DOM Sandboxing

With Regular expressions

{CSS:Reg.*} (JSReg.*) (HTMLReg.*)

/([\r\n]+)|(\s*for\s*[(]\s*(?:var\s+)?(?:[a-zA-Z_$]|\\u[0-9a-fA-F]{4})(?:[\w$_]|\\u[0-9a-fA-F]{4})*\s+in\s*(?:(?:(?:[']|(?:\\{2}|\\[']|[^'])*[']))|(?:["](?:\\{2}|\\["]|[^"])*["])))|(?:[\/](?:\[(?:\\[\]]|[^\]])+\]|\\[\/]|[^\/*])(?:\[(?:\\[\]]|[^\]])+|\\[\/]|[^\/])*?[\/](?:[a-zA-Z]*)))*[)]|[{](?:.|(?:(?:[']|(?:\\{2}|\\[']|[^'])*[']))|(?:["](?:\\{2}|\\["]|[^"])*["])))|(?:[\/](?:\[(?:\\[\]]|[^\]])+\]|\\[\/]|[^\/*])(?:\[(?:\\[\]]|[^\]])+|\\[\/]|[^\/])*?[\/](?:[a-zA-Z]*)))*[}]\s*[)]\s*[{]?)|(\s*in(?:stanceof)?(?=[\^\d'"\[\s\(\{]))|((?:(?:\s+(?:in(?:stanceof)?)\s+)|\s*\b(?:delete|this|Infinity|NaN|void|do|else|case|default|return|var|continue|undefined|null|new|typeof|throw|break|try|finally|true|false)\b\s*|\s*\b(?:if|else\s\s*if|with|while|for|switch|catch)\b\s*(?=[({]))|((?:,\{]\s*(?:(?:(?:[']|(?:\\{2}|\\[']|[^'])*[']))|(?:["](?:\\{2}|\\["]|[^"])*["]))|(?:[0][xX][0-9a-fA-F]*)|(?:[0]|[1-9]\d+)?(?:[.]?\d+)+(?:[eE][+-]?\d+)?|(?:[a-zA-Z_$]|\\u[0-9a-fA-F]{4})(?:[\w$_]|\\u[0-9a-fA-F]{4})*)\s*(?=[:]))|((?:(?:[']|(?:\\{2}|\\[']|[^'])*[']))|(?:["](?:\\{2}|\\["]|[^"])*["])))|((?:(?:[:]|(?:(?:^\s*|\s*$)|[,]|[;\n\r]+)|(?:[!]|[=]{0,2}|[%][=]?|[&]{1,2}|[&][=]|[*][=]?|[+]{1,2}|[+][=]|[\-]{1,2}|[\-][=]|[\/][=]?|[<]{1,2}[=]?|[=]{1,3}|[>]{1,3}[=]?|[\^][=]?|[|][=]?|[|]{2}))|([)]+)\s*(?:[\/](?:\[(?:\\[\]]|[^\]])+\]|\\[\/]|[^\/*])(?:\[(?:\\[\]]|[^\]])+|\\[\/]|[^\/])*?[\/](?:[a-zA-Z]*)))\s*(?:(?:(?:^\s*|\s*$)|[,]|[;\n\r]+)|(?:[!]|[=]{0,2}|[%][=]?|[&]{1,2}|[&][=]|[*][=]?|[+]{1,2}|[+][=]|[\-]{1,2}|[\-][=]|[\/][=]?|[<]{1,2}[=]?|[=]{1,3}|[>]{1,3}[=]?|[\^][=]?|[|][=]?|[|]{2}))|([)]+|(?=\s*[\[.\}\]])))|((?:[0][xX][0-9a-fA-F]*)|(?:[0]|[1-9]\d+)?(?:[.]?\d+)+(?:[eE][+-]?\d+)?)|(\s*[\[])|(\s*[\]])|(\s*(?:function\s*(?:(?:[a-zA-Z_$]|\\u[0-9a-fA-F]{4})(?:[\w$_]|\\u[0-9a-fA-F]{4})*)?)\s*[(](?:\s*(?:[a-zA-Z_$]|\\u[0-9a-fA-F]{4})(?:[\w$_]|\\u[0-9a-fA-F]{4})*\s*)?(?:[,]\s*(?:[a-zA-Z_$]|\\u[0-9a-fA-F]{4})(?:[\w$_]|\\u[0-9a-fA-F]{4})*\s*)*[)]\s*[{])|((?:@#[(])))|((?:[.]?\s*(?:[a-zA-Z_$]|\\u[0-9a-fA-F]{4})(?:[\w$_]|\\u[0-9a-fA-F]{4})*))|([,;])|((?:[!]|[=]{0,2}|[%][=]?|[&]{1,2}|[&][=]|[*][=]?|[+]{1,2}|[+][=]|[\-]{1,2}|[\-][=]|[\/][=]?|[<]{1,2}[=]?|[=]{1,3}|[>]{1,3}[=]?|[\^][=]?|[|][=]?|[|]{2}))|([{}]))/g

JSReg 0.1

- Started to create a JavaScript parser
- Recreating JavaScript within JavaScript
- Why do you need to sandbox JavaScript?
- There's got to be a better way?

/([\r\n]+)|(\s*for\s*[(]\s*(?:var\s+)?(?:[a-zA-Z_$]|\\u[0-9a-fA-F]{4})(?:[\w$_]|\\u[0-9a-fA-F]{4})*\s+in\s*(?:(?:(?:[']|(?:\\{2}|\\[']|[^'])*[']))|(?:["](?:\\{2}|\\["]|[^"])*["]))|(?:[\/](?:\[(?:\\[\]])+\]|\\[\/]|[^\/*])(?:\[(?:\\[\]]|[^\]])+|\\[\/]|[^\/])*?[\/](?:[a-zA-Z]*)))|(?:(?:[.]?\s*(?:[a-zA-Z_$]|\\u[0-9a-fA-F]{4})(?:[\w$_]|\\u[0-9a-fA-F]{4}))*)+)|[{](?:..|(?:(?:[']|(?:\\{2}|\\[']|[^'])*[']))|(?:["](?:\\{2}|\\["]|[^"])*["]))|(?:[\/](?:\[(?:\\[\]])+\]|\\[\/]|[^\/*])(?:\[(?:\\[\]]|[^\]])+|\\[\/]|[^\/])*?[\/](?:[a-zA-Z]*)))*[}]|[{](?:..|(?:(?:[']|(?:\\{2}|\\[']|[^'])*[']))|(?:["](?:\\{2}|\\["]|[^"])*["]))|(?:[\/](?:\[(?:\\[\]])+\]|\\[\/]|[^\/*])(?:\[(?:\\[\]]|[^\]])+|\\[\/]|[^\/])*?[\/](?:[a-zA-Z]*)))*[}])\s*[{]?)|(\s*in(?:stanceof)?(?=[\/\d"'\[\s\(\{]))|((?:(?:\s+(?:in(?:stanceof)?)\s+)|\s*\b(?:delete|this|Infinity|NaN|void|do|else|case|default|return|var|continue|undefined|null|new|typeof|throw|break|try|finally|true|false)\b\s*|\s*\b(?:if|else\s\s*if|with|while|for|switch|catch)\b\s*(?=[({]))|((,\{]\s*(?:(?:(?:[']|(?:\\{2}|\\[']|[^'])*[']))|(?:["](?:\\{2}|\\["]|[^"])*["]))|(?:[0][xX][0-9a-fA-F]*)|(?:[0]|[1-9]\d+)?(?:[.]?\d+)+(?:[eE][+-]?\d+)?|(?:[a-zA-Z_$]|\\u[0-9a-fA-F]{4})(?:[\w$_]|\\u[0-9a-fA-F]{4})*)\s*(?=[:]))|((?:(?:[']|(?:\\{2}|\\[']|[^'])*[']))|(?:["](?:\\{2}|\\["]|[^"])*["]))|((?:(?:[:]|(?:(?:^\s*|\s*$)|[,]|[;\n\r]+)|(?:[!]|[=]{0,2}|[%]|[=]?|[&]{1,2}|[&][=]|[*][=]?|[+]{1,2}|[+][=]|[\-]{1,2}|[\-][=]|[\/][=]?|[<]{1,2}[=]?|[=]{1,3}|[>]{1,3}[=]?|[\^][=]?|[|][=]?|[|]{2}))|([)]+)\s*(?:[\/](?:\[(?:\\[\]])+\]|\\[\/]|[^\/*])(?:\[(?:\\[\]]|[^\]])+|\\[\/]|[^\/])*?[\/](?:[a-zA-Z]*)))\s*(?:(?:(?:^\s*|\s*$)|[,]|[;\n\r]+)|(?:[!]|[=]{0,2}|[%]|[=]?|[&]{1,2}|[&][=]|[*][=]?|[+]{1,2}|[+][=]|[\-]{1,2}|[\-][=]|[\/][=]?|[<]{1,2}[=]?|[=]{1,3}|[>]{1,3}[=]?|[\^][=]?|[|][=]?|[|]{2}))|([}]+|(?=\s*[\[.\}\]]))))|((?:[0][xX][0-9a-fA-F]*)|(?:[0]|[1-9]\d+)?(?:[.]?\d+)+(?:[eE][+-]?\d+)?)|(\s*[\[])|(\s*[\]])|(\s*(?:function\s*(?:(?:[a-zA-Z_$]|\\u[0-9a-fA-F]{4})(?:[\w$_]|\\u[0-9a-fA-F]{4}))*)?\s*[(](?:\s*(?:[a-zA-Z_$]|\\u[0-9a-fA-F]{4})(?:[\w$_]|\\u[0-9a-fA-F]{4}))*\s*)?(?:[,]\s*(?:[a-zA-Z_$]|\\u[0-9a-fA-F]{4})(?:[\w$_]|\\u[0-9a-fA-F]{4}))*\s*[)]\s*[{])|((?:@#[()])|((?:[.]?\s*(?:[a-zA-Z_$]|\\u[0-9a-fA-F]{4})(?:[\w$_]|\\u[0-9a-fA-F]{4}))*)|([,;])|((?:[!]|[=]{0,2}|[%]|[=]?|[&]{1,2}|[&][=]|[*][=]?|[+]{1,2}|[+][=]|[\-]{1,2}|[\-][=]|[\/][=]?|[<]{1,2}[=]?|[=]{1,3}|[>]{1,3}[=]?|[\^][=]?|[|][=]?|[|]{2}))|([{}]))/g

