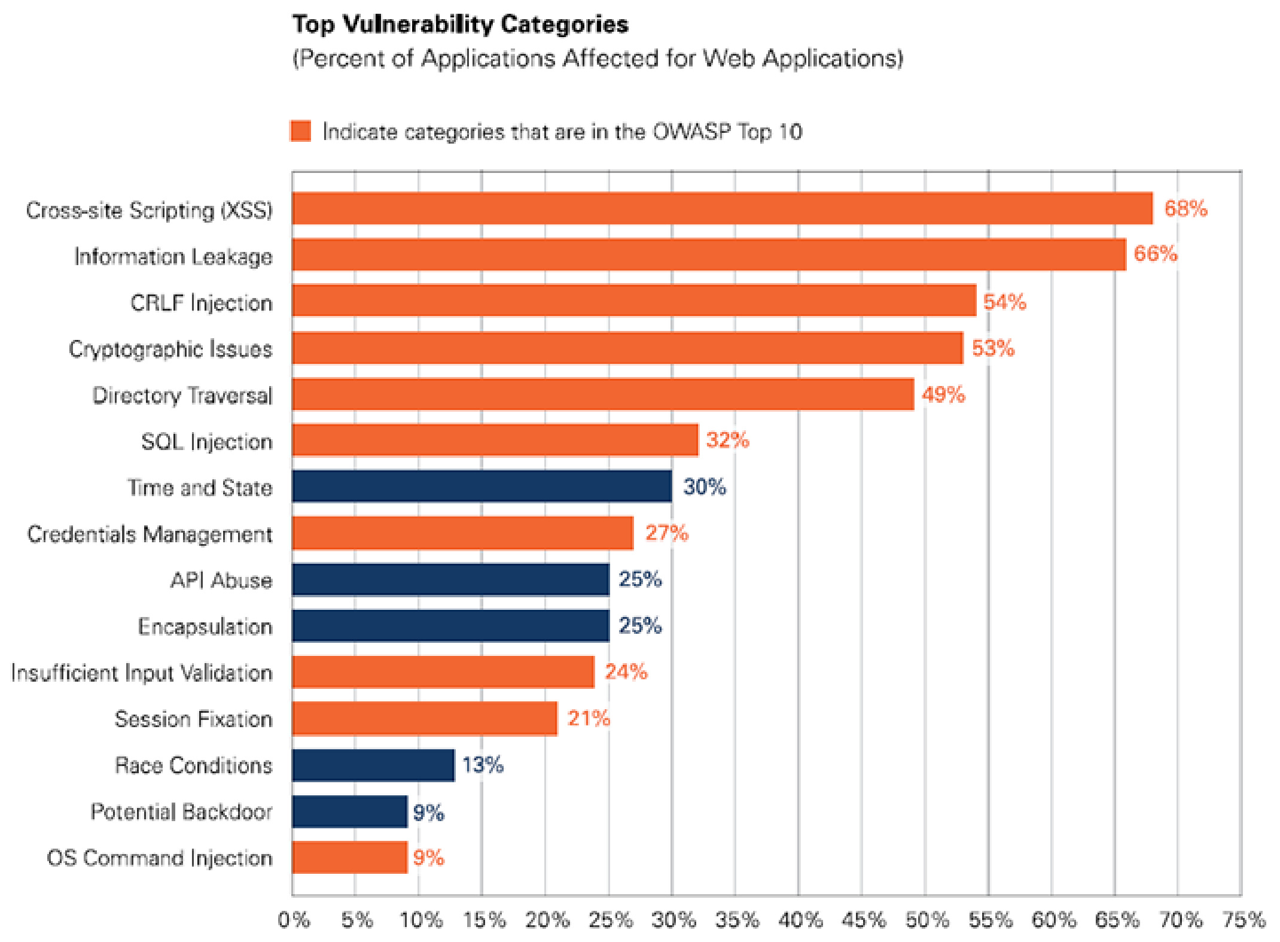
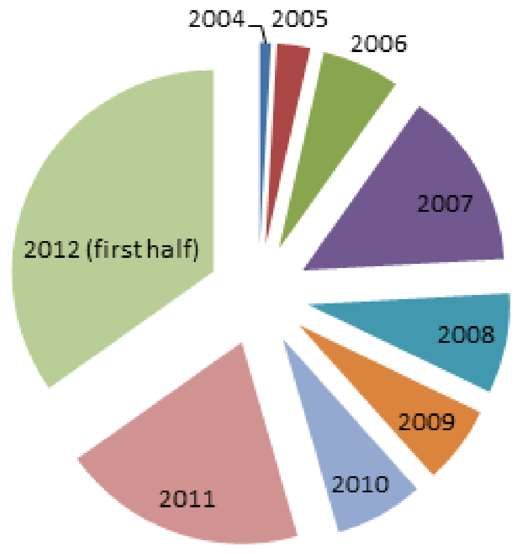
