Varis: IDE Support for Embedded Client Code in PHP Web Applications

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Dynamic Web Applications

Server code

```php
<?php
include("header.php");

if ($ajax) {
    $input = '<input ... onkeyup="update()" />'; 
    echo $input;
} else {
    echo '<form method="POST" name="searchform">'
        . '<input ... onkeyup="update()" />' . '<input type="submit" />' . '</form>'
        . '<script type="text/javascript">
            function update() {
                ...
            }
        </script>'
    . '</form>'
    . '<script type="text/javascript" defer>
        function update() {
            ...
        }
    </script>'
    . '</html>

<?php
include("footer.php");
?>
```

Client code

If you want to add someone to Address Book, here's how to create a new card.
Embedded Client Code in Web Apps

Server code

PHP
ASP
JSP

$\text{input} = \text{`}<\text{input} \ldots \text{onkeyup=}`update()`\text{`} />`;
Code completion for PHP code
Code completion for embedded client code

eclipse + VARIS

Varis Recommendation
Attribute: contextmenu

Press 'Space' to show Template Proposals
Embedded Code Analysis

IDE Support

- Syntax validation
- Syntax highlighting
- Code completion
- Auto correction
- Refactoring

...
1. Client code embedded in strings
2. Computed from multiple sources
3. Scattered & fragmented
4. Conditional client code variations
Key Ideas

1. Symbolic Execution
2. Symbolic, conditional output
3. Variability-Aware Parsing
4. VarDOM
5. Server code
6. Analysis results
Embedded Code Analysis with VarDOM

VarDOM

<html>
<script>
<style>
Cond. JS AST
Cond. CSS AST

= Conditional ASTs

HTML
JS
CSS

Enables client code analysis within server-side strings
VARIS TOOL DEMO
VARIS TOOL DEMO
Embedded Code Analysis for PHP Web Apps

Varis: Embedded Code Analysis for PHP Web Application
Hung Nguyen

https://www.youtube.com/watch?v=w1TECeRXGrG
VARIS TOOL

Syntax highlighting for embedded client code

Code completion for embedded client code

Our approach (called VARIS)

Call graph for embedded client code

~196 lines apart

Find declaration

52% JS jumps cross strings
Conclusion

• Conditional ASTs for HTML, CSS, JS
• Produced by **Symbolic Execution + Variability-Aware Parsing**

**Applications for embedded code**

• Call graph
• Code navigation
• Syntax validation
• Syntax highlighting
• Code completion
• Auto correction
• Refactoring
• **and more…**