Bright idea!

- Since we want to execute JavaScript in JavaScript why not use the engine itself?
- Instead of parsing, why not rewrite instead!
- Char by char seems longwinded especially when we have regex


```
/([\r\n]+)|(\s*for\s*[(]\s*(?:var\s+)?(?:[a-zA-Z_$]|\\u[0-9a-fA-F]{4})(?:[\w$_]|\\u[0-9a-fA-
F]{4})*\s+in\s*(?:(?:(?:[']|(?:\\{2}|\\[']|[^'])*[']))|(?:["](?:\\{2}|\\["]|[^"])*["])|(?:[\/](?:\[(?:\\[\]])+\]|\\[\/]|[^\/*])(?:\[(?:\\[\]]|[^\]])+|\\[\/]|[^\/])*?[\/](?:[a-zA-Z]*)))|(?:(?:[.]?\s*(?:[a-zA-Z_$]|\\u[0-9a-fA-
F]{4})(?:[\w$_]|\\u[0-9a-fA-F]{4}))*)+)|[{](?:..|(?:(?:[']|(?:\\{2}|\\[']|[^'])*[']))|(?:["](?:\\{2}|\\["]|[^"])*["]))|(?:[\/](?:\[(?:\\[\]])+\]|\\[\/]|[^\/*])(?:\[(?:\\[\]]|[^\]])+|\\[\/]|[^\/])*?[\/](?:[a-zA-
Z]*)))*[}]|[{](?:..|(?:(?:[']|(?:\\{2}|\\[']|[^'])*[']))|(?:["](?:\\{2}|\\["]|[^"])*["]))|(?:[\/](?:\[(?:\\[\]])+\]|\\[\/]|[^\/*])(?:\[(?:\\[\]]|[^\]])+|\\[\/]|[^\/])*?[\/](?:[a-zA-
Z]*)))*[}])\s*[}]\s*[{]?)|(\s*in(?:stanceof)?(?=[\/\d"'\[\s\(\{]))|((?:(?:\s+(?:in(?:stanceof)?)\s+)|\s*\b(?:delete|this|Infinity|NaN|void|do|else|case|default|return|var|continue|undefined|null|new|typeof|throw|br
eak|try|finally|true|false)\b\s*|\s*\b(?:if|else\s\s*if|with|while|for|switch|catch)\b\s*(?=[({]))|((?:,\{]\s*(?:(?:(?:[']|(?:\\{2}|\\[']|[^'])*[']))|(?:["](?:\\{2}|\\["]|[^"])*["]))|(?:[0][xX][0-9a-fA-F]*)|(?:[0]|[1-
9]\d+)?(?:[.]?\d+)+(?:[eE][+-]?\d+)?|(?:[a-zA-Z_$]|\\u[0-9a-fA-F]{4})(?:[\w$_]|\\u[0-9a-fA-
F]{4})*)\s*(?=[:]))|((?:(?:[']|(?:\\{2}|\\[']|[^'])*[']))|(?:["](?:\\{2}|\\["]|[^"])*["]))|((?:(?:[:]|(?:(?:^\s*|\s*$)|[,]|[;\n\r]+)|(?:[!][=]{0,2}|[%][=]?|[&]{1,2}|[&][=]|[*][=]?|[+]{1,2}|[+][=]|[\-]{1,2}|[\-
][=]|[\/][=]?|[<]{1,2}[=]?|[=]{1,3}|[>]{1,3}[=]?|[^][=]?|[|][=]?|[|]{2}))|([)]+)\s*(?:[\/](?:\[(?:\\[\]])+\]|\\[\/]|[^\/*])(?:\[(?:\\[\]]|[^\]])+|\\[\/]|[^\/])*?[\/](?:[a-zA-
Z]*)))\s*(?:(?:(?:^\s*|\s*$)|[,]|[;\n\r]+)|(?:[!][=]{0,2}|[%][=]?|[&]{1,2}|[&][=]|[*][=]?|[+]{1,2}|[+][=]|[\-]{1,2}|[\-
][=]|[\/][=]?|[<]{1,2}[=]?|[=]{1,3}|[>]{1,3}[=]?|[^][=]?|[|][=]?|[|]{2}))|([)]+|(?=\s*[\[.\}\]]))|((?:[0][xX][0-9a-fA-F]*)|(?:[0]|[1-9]\d+)?(?:[.]?\d+)+(?:[eE][+-]?\d+)?)|(\s*[\[])|(\s*[\]])|(\s*(?:function\s*(?:(?:[a-zA-
Z_$]|\\u[0-9a-fA-F]{4})(?:[\w$_]|\\u[0-9a-fA-F]{4}))*)?\s*[(](?:\s*(?:[a-zA-Z_$]|\\u[0-9a-fA-F]{4})(?:[\w$_]|\\u[0-9a-fA-F]{4}))*\s*)?(?:[,]\s*(?:[a-zA-Z_$]|\\u[0-9a-fA-F]{4})(?:[\w$_]|\\u[0-9a-fA-
F]{4}))*\s*)*[)]\s*[{])|((?:@#[()])|((?:[.]?\s*(?:[a-zA-Z_$]|\\u[0-9a-fA-F]{4})(?:[\w$_]|\\u[0-9a-fA-F]{4})*))|([,;])|((?:[!][=]{0,2}|[%][=]?|[&]{1,2}|[&][=]|[*][=]?|[+]{1,2}|[+][=]|[\-]{1,2}|[\-
][=]|[\/][=]?|[<]{1,2}[=]?|[=]{1,3}|[>]{1,3}[=]?|[^][=]?|[|][=]?|[|]{2}))|([{}])/g
```

It’s not that simple

- You don’t know a value until it’s executed
- E.g. x=func();obj[x]; // what is x?
- RegEx isn’t good for recursive values like square bracket notion in JavaScript
- Regex is slow