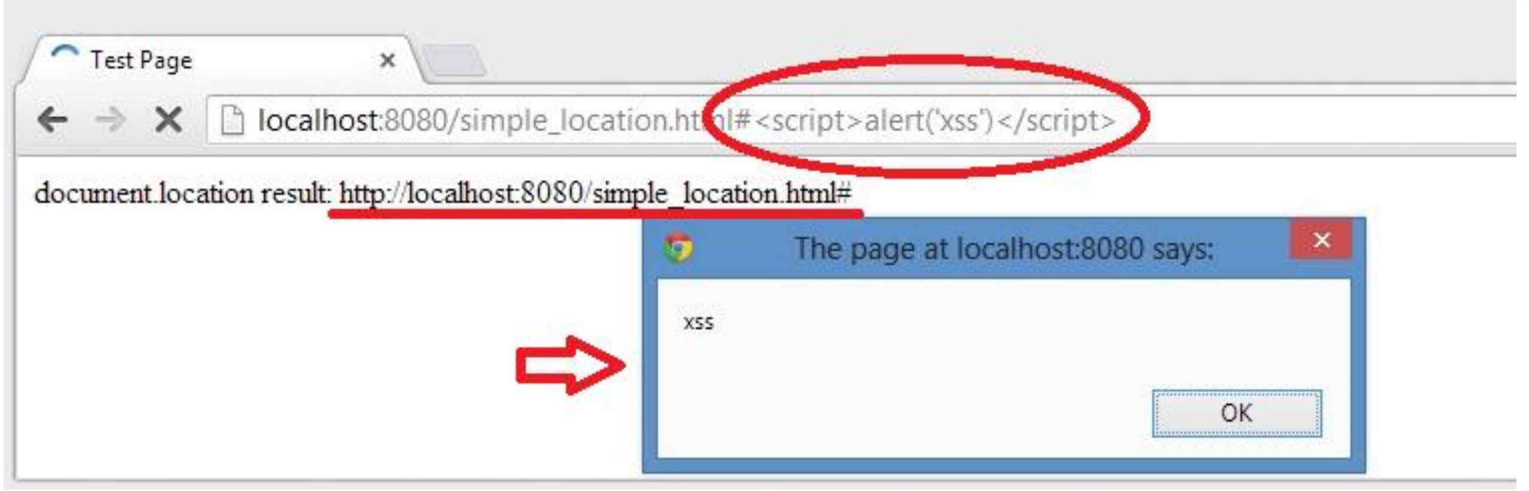
Web Apps Attack Trends


Top Vulnerability Categories
(Percent of Applications Affected for Web Applications)

Percentage of MSRC cases identified as XSS



DOM-based XSS is different from stored XSS and reflected XSS



localhost:8080/simple_location.html#<script>alert('xss')</script>

document.location result: http://localhost:8080/simple_location.html#

The page at localhost:8080 says:

xss

OK

Attack is executed entirely within the browser!

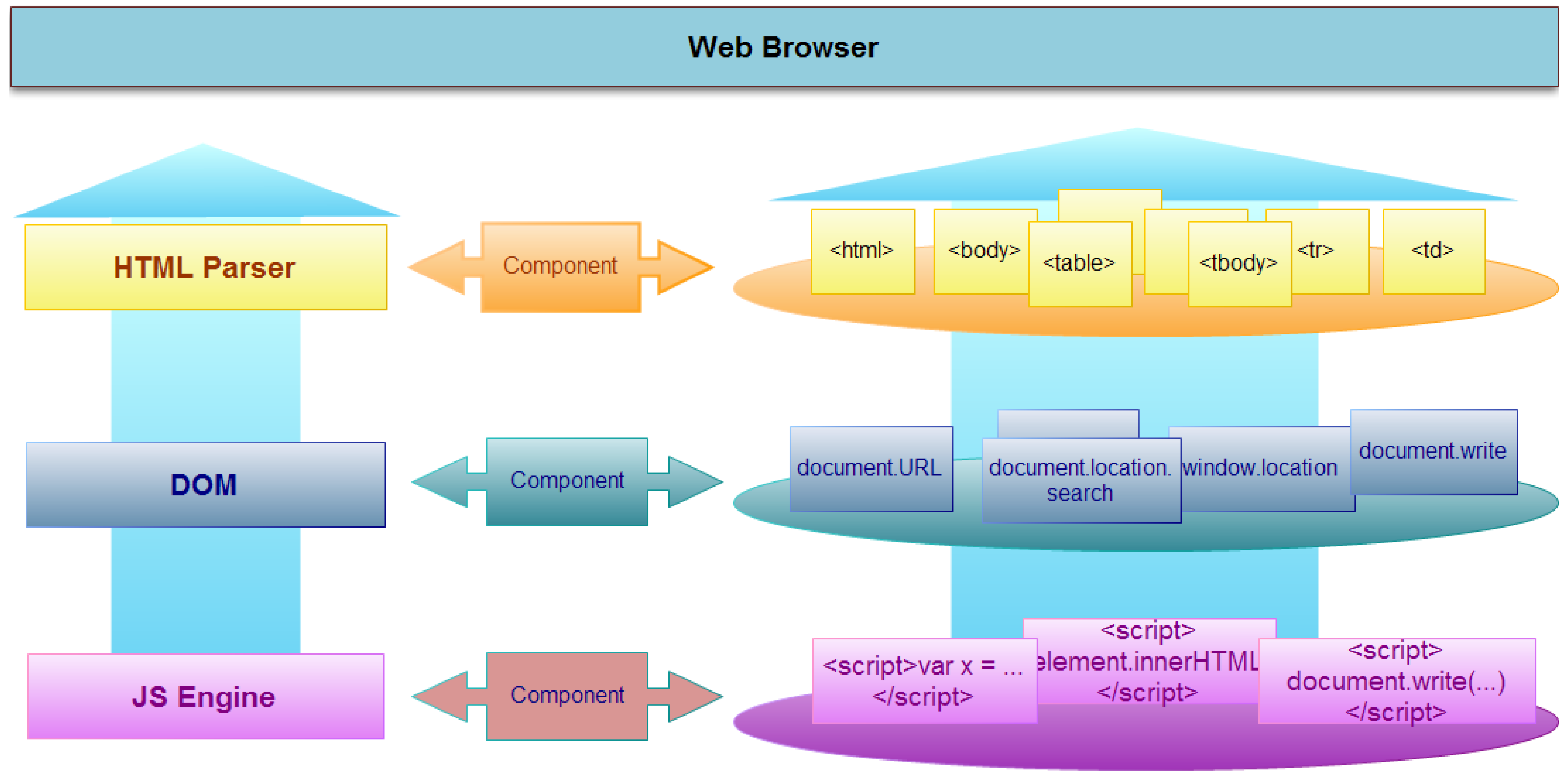
Page makes use of unsafe input!

Goal

Intercept and handle potential vulnerability with minimal impact on user experience.