/([\r\n]+)|(\s*for\s*[(]\s*(?:var\s+)?(?:[a-zA-Z_$]|\\u[0-9a-fA-F]{4})(?:[\w$_]|\\u[0-9a-fA-F]{4})*\s+in\s*(?:(?:(?:[']|(?:\\{2}|\\[']|[^'])*[']))|(?:["]|(?:\\{2}|\\["]|[^"])*["])))|(?:[\/](?:\[(?:\\[\]]|[^\]])+\]|\\[\/]|[^\/*])(?:\[(?:\\[\]]|[^\]])+|\\[\/]|[^\/])*?[\/](?:[a-zA-Z]*)))|(?:(?:[.]?\s*(?:[a-zA-Z_$]|\\u[0-9a-fA-F]{4})(?:[\w$_]|\\u[0-9a-fA-F]{4}))*)+)|[{](?:.|(?:(?:[']|(?:\\{2}|\\[']|[^'])*[']))|(?:["]|(?:\\{2}|\\["]|[^"])*["])))|(?:[\/](?:\[(?:\\[\]]|[^\]])+\]|\\[\/]|[^\/*])(?:\[(?:\\[\]]|[^\]])+|\\[\/]|[^\/])*?[\/](?:[a-zA-Z]*)))*[}]|[{](?:.|(?:(?:[']|(?:\\{2}|\\[']|[^'])*[']))|(?:["]|(?:\\{2}|\\["]|[^"])*["])))|(?:[\/](?:\[(?:\\[\]]|[^\]])+\]|\\[\/]|[^\/*])(?:\[(?:\\[\]]|[^\]])+|\\[\/]|[^\/])*?[\/](?:[a-zA-Z]*)))*[}])\s*[{]?)|(\s*in(?:stanceof)?(?=[\/\d"'\[\s\(\{]))|((?:(?:\s+(?:in(?:stanceof)?)\s+)|\s*\b(?:delete|this|Infinity|NaN|void|do|else|case|default|return|var|continue|undefined|null|new|typeof|throw|break|try|finally|true|false)\b\s*|\s*\b(?:if|else\s\s*if|with|while|for|switch|catch)\b\s*(?=[({]))|((,\{]\s*(?:(?:(?:[']|(?:\\{2}|\\[']|[^'])*[']))|(?:["]|(?:\\{2}|\\["]|[^"])*["])))|(?:[0][xX][0-9a-fA-F]*)|(?:[0]|[1-9]\d+)?(?:[.]?\d+)+(?:[eE][+-]?\d+)?|(?:[a-zA-Z_$]|\\u[0-9a-fA-F]{4})(?:[\w$_]|\\u[0-9a-fA-F]{4})*)\s*(?=[:]))|((?:(?:[']|(?:\\{2}|\\[']|[^'])*[']))|(?:["]|(?:\\{2}|\\["]|[^"])*["])))|((?:(?:[:]|(?:(?:^\s*|\s*$)|[,]|[;\n\r]+)|(?:[!]|[=]{0,2}|[%]|[=]?|[&]{1,2}|[&]|[=]|[*]|[=]?|[+]{1,2}|[+]|[=]|[\-]{1,2}|[\-]|[=]|[\/]|[=]?|[<]{1,2}|[=]?|[=]{1,3}|[>]{1,3}|[=]?|[^]|[=]?|[|]|[=]?|[|]{2}))|([)]+|(?=\s*[\[.\}\]]))|((?:[0][xX][0-9a-fA-F]*)|(?:[0]|[1-9]\d+)?(?:[.]?\d+)+(?:[eE][+-]?\d+)?)|(\s*[\[])|(\s*[\]])|(\s*(?:function\s*(?:(?:[a-zA-Z_$]|\\u[0-9a-fA-F]{4})(?:[\w$_]|\\u[0-9a-fA-F]{4}))*)?\s*[(](?:\s*(?:[a-zA-Z_$]|\\u[0-9a-fA-F]{4})(?:[\w$_]|\\u[0-9a-fA-F]{4}))*\s*)?(?:[,]\s*(?:[a-zA-Z_$]|\\u[0-9a-fA-F]{4})(?:[\w$_]|\\u[0-9a-fA-F]{4}))*\s*)?[)]\s*[{])|((?:@#[()])|((?:[.]?\s*(?:[a-zA-Z_$]|\\u[0-9a-fA-F]{4})(?:[\w$_]|\\u[0-9a-fA-F]{4}))*))|([,;])|((?:[!]|[=]{0,2}|[%]|[=]?|[&]{1,2}|[&]|[=]|[*]|[=]?|[+]{1,2}|[+]|[=]|[\-]{1,2}|[\-]|[=]|[\/]|[=]?|[<]{1,2}|[=]?|[=]{1,3}|[>]{1,3}|[=]?|[^]|[=]?|[|]|[=]?|[|]{2}))|([}])/g

Why bother?

- I want to share JavaScript safely
- Browsers don't provide the tools to do it (ES5 is getting there)
- SOP has expired, we need something else. That something doesn't exist

/([\r\n]+)|(\s*for\s*[(]\s*(?:var\s+)?(?:[a-zA-Z_$]|\\u[0-9a-fA-F]{4})(?:[\w$_]|\\u[0-9a-fA-F]{4})*\s+in\s*(?:(?:(?:[']|(?:\\{2}|\\[']|[^'])*[']))|(?:["]|(?:\\{2}|\\["]|[^"])*["]))|(?:[\/](?:\[(?:\\[\]]|[^\]])+\]|\\[\/]|[^\/*])(?:\[(?:\\[\]]|[^\]])+|\\[\/]|[^\/])*?[\/](?:[a-zA-Z]*)))*[)]|[{](?:..|(?:(?:[']|(?:\\{2}|\\[']|[^'])*[']))|(?:["]|(?:\\{2}|\\["]|[^"])*["]))|(?:[\/](?:\[(?:\\[\]]|[^\]])+\]|\\[\/]|[^\/*])(?:\[(?:\\[\]]|[^\]])+|\\[\/]|[^\/])*?[\/](?:[a-zA-Z]*)))*[}])\s*[)]\s*[{]?)|(\s*in(?:stanceof)?(?=[\/\d"'\[\s\(\{]))|((?:(?:\s+(?:in(?:stanceof)?)\s+)|\s*\b(?:delete|this|Infinity|NaN|void|do|else|case|default|return|var|continue|undefined|null|new|typeof|throw|break|try|finally|true|false)\b\s*|\s*\b(?:if|else\s\s*if|with|while|for|switch|catch)\b\s*(?=[({]))|((,\{]\s*(?:(?:(?:[']|(?:\\{2}|\\[']|[^'])*[']))|(?:["]|(?:\\{2}|\\["]|[^"])*["]))|(?:[0][xX][0-9a-fA-F]*)|(?:[0]|[1-9]\d+)?(?:[.]?\d+)+(?:[eE][+-]?\d+)?|(?:[a-zA-Z_$]|\\u[0-9a-fA-F]{4})(?:[\w$_]|\\u[0-9a-fA-F]{4})*)\s*(?=[:]))|((?:(?:[']|(?:\\{2}|\\[']|[^'])*[']))|(?:["]|(?:\\{2}|\\["]|[^"])*["]))|((?:(?:[:]|(?:(?:^\s*|\s*$)|[,]|[;\n\r]+)|(?:[!]|[=]{0,2}|[%][=]?|[&]{1,2}|[&][=]|[*][=]?|[+]{1,2}|[+][=]|[\-]{1,2}|[\-][=]|[\/][=]?|[<]{1,2}[=]?|[=]{1,3}|[>]{1,3}[=]?|[\^][=]?|[|][=]?|[|]{2}))|([)]+)\s*(?:[\/](?:\[(?:\\[\]]|[^\]])+\]|\\[\/]|[^\/*])(?:\[(?:\\[\]]|[^\]])+|\\[\/]|[^\/])*?[\/](?:[a-zA-Z]*)))\s*(?:(?:(?:^\s*|\s*$)|[,]|[;\n\r]+)|(?:[!]|[=]{0,2}|[%][=]?|[&]{1,2}|[&][=]|[*][=]?|[+]{1,2}|[+][=]|[\-]{1,2}|[\-][=]|[\/][=]?|[<]{1,2}[=]?|[=]{1,3}|[>]{1,3}[=]?|[\^][=]?|[|][=]?|[|]{2}))|([)]+|(?=\s*[\[.\}\]]))))|((?:[0][xX][0-9a-fA-F]*)|(?:[0]|[1-9]\d+)?(?:[.]?\d+)+(?:[eE][+-]?\d+)?)|(\s*[\[])|(\s*[\]])|(\s*(?:function\s*(?:(?:[a-zA-Z_$]|\\u[0-9a-fA-F]{4})(?:[\w$_]|\\u[0-9a-fA-F]{4})*)?)\s*[(](?:\s*(?:[a-zA-Z_$]|\\u[0-9a-fA-F]{4})(?:[\w$_]|\\u[0-9a-fA-F]{4})*\s*)?(?:[,]\s*(?:[a-zA-Z_$]|\\u[0-9a-fA-F]{4})(?:[\w$_]|\\u[0-9a-fA-F]{4})*\s*)*[)]\s*[{])|((?:@#[()])|((?:[.]?\s*(?:[a-zA-Z_$]|\\u[0-9a-fA-F]{4})(?:[\w$_]|\\u[0-9a-fA-F]{4})*))|([,;])|((?:[!]|[=]{0,2}|[%][=]?|[&]{1,2}|[&][=]|[*][=]?|[+]{1,2}|[+][=]|[\-]{1,2}|[\-][=]|[\/][=]?|[<]{1,2}[=]?|[=]{1,3}|[>]{1,3}[=]?|[\^][=]?|[|][=]?|[|]{2}))|([{}])/g

The design

```
converted =
  code.replace(mainRegExp,
  function($0, $newLines, $forIn,
  $inInstanceofOperator,
  $statements, ..
```

Global regex to handle all combined regexes

Each statement/object is separated into separate groups

/([\r\n]+)|(\s*for\s*[(]\s*(?:var\s+)?(?:[a-zA-Z_$]|\\u[0-9a-fA-F]{4})(?:[\w$_]|\\u[0-9a-fA-F]{4})*\s+in\s*(?:(?:(?:['](?:\\{2}|\\[']|[^'])*[']))|(?:["](?:\\{2}|\\["]|[^"])*["])|(?:[\/](?:\[(?:\\[\]]|[^\]])+\]|\\[\/]|[^\/*])(?:\[(?:\\[\]]|[^\]])+|\\[\/]|[^\/])*?[\/](?:[a-zA-Z]*)))|(?:(?:[.]?\s*(?:[a-zA-Z_$]|\\u[0-9a-fA-F]{4})(?:[\w$_]|\\u[0-9a-fA-F]{4}))*)+)|[{](?:.|(?:(?:['](?:\\{2}|\\[']|[^'])*[']))|(?:["](?:\\{2}|\\["]|[^"])*["]))|(?:[\/](?:\[(?:\\[\]]|[^\]])+\]|\\[\/]|[^\/*])(?:\[(?:\\[\]]|[^\]])+|\\[\/]|[^\/])*?[\/](?:[a-zA-Z]*)))*[}]|[{](?:.|(?:(?:['](?:\\{2}|\\[']|[^'])*[']))|(?:["](?:\\{2}|\\["]|[^"])*["]))|(?:[\/](?:\[(?:\\[\]]|[^\]])+\]|\\[\/]|[^\/*])(?:\[(?:\\[\]]|[^\]])+|\\[\/]|[^\/])*?[\/](?:[a-zA-Z]*)))*[}])\s*[{]?)|(\s*in(?:stanceof)?(?=[\/\d"'\[\s\(\{]))|((?:(?:\s+(?:in(?:stanceof)?)\s+)|\s*\b(?:delete|this|Infinity|NaN|void|do|else|case|default|return|var|continue|undefined|null|new|typeof|throw|break|try|finally|true|false)\b\s*|\s*\b(?:if|else\s\s*if|with|while|for|switch|catch)\b\s*(?=[({]))|([,\{]\s*(?:(?:(?:['](?:\\{2}|\\[']|[^'])*[']))|(?:["](?:\\{2}|\\["]|[^"])*["]))|(?:[0][xX][0-9a-fA-F]*)|(?:[0]|[1-9]\d+)?(?:[.]?\d+)+(?:[eE][+-]?\d+)?|(?:[a-zA-Z_$]|\\u[0-9a-fA-F]{4})(?:[\w$_]|\\u[0-9a-fA-F]{4})*)\s*(?=[:]))|((?:(?:['](?:\\{2}|\\[']|[^'])*[']))|(?:["](?:\\{2}|\\["]|[^"])*["]))|((?:(?:[:]|(?:(?:^\s*|\s*$)|[,]|[;\n\r]+)|(?:[!][=]{0,2}|[%][=]?|[&]{1,2}|[&][=]|[*][=]?|[+]{1,2}|[+][=]|[\-]{1,2}|[\-][=]|[\/][=]?|[<]{1,2}[=]?|[=]{1,3}|[>]{1,3}[=]?|[\^][=]?|[|][=]?|[|]{2}))|([)]+|(?=\s*[\[.\(\]]))))|((?:[0][xX][0-9a-fA-F]*)|(?:[0]|[1-9]\d+)?(?:[.]?\d+)+(?:[eE][+-]?\d+)?)|(\s*[\[]))|(\s*[\]])|(\s*(?:function\s*(?:(?:[a-zA-Z_$]|\\u[0-9a-fA-F]{4})(?:[\w$_]|\\u[0-9a-fA-F]{4}))*)?\s*[(](?:\s*(?:[a-zA-Z_$]|\\u[0-9a-fA-F]{4})(?:[\w$_]|\\u[0-9a-fA-F]{4}))*\s*)?(?:[,]\s*(?:[a-zA-Z_$]|\\u[0-9a-fA-F]{4})(?:[\w$_]|\\u[0-9a-fA-F]{4}))*\s*[)]\s*[{])|((?:@#[()]))|((?:[.]?\s*(?:[a-zA-Z_$]|\\u[0-9a-fA-F]{4})(?:[\w$_]|\\u[0-9a-fA-F]{4}))*)|([,;])|((?:[!][=]{0,2}|[%][=]?|[&]{1,2}|[&][=]|[*][=]?|[+]{1,2}|[+][=]|[\-]{1,2}|[\-][=]|[\/][=]?|[<]{1,2}[=]?|[=]{1,3}|[>]{1,3}[=]?|[\^][=]?|[|][=]?|[|]{2}))|([}])/g

The design cont.

Regexp constructor is used to dynamically generate regexes

```
mainRegExp = new RegExp('(' +
  newLines.source +
  ')|('+forIn.source+')|(' +
  inInstanceofOperator.source +
  ')..
```

Main regexp is constructed using all the others

/([\r\n]+)|(\s*for\s*[(]\s*(?:var\s+)?(?:[a-zA-Z_$]|\\u[0-9a-fA-F]{4})(?:[\w$_]|\\u[0-9a-fA-F]{4})*\s+in\s*(?:(?:(?:[']|\\[']|[^'])*['])|(?:["]|\\["]|[^"])*["])))|(?:[\/](?:\[(?:\\[\]]|[^\]])+\]|\\[\/]|[^\/*])(?:\[(?:\\[\]]|[^\]])+|\\[\/]|[^\/])*?[\/](?:[a-zA-Z]*)))|(?:(?:[.]?\s*(?:[a-zA-Z_$]|\\u[0-9a-fA-F]{4})(?:[\w$_]|\\u[0-9a-fA-F]{4})*)+)|([{](?:.|(?:(?:[']|\\[']|[^'])*['])|(?:["]|\\["]|[^"])*["]))|(?:[\/](?:\[(?:\\[\]]|[^\]])+\]|\\[\/]|[^\/*])(?:\[(?:\\[\]]|[^\]])+|\\[\/]|[^\/])*?[\/](?:[a-zA-Z]*))*[}]|[(](?:.|(?:(?:[']|\\[']|[^'])*['])|(?:["]|\\["]|[^"])*["]))|(?:[\/](?:\[(?:\\[\]]|[^\]])+\]|\\[\/]|[^\/*])(?:\[(?:\\[\]]|[^\]])+|\\[\/]|[^\/])*?[\/](?:[a-zA-Z]*))*[)]|[[](?:.|(?:(?:[']|\\[']|[^'])*['])|(?:["]|\\["]|[^"])*["]))|(?:[\/](?:\[(?:\\[\]]|[^\]])+\]|\\[\/]|[^\/*])(?:\[(?:\\[\]]|[^\]])+|\\[\/]|[^\/])*?[\/](?:[a-zA-Z]*))*[]]\s*[{]}\s*[{]?)|(\s*in(?:stanceof)?(?=[\/\d"'\[\s\(\{])))|((?:(?:\s+(?:in(?:stanceof)?)\s+)|\s*\b(?:delete|this|Infinity|NaN|void|do|else|case|default|return|var|continue|undefined|null|new|typeof|throw|break|try|finally|true|false)\b\s*|\s*\b(?:if|else\s\s*if|with|while|for|switch|catch)\b\s*(?=[({]))|([,\{]\s*(?:(?:(?:[']|\\[']|[^'])*['])|(?:["]|\\["]|[^"])*["]))|(?:[0][xX][0-9a-fA-F]*)|(?:[0]|[1-9]\d+)?(?:[.]?\d+)+(?:[eE][+-]?\d+)?|(?:[a-zA-Z_$]|\\u[0-9a-fA-F]{4})(?:[\w$_]|\\u[0-9a-fA-F]{4})*)\s*(?=[:]))|((?:(?:[']|\\[']|[^'])*['])|(?:["]|\\["]|[^"])*["])))|((?:(?:[:]|(?:(?:^\s*|\s*$)|[,]|[;\n\r]+)|(?:[!][=]{0,2}|[%][=]?|[&]{1,2}|[&][=]|[*][=]?|[+]{1,2}|[+][=]|[\-]{1,2}|[\-][=]|[\/][=]?|[<]{1,2}[=]?|[=]{1,3}|[>]{1,3}[=]?|[\^][=]?|[|][=]?|[|]{2}))|([)]+)\s*(?:[\/](?:\[(?:\\[\]]|[^\]])+\]|\\[\/]|[^\/*])(?:\[(?:\\[\]]|[^\]])+|\\[\/]|[^\/])*?[\/](?:[a-zA-Z]*)))\s*(?:(?:(?:^\s*|\s*$)|[,]|[;\n\r]+)|(?:[!][=]{0,2}|[%][=]?|[&]{1,2}|[&][=]|[*][=]?|[+]{1,2}|[+][=]|[\-]{1,2}|[\-][=]|[\/][=]?|[<]{1,2}[=]?|[=]{1,3}|[>]{1,3}[=]?|[\^][=]?|[|][=]?|[|]{2}))|([}]+|(?=\s*[\[.\}\]])))|((?:[0][xX][0-9a-fA-F]*)|(?:[0]|[1-9]\d+)?(?:[.]?\d+)+(?:[eE][+-]?\d+)?)|(\s*[\[])|(\s*[\]])|(\s*(?:function\s*(?:(?:[a-zA-Z_$]|\\u[0-9a-fA-F]{4})(?:[\w$_]|\\u[0-9a-fA-F]{4})*)?)\s*[(](?:\s*(?:[a-zA-Z_$]|\\u[0-9a-fA-F]{4})(?:[\w$_]|\\u[0-9a-fA-F]{4})*\s*)?(?:[,]\s*(?:[a-zA-Z_$]|\\u[0-9a-fA-F]{4})(?:[\w$_]|\\u[0-9a-fA-F]{4})*\s*)*[)]\s*[{])|((?:@#[(])))|((?:[.]?\s*(?:[a-zA-Z_$]|\\u[0-9a-fA-F]{4})(?:[\w$_]|\\u[0-9a-fA-F]{4})*))|([,;])|((?:[!][=]{0,2}|[%][=]?|[&]{1,2}|[&][=]|[*][=]?|[+]{1,2}|[+][=]|[\-]{1,2}|[\-][=]|[\/][=]?|[<]{1,2}[=]?|[=]{1,3}|[>]{1,3}[=]?|[\^][=]?|[|][=]?|[|]{2}))|([}])/g