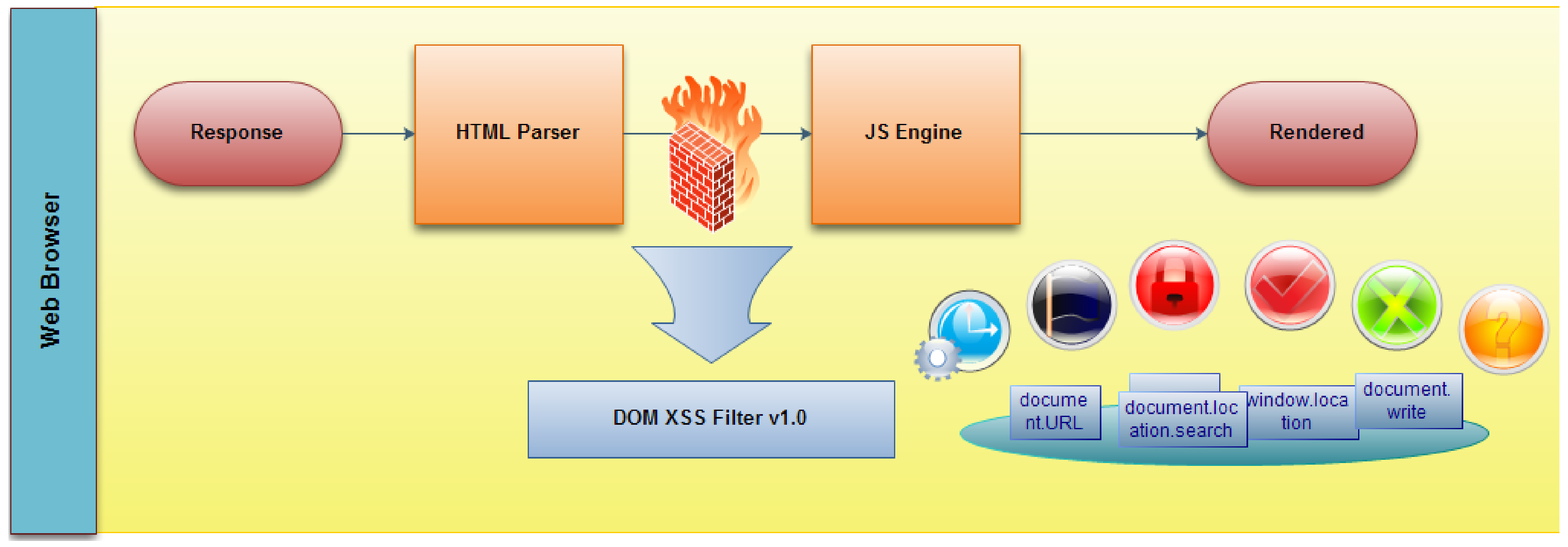
- **Efficiency: No significant overhead**
- **Flexibility: Easy to maintain**
- **Compatibility: Compatible with most websites**
- **Effectiveness: Protection from DOM-based XSS**

Approach Overview



Our Solution: Protect access to unsafe inputs!

- **Remove Referer from HTTP header**
  - **Intercept and remove by chrome.webRequest API**
- **Protection: encode return value**