The design cont.

- Main regex is run in global mode without start or end anchor: /(...)|(...)/g
- The regex starts from the next valid match
- Skips stuff that isn't matched
- Regex lastIndex keeps track of position

/([\r\n]+)|(\s*for\s*[(]\s*(?:var\s+)?(?:[a-zA-Z_$]|\\u[0-9a-fA-F]{4})(?:[\w$_]|\\u[0-9a-fA-F]{4})*\s+in\s*(?:(?:(?:[']|(?:\\{2}|\\[']|[^'])*[']))|(?:["]|(?:\\{2}|\\["]|[^"])*["])))|(?:[\/](?:\[(?:\\[\]]|[^\]])+\]|\\[\/]|[^\/*])(?:\[(?:\\[\]]|[^\]])+|\\[\/]|[^\/])*?[\/](?:[a-zA-Z]*)))|(?:(?:[.]?\s*(?:[a-zA-Z_$]|\\u[0-9a-fA-F]{4})(?:[\w$_]|\\u[0-9a-fA-F]{4}))*)+)|[{](?:.|(?:(?:[']|(?:\\{2}|\\[']|[^'])*[']))|(?:["]|(?:\\{2}|\\["]|[^"])*["])))|(?:[\/](?:\[(?:\\[\]]|[^\]])+\]|\\[\/]|[^\/*])(?:\[(?:\\[\]]|[^\]])+|\\[\/]|[^\/])*?[\/](?:[a-zA-Z]*)))*[}]|[{](?:.|(?:(?:[']|(?:\\{2}|\\[']|[^'])*[']))|(?:["]|(?:\\{2}|\\["]|[^"])*["])))|(?:[\/](?:\[(?:\\[\]]|[^\]])+\]|\\[\/]|[^\/*])(?:\[(?:\\[\]]|[^\]])+|\\[\/]|[^\/])*?[\/](?:[a-zA-Z]*)))*[}])\s*[}]\s*[{]?)|(\s*in(?:stanceof)?(?=[\/\d"'\[\s\(\{]))|((?:(?:\s+(?:in(?:stanceof)?)\s+)|\s*\b(?:delete|this|Infinity|NaN|void|do|else|case|default|return|var|continue|undefined|null|new|typeof|throw|break|try|finally|true|false)\b\s*|\s*\b(?:if|else\s\s*if|with|while|for|switch|catch)\b\s*(?=[({]))|((,\{]\s*(?:(?:(?:[']|(?:\\{2}|\\[']|[^'])*[']))|(?:["]|(?:\\{2}|\\["]|[^"])*["]))|(?:[0][xX][0-9a-fA-F]*)|(?:[0]|[1-9]\d+)?(?:[.]?\d+)+(?:[eE][+-]?\d+)?|(?:[a-zA-Z_$]|\\u[0-9a-fA-F]{4})(?:[\w$_]|\\u[0-9a-fA-F]{4})*)\s*(?=[:]))|((?:(?:[']|(?:\\{2}|\\[']|[^'])*[']))|(?:["]|(?:\\{2}|\\["]|[^"])*["])))|((?:(?:[:]|(?:(?:^\s*|\s*$)|[,]|[;\n\r]+)|(?:[!]|[=]{0,2}|[%][=]?|[&]{1,2}|[&][=]|[*][=]?|[+]{1,2}|[+][=]|[\-]{1,2}|[\-][=]|[\/][=]?|[<]{1,2}[=]?|[=]{1,3}|[>]{1,3}[=]?|[^][=]?|[|][=]?|[|]{2}))|([)]+)\s*(?:[\/](?:\[(?:\\[\]]|[^\]])+\]|\\[\/]|[^\/*])(?:\[(?:\\[\]]|[^\]])+|\\[\/]|[^\/])*?[\/](?:[a-zA-Z]*)))\s*(?:(?:(?:^\s*|\s*$)|[,]|[;\n\r]+)|(?:[!]|[=]{0,2}|[%][=]?|[&]{1,2}|[&][=]|[*][=]?|[+]{1,2}|[+][=]|[\-]{1,2}|[\-][=]|[\/][=]?|[<]{1,2}[=]?|[=]{1,3}|[>]{1,3}[=]?|[^][=]?|[|][=]?|[|]{2}))|[)]+|(?=\s*[\[.\}\]]))|((?:[0][xX][0-9a-fA-F]*)|(?:[0]|[1-9]\d+)?(?:[.]?\d+)+(?:[eE][+-]?\d+)?)|(\s*[\[])|(\s*[\]])|(\s*(?:function\s*(?:(?:[a-zA-Z_$]|\\u[0-9a-fA-F]{4})(?:[\w$_]|\\u[0-9a-fA-F]{4}))*)?\s*[(](?:\s*(?:[a-zA-Z_$]|\\u[0-9a-fA-F]{4})(?:[\w$_]|\\u[0-9a-fA-F]{4}))*\s*)?(?:[,]\s*(?:[a-zA-Z_$]|\\u[0-9a-fA-F]{4})(?:[\w$_]|\\u[0-9a-fA-F]{4}))*\s*[)]\s*[{])|((?:@#[()])|((?:[.]?\s*(?:[a-zA-Z_$]|\\u[0-9a-fA-F]{4})(?:[\w$_]|\\u[0-9a-fA-F]{4}))*))|([,;])|((?:[!]|[=]{0,2}|[%][=]?|[&]{1,2}|[&][=]|[*][=]?|[+]{1,2}|[+][=]|[\-]{1,2}|[\-][=]|[\/][=]?|[<]{1,2}[=]?|[=]{1,3}|[>]{1,3}[=]?|[^][=]?|[|][=]?|[|]{2}))|([}])/g

The design cont.

Each group is checked to see if it's matched

```
} else if ($jsregArrays !==
  undefined &&
  $jsregArrays.length) {
return 'JSREG_A(';
```

Matching string is either rewritten or returned literally for performance

/([\r\n]+)|(\s*for\s*[(]\s*(?:var\s+)?(?:[a-zA-Z_$]|\\u[0-9a-fA-F]{4})(?:[\w$_]|\\u[0-9a-fA-F]{4})*\s+in\s*(?:(?:(?:[']|\\{2}|\\[']|[^'])*['])|(?:["]|\\{2}|\\["]|[^"])*["]))|(?:[\/](?:\[(?:\\[\]]|[^\]])+\]|\\[\/]|[^\/*])(?:\[(?:\\[\]]|[^\]])+|\\[\/]|[^\/])*?[\/](?:[a-zA-Z]*)))|(?:(?:[.]?\s*(?:[a-zA-Z_$]|\\u[0-9a-fA-F]{4})(?:[\w$_]|\\u[0-9a-fA-F]{4}))*)+)|([{](?:..|(?:(?:[']|\\{2}|\\[']|[^'])*[']))|(?:["]|\\{2}|\\["]|[^"])*["]))|(?:[\/](?:\[(?:\\[\]]|[^\]])+\]|\\[\/]|[^\/*])(?:\[(?:\\[\]]|[^\]])+|\\[\/]|[^\/])*?[\/](?:[a-zA-Z]*)))*[}]|[(](?:..|(?:(?:[']|\\{2}|\\[']|[^'])*[']))|(?:["]|\\{2}|\\["]|[^"])*["]))|(?:[\/](?:\[(?:\\[\]]|[^\]])+\]|\\[\/]|[^\/*])(?:\[(?:\\[\]]|[^\]])+|\\[\/]|[^\/])*?[\/](?:[a-zA-Z]*)))*[)]\s*[{]?)|(\s*in(?:stanceof)?(?=[\^\d'"\[\s\(\{]))|((?:(?:\s+(?:in(?:stanceof)?)\s+)|\s*\b(?:delete|this|Infinity|NaN|void|do|else|case|default|return|var|continue|undefined|null|new|typeof|throw|break|try|finally|true|false)\b\s*|\s*\b(?:if|else\s\s*if|with|while|for|switch|catch)\b\s*(?=[({]))))|([,\{]\s*(?:(?:(?:[']|\\{2}|\\[']|[^'])*[']))|(?:["]|\\{2}|\\["]|[^"])*["]))|(?:[0][xX][0-9a-fA-F]*)|(?:[0]|[1-9]\d+)?(?:[.]?\d+)+(?:[eE][+-]?\d+)?|(?:[a-zA-Z_$]|\\u[0-9a-fA-F]{4})(?:[\w$_]|\\u[0-9a-fA-F]{4})*)\s*(?=[:]))|((?:(?:[']|\\{2}|\\[']|[^'])*[']))|(?:["]|\\{2}|\\["]|[^"])*["]))|((?:(?:[:]|(?:(?:^\s*|\s*$)|[,]|[;\n\r]+)|(?:[!][=]{0,2}|[%][=]?|[&]{1,2}|[&][=]|[*][=]?|[+]{1,2}|[+][=]|[\-]{1,2}|[\-][=]|[\/][=]?|[<]{1,2}[=]?|[=]{1,3}|[>]{1,3}[=]?|[\^][=]?|[|][=]?|[|]{2}))|([)]+)\s*(?:[\/](?:\[(?:\\[\]]|[^\]])+\]|\\[\/]|[^\/*])(?:\[(?:\\[\]]|[^\]])+|\\[\/]|[^\/])*?[\/](?:[a-zA-Z]*)))\s*(?:(?:(?:^\s*|\s*$)|[,]|[;\n\r]+)|(?:[!][=]{0,2}|[%][=]?|[&]{1,2}|[&][=]|[*][=]?|[+]{1,2}|[+][=]|[\-]{1,2}|[\-][=]|[\/][=]?|[<]{1,2}[=]?|[=]{1,3}|[>]{1,3}[=]?|[\^][=]?|[|][=]?|[|]{2}))|([)]+|(?=\s*[\[.\}\]])))|((?:[0][xX][0-9a-fA-F]*)|(?:[0]|[1-9]\d+)?(?:[.]?\d+)+(?:[eE][+-]?\d+)?)|(\s*[\[])|(\s*[\]])|(\s*(?:function\s*(?:(?:[a-zA-Z_$]|\\u[0-9a-fA-F]{4})(?:[\w$_]|\\u[0-9a-fA-F]{4}))*)?\s*[(](?:\s*(?:[a-zA-Z_$]|\\u[0-9a-fA-F]{4})(?:[\w$_]|\\u[0-9a-fA-F]{4}))*\s*)?(?:[,]\s*(?:[a-zA-Z_$]|\\u[0-9a-fA-F]{4})(?:[\w$_]|\\u[0-9a-fA-F]{4}))*\s*[)]\s*[{])|((?:@#[()])|((?:[.]?\s*(?:[a-zA-Z_$]|\\u[0-9a-fA-F]{4})(?:[\w$_]|\\u[0-9a-fA-F]{4}))*)|([,;])|((?:[!][=]{0,2}|[%][=]?|[&]{1,2}|[&][=]|[*][=]?|[+]{1,2}|[+][=]|[\-]{1,2}|[\-][=]|[\/][=]?|[<]{1,2}[=]?|[=]{1,3}|[>]{1,3}[=]?|[\^][=]?|[|][=]?|[|]{2}))|([{}])/g

The design cont.

- The rewrite can be called recursively if required (but it gets complicated) considering the left context of the match
- JavaScript has no lookbehind!
- Hard to know what context the code your matching is in. E.g. {}[1,2,3] is an array
- 1,{}[1] is a Object literal


```
/([\r\n]+)|(\s*for\s*[(]\s*(?:var\s+)?(?:[a-zA-Z_$]|\\u[0-9a-fA-F]{4})(?:[\w$_]|\\u[0-9a-fA-
F]{4})*\s+in\s*(?:(?:(?:[']|\\[']|[^'])*['])|(?:["](?:\\{2}|\\["]|[^"])*["])))|(?:[\/](?:\[(?:\\[\]]|[^\]])+\]|\\[\/]|[^\/*])(?:\[(?:\\[\]]|[^\]])+|\\[\/]|[^\/])*?[\/](?:[a-zA-Z]*)))|(?:(?:[.]?\s*(?:[a-zA-Z_$]|\\u[0-9a-fA-
F]{4})(?:[\w$_]|\\u[0-9a-fA-F]{4}))*)+)|([{](?:.|(?:(?:[']|\\[']|[^'])*['])|(?:["](?:\\{2}|\\["]|[^"])*["])))|(?:[\/](?:\[(?:\\[\]]|[^\]])+\]|\\[\/]|[^\/*])(?:\[(?:\\[\]]|[^\]])+|\\[\/]|[^\/])*?[\/](?:[a-zA-
Z]*)))*[}]|[{](?:.|(?:(?:[']|\\[']|[^'])*['])|(?:["](?:\\{2}|\\["]|[^"])*["])))|(?:[\/](?:\[(?:\\[\]]|[^\]])+\]|\\[\/]|[^\/*])(?:\[(?:\\[\]]|[^\]])+|\\[\/]|[^\/])*?[\/](?:[a-zA-
Z]*)))*[}])\s*[}]\s*[{][?])|(\s*in(?:stanceof)?(?=[\^\d""\[\s\(\{]))|((?:(?:\s+(?:in(?:stanceof)?)\s+)|\s*\b(?:delete|this|Infinity|NaN|void|do|else|case|default|return|var|continue|undefined|null|new|typeof|throw|br
eak|try|finally|true|false)\b\s*|\s*\b(?:if|else\s\s*if|with|while|for|switch|catch)\b\s*(?=[({]))|([,\{]\s*(?:(?:(?:[']|\\[']|[^'])*['])|(?:["](?:\\{2}|\\["]|[^"])*["]))|(?:[0][xX][0-9a-fA-F]*)|(?:[0]|[1-
9]\d+)?(?:[.]?\d+)+(?:[eE][+-]?\d+)?|(?:[a-zA-Z_$]|\\u[0-9a-fA-F]{4})(?:[\w$_]|\\u[0-9a-fA-
F]{4})*)\s*(?=[:]))|((?:(?:[']|\\[']|[^'])*['])|(?:["](?:\\{2}|\\["]|[^"])*["])))|((?:(?:[:]|(?:(?:^\s*|\s*$)|[,]|[;\n\r]+)|(?:[!][=]{0,2}|[%][=]?|[&]{1,2}|[&][=]|[*][=]?|[+]{1,2}|[+][=]|[\-]{1,2}|[\-
][=]|[\/][=]?|[<]{1,2}[=]?|[=]{1,3}|[>]{1,3}[=]?|[^][=]?|[|][=]?|[|]{2}))|([)]+)\s*(?:[\/](?:\[(?:\\[\]]|[^\]])+\]|\\[\/]|[^\/*])(?:\[(?:\\[\]]|[^\]])+|\\[\/]|[^\/])*?[\/](?:[a-zA-
Z]*)))\s*(?:(?:(?:^\s*|\s*$)|[,]|[;\n\r]+)|(?:[!][=]{0,2}|[%][=]?|[&]{1,2}|[&][=]|[*][=]?|[+]{1,2}|[+][=]|[\-]{1,2}|[\-
][=]|[\/][=]?|[<]{1,2}[=]?|[=]{1,3}|[>]{1,3}[=]?|[^][=]?|[|][=]?|[|]{2}))|[)]+|(?=\s*[\[.\}\]]))|((?:[0][xX][0-9a-fA-F]*)|(?:[0]|[1-9]\d+)?(?:[.]?\d+)+(?:[eE][+-]?\d+)?)|(\s*[\[])|(\s*[\]])|(\s*(?:function\s*(?:(?:[a-zA-
Z_$]|\\u[0-9a-fA-F]{4})(?:[\w$_]|\\u[0-9a-fA-F]{4}))*)?\s*[(](?:\s*(?:[a-zA-Z_$]|\\u[0-9a-fA-F]{4})(?:[\w$_]|\\u[0-9a-fA-F]{4}))*\s*)?(?:[,]\s*(?:[a-zA-Z_$]|\\u[0-9a-fA-F]{4})(?:[\w$_]|\\u[0-9a-fA-
F]{4}))*\s*)*[)]\s*[{])|((?:@#[()])|((?:[.]?\s*(?:[a-zA-Z_$]|\\u[0-9a-fA-F]{4})(?:[\w$_]|\\u[0-9a-fA-F]{4})*))|([,;])|((?:[!][=]{0,2}|[%][=]?|[&]{1,2}|[&][=]|[*][=]?|[+]{1,2}|[+][=]|[\-]{1,2}|[\-
][=]|[\/][=]?|[<]{1,2}[=]?|[=]{1,3}|[>]{1,3}[=]?|[^][=]?|[|][=]?|[|]{2}))|([}])/g
```