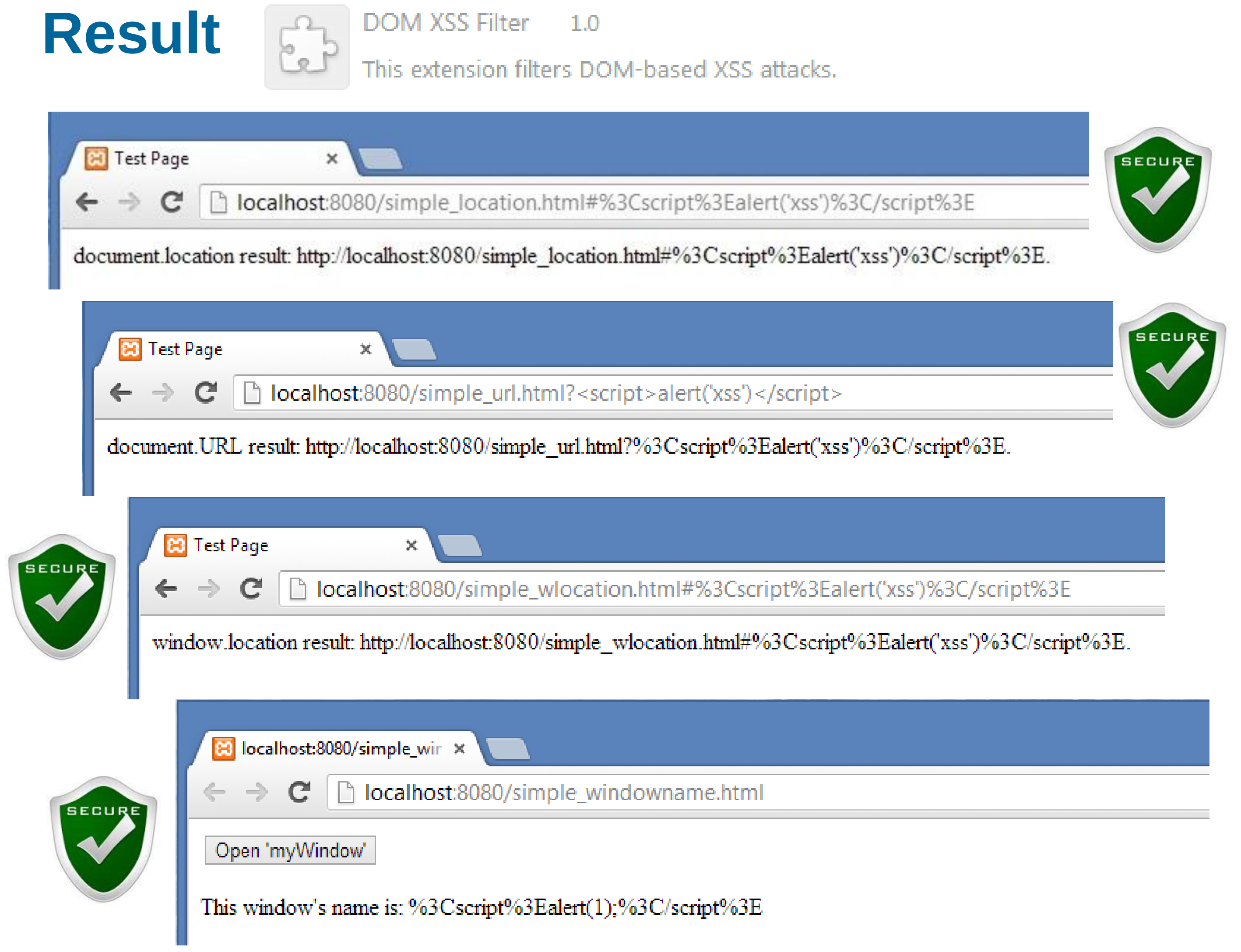


- **Chrome Content Script**
  - **Before complete DOM tree is constructed, inject small amount of JavaScript to…**
    - **Override `document.URL` getter**
    - **Override `document.URLUnencoded` getter**
    - **Protect `document.location`:**
      - **`document.location.search` already encoded**
      - **Override `document.location.hash` getter**
    - **Override `window.name` getter**
    - **Force encode `window.location.hash`**

Implementation

- **Browser**
  - **Google Chrome 26.0.1410.43 m & 27.0.1453.9 m**
- **JavaScript**
- **Chrome Extension API**
  - **chrome.webRequest**
  - **Content Script**

Result



DOM XSS Filter 1.0

This extension filters DOM-based XSS attacks.

localhost:8080/simple_location.html#%3Cscript%3Ealert('xss')%3C/script%3E

document.location result: http://localhost:8080/simple_location.html#%3Cscript%3Ealert('xss')%3C/script%3E.

localhost:8080/simple_url.html?<script>alert('xss')</script>

document.URL result: http://localhost:8080/simple_url.html?%3Cscript%3Ealert('xss')%3C/script%3E.

localhost:8080/simple_wlocation.html#%3Cscript%3Ealert('xss')%3C/script%3E

window.location result: http://localhost:8080/simple_wlocation.html#%3Cscript%3Ealert('xss')%3C/script%3E.

localhost:8080/simple_wir

localhost:8080/simple_windowname.html

This window's name is: %3Cscript%3Ealert(1);%3C/script%3E

Evaluation

- **Efficiency: 1.5 page of un-minified code**
- **Flexibility: Plain JavaScript & Chrome API**
- **Compatibility: Tested with 10 websites**

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https://www.facebook.com	https://twitter.com
http://www.wikipedia.org	http://slashdot.org
https://news.ycombinator.com	http://www.yahoo.com
http://www.youtube.com	http://www.amazon.com

- **Effectiveness: See Result**