What happens to my code?

- Code is converted from variable to $variable$
- Square bracket notion is rewritten from obj[x] to obj[JSREG_FUNC.gp(x)]
- We are forcing JavaScript into a whitelist of allowed commands

```
/([\r\n]+)|(\s*for\s*[(]\s*(?:var\s+)?(?:[a-zA-Z_$]|\\u[0-9a-fA-F]{4})(?:[\w$_]|\\u[0-9a-fA-
F]{4})*\s+in\s*(?:(?:(?:['](?:\\{2}|\\[']|[^'])*['])|(?:["](?:\\{2}|\\["]|[^"])*["]))|(?:[\/](?:\[(?:\\[\]])+\]|\\[\/]|[^\/*])(?:\[(?:\\[\]]|[^\]])+|\\[\/]|[^\/])*?[\/](?:[a-zA-Z]*))|(?:(?:[.]?\s*(?:[a-zA-Z_$]|\\u[0-9a-fA-
F]{4})(?:[\w$_]|\\u[0-9a-fA-F]{4})*)+)|[{](?:.|(?:(?:['](?:\\{2}|\\[']|[^'])*['])|(?:["](?:\\{2}|\\["]|[^"])*["]))|(?:[\/](?:\[(?:\\[\]])+\]|\\[\/]|[^\/*])(?:\[(?:\\[\]]|[^\]])+|\\[\/]|[^\/])*?[\/](?:[a-zA-
Z]*)))*[}]|[(](?:.|(?:(?:['](?:\\{2}|\\[']|[^'])*['])|(?:["](?:\\{2}|\\["]|[^"])*["]))|(?:[\/](?:\[(?:\\[\]])+\]|\\[\/]|[^\/*])(?:\[(?:\\[\]]|[^\]])+|\\[\/]|[^\/])*?[\/](?:[a-zA-
Z]*)))*[)])\s*[)]\s*[{]?)|(\s*in(?:stanceof)?(?=[\/\d"'\[\s\(\{]))|((?:(?:\s+(?:in(?:stanceof)?)\s+)|\s*\b(?:delete|this|Infinity|NaN|void|do|else|case|default|return|var|continue|undefined|null|new|typeof|throw|br
eak|try|finally|true|false)\b\s*|\s*\b(?:if|else\s\s*if|with|while|for|switch|catch)\b\s*(?=[(]))|([,\{]\s*(?:(?:(?:['](?:\\{2}|\\[']|[^'])*['])|(?:["](?:\\{2}|\\["]|[^"])*["]))|(?:[0][xX][0-9a-fA-F]*)|(?:[0]|[1-
9]\d+)?(?:[.]?\d+)+(?:[eE][+-]?\d+)?|(?:[a-zA-Z_$]|\\u[0-9a-fA-F]{4})(?:[\w$_]|\\u[0-9a-fA-
F]{4})*)\s*(?=[:]))|((?:(?:['](?:\\{2}|\\[']|[^'])*['])|(?:["](?:\\{2}|\\["]|[^"])*["])))|((?:(?:[:]|(?:(?:^\s*|\s*$)|[,]|[;\n\r]+)|(?:[!][=]{0,2}|[%][=]?|[&]{1,2}|[&][=]|[*][=]?|[+]{1,2}|[+][=]|[\-]{1,2}|[\-
][=]|[\/][=]?|[<]{1,2}[=]?|[=]{1,3}|[>]{1,3}[=]?|[\^][=]?|[|][=]?|[|]{2})|[(]+)\s*(?:[\/](?:\[(?:\\[\]])+\]|\\[\/]|[^\/*])(?:\[(?:\\[\]]|[^\]])+|\\[\/]|[^\/])*?[\/](?:[a-zA-
Z]*)))\s*(?:(?:(?:^\s*|\s*$)|[,]|[;\n\r]+)|(?:[!][=]{0,2}|[%][=]?|[&]{1,2}|[&][=]|[*][=]?|[+]{1,2}|[+][=]|[\-]{1,2}|[\-
][=]|[\/][=]?|[<]{1,2}[=]?|[=]{1,3}|[>]{1,3}[=]?|[\^][=]?|[|][=]?|[|]{2})|[)]+|(?=\s*[\[.\}\]]))|((?:[0][xX][0-9a-fA-F]*)|(?:[0]|[1-9]\d+)?(?:[.]?\d+)+(?:[eE][+-]?\d+)?)|(\s*[\[])|(\s*[\]])|(\s*(?:function\s*(?:(?:[a-zA-
Z_$]|\\u[0-9a-fA-F]{4})(?:[\w$_]|\\u[0-9a-fA-F]{4})*)?)\s*[(](?:\s*(?:[a-zA-Z_$]|\\u[0-9a-fA-F]{4})(?:[\w$_]|\\u[0-9a-fA-F]{4})*\s*)?(?:[,]\s*(?:[a-zA-Z_$]|\\u[0-9a-fA-F]{4})(?:[\w$_]|\\u[0-9a-fA-
F]{4})*\s*)*[)]\s*[{])|((?:@#[(]))|((?:[.]?\s*(?:[a-zA-Z_$]|\\u[0-9a-fA-F]{4})(?:[\w$_]|\\u[0-9a-fA-F]{4})*))|([,;])|((?:[!][=]{0,2}|[%][=]?|[&]{1,2}|[&][=]|[*][=]?|[+]{1,2}|[+][=]|[\-]{1,2}|[\-
][=]|[\/][=]?|[<]{1,2}[=]?|[=]{1,3}|[>]{1,3}[=]?|[\^][=]?|[|][=]?|[|]{2}))|([}])/g
```

How to match object literals?

- Cheat

```
new RegExp('[,\\{]' +
  spaces.source + '(?:' +
  strings.source + '|' +
  numbers.source + '|' +
  variable.source + ')' +
  spaces.source + '(?=[:])')
```

Is it the start or the next prop?

Linked regexes do the donkey work

Use syntax errors to prevent misidentification

/([\r\n]+)|(\s*for\s*[(]\s*(?:var\s+)?(?:[a-zA-Z_$]|\\u[0-9a-fA-F]{4})(?:[\w$_]|\\u[0-9a-fA-F]{4})*\s+in\s*(?:(?:(?:[']|\\{2}|\\[']|[^'])*['])|(?:["]|\\{2}|\\["]|[^"])*["]))|(?:[\/](?:\[(?:\\[\]]|[^\]])+\]|\\[\/]|[^\/*])(?:\[(?:\\[\]]|[^\]])+|\\[\/]|[^\/])*?[\/](?:[a-zA-Z]*)))*[)]|[{](?:.|(?:(?:[']|\\{2}|\\[']|[^'])*[']))|(?:["]|\\{2}|\\["]|[^"])*["]))|(?:[\/](?:\[(?:\\[\]]|[^\]])+\]|\\[\/]|[^\/*])(?:\[(?:\\[\]]|[^\]])+|\\[\/]|[^\/])*?[\/](?:[a-zA-Z]*)))*[}])\s*[)]\s*[{][?])|(\s*in(?:stanceof)?(?=[\^\d"'\[\s\(\{]))|((?:(?:\s+(?:in(?:stanceof)?)\s+)|\s*\b(?:delete|this|Infinity|NaN|void|do|else|case|default|return|var|continue|undefined|null|new|typeof|throw|break|try|finally|true|false)\b\s*|\s*\b(?:if|else\s\s*if|with|while|for|switch|catch)\b\s*(?=[{}]))|({[,\{]\s*(?:(?:(?:[']|\\{2}|\\[']|[^'])*[']))|(?:["]|\\{2}|\\["]|[^"])*["]))|(?:[0][xX][0-9a-fA-F]*)|(?:[0]|[1-9]\d+)?(?:[.]?\d+)+(?:[eE][+-]?\d+)?|(?:[a-zA-Z_$]|\\u[0-9a-fA-F]{4})(?:[\w$_]|\\u[0-9a-fA-F]{4})*)\s*(?=[:]))|((?:(?:[']|\\{2}|\\[']|[^'])*[']))|(?:["]|\\{2}|\\["]|[^"])*["])))|((?:(?:[:]|(?:(?:^\s*|\s*$)|[,]|[;\n\r]+)|(?:[!][=]{0,2}|[%][=]?|[&]{1,2}|[&][=]|[*][=]?|[+]{1,2}|[+][=]|[\-]{1,2}|[\-][=]|[\/][=]?|[<]{1,2}[=]?|[=]{1,3}|[>]{1,3}[=]?|[\^][=]?|[|][=]?|[|]{2}))|([)]+)\s*(?:[\/](?:\[(?:\\[\]]|[^\]])+\]|\\[\/]|[^\/*])(?:\[(?:\\[\]]|[^\]])+|\\[\/]|[^\/])*?[\/](?:[a-zA-Z]*)))\s*(?:(?:(?:^\s*|\s*$)|[,]|[;\n\r]+)|(?:[!][=]{0,2}|[%][=]?|[&]{1,2}|[&][=]|[*][=]?|[+]{1,2}|[+][=]|[\-]{1,2}|[\-][=]|[\/][=]?|[<]{1,2}[=]?|[=]{1,3}|[>]{1,3}[=]?|[\^][=]?|[|][=]?|[|]{2}))|([)]+|(?=\s*[\[.\}\]]))))|((?:[0][xX][0-9a-fA-F]*)|(?:[0]|[1-9]\d+)?(?:[.]?\d+)+(?:[eE][+-]?\d+)?)|(\s*[\[])|(\s*[\]])|(\s*(?:function\s*(?:(?:[a-zA-Z_$]|\\u[0-9a-fA-F]{4})(?:[\w$_]|\\u[0-9a-fA-F]{4})*)?)\s*[(]|(?:\s*(?:[a-zA-Z_$]|\\u[0-9a-fA-F]{4})(?:[\w$_]|\\u[0-9a-fA-F]{4})*\s*)?(?:[,]\s*(?:[a-zA-Z_$]|\\u[0-9a-fA-F]{4})(?:[\w$_]|\\u[0-9a-fA-F]{4})*\s*)*[)]\s*[{])|((?:@#[(])|((?:[.]?\s*(?:[a-zA-Z_$]|\\u[0-9a-fA-F]{4})(?:[\w$_]|\\u[0-9a-fA-F]{4})*))|([,;])|((?:[!][=]{0,2}|[%][=]?|[&]{1,2}|[&][=]|[*][=]?|[+]{1,2}|[+][=]|[\-]{1,2}|[\-][=]|[\/][=]?|[<]{1,2}[=]?|[=]{1,3}|[>]{1,3}[=]?|[\^][=]?|[|][=]?|[|]{2}))|([}])/g

How to rewrite object literals?

- 1,{'a':123} is rewritten to 1,{'a':123};
- 1,{'\
- a':123} normalized to 1,{'a':123};
- 1,{'\x61':123}; rewritten to 1,{'$\x61$':123};
- The strict nature of object property names makes it easier


```
/([\r\n]+)|(\s*for\s*[(]\s*(?:var\s+)?(?:[a-zA-Z_$]|\\u[0-9a-fA-F]{4})(?:[\w$_]|\\u[0-9a-fA-
F]{4})*\s+in\s*(?:(?:(?:[']|(?:\\{2}|\\[']|[^'])*[']))|(?:["]|(?:\\{2}|\\["]|[^"])*["])))|(?:[\/](?:\[(?:\\[\]])+\]|\\[\/]|[^\/*])(?:\[(?:\\[\]]|[^\]])+|\\[\/]|[^\/])*?[\/](?:[a-zA-Z]*)))|(?:(?:[.]?\s*(?:[a-zA-Z_$]|\\u[0-9a-fA-
F]{4})(?:[\w$_]|\\u[0-9a-fA-F]{4})*)+)|[{](?:.|(?:(?:[']|(?:\\{2}|\\[']|[^'])*[']))|(?:["]|(?:\\{2}|\\["]|[^"])*["])))|(?:[\/](?:\[(?:\\[\]])+\]|\\[\/]|[^\/*])(?:\[(?:\\[\]]|[^\]])+|\\[\/]|[^\/])*?[\/](?:[a-zA-
Z]*))*[}]|[{](?:.|(?:(?:[']|(?:\\{2}|\\[']|[^'])*[']))|(?:["]|(?:\\{2}|\\["]|[^"])*["])))|(?:[\/](?:\[(?:\\[\]])+\]|\\[\/]|[^\/*])(?:\[(?:\\[\]]|[^\]])+|\\[\/]|[^\/])*?[\/](?:[a-zA-
Z]*))*[}])\s*[}]\s*[{]?)|(\s*in(?:stanceof)?(?=[\/\d"'\[\s\(\{]))|((?:(?:\s+(?:in(?:stanceof)?)\s+)|\s*\b(?:delete|this|Infinity|NaN|void|do|else|case|default|return|var|continue|undefined|null|new|typeof|throw|br
eak|try|finally|true|false)\b\s*|\s*\b(?:if|else\s\s*if|with|while|for|switch|catch)\b\s*(?=[({]))|((?:,\{]\s*(?:(?:(?:[']|(?:\\{2}|\\[']|[^'])*[']))|(?:["]|(?:\\{2}|\\["]|[^"])*["])))|(?:[0][xX][0-9a-fA-F]*)|(?:[0]|[1-
9]\d+)?(?:[.]?\d+)+(?:[eE][+-]?\d+)?|(?:[a-zA-Z_$]|\\u[0-9a-fA-F]{4})(?:[\w$_]|\\u[0-9a-fA-
F]{4})*)\s*(?=[:]))|((?:(?:[']|(?:\\{2}|\\[']|[^'])*[']))|(?:["]|(?:\\{2}|\\["]|[^"])*["])))|((?:(?:[:]|(?:(?:^\s*|\s*$)|[,]|[;\n\r]+)|(?:[!][=]{0,2}|[%][=]?|[&]{1,2}|[&][=]|[*][=]?|[+]{1,2}|[+][=]|[\-]{1,2}|[\-
][=]|[\/][=]?|[<]{1,2}[=]?|[=]{1,3}|[>]{1,3}[=]?|[^][=]?|[|][=]?|[|]{2}))|([)]+|\s*(?:[\/](?:\[(?:\\[\]])+\]|\\[\/]|[^\/*])(?:\[(?:\\[\]]|[^\]])+|\\[\/]|[^\/])*?[\/](?:[a-zA-
Z]*)))\s*(?:(?:(?:^\s*|\s*$)|[,]|[;\n\r]+)|(?:[!][=]{0,2}|[%][=]?|[&]{1,2}|[&][=]|[*][=]?|[+]{1,2}|[+][=]|[\-]{1,2}|[\-
][=]|[\/][=]?|[<]{1,2}[=]?|[=]{1,3}|[>]{1,3}[=]?|[^][=]?|[|][=]?|[|]{2}))|([)]+|(?=\s*[\[.\}\]]))|((?:[0][xX][0-9a-fA-F]*)|(?:[0]|[1-9]\d+)?(?:[.]?\d+)+(?:[eE][+-]?\d+)?)|(\s*[\[])|(\s*[\]])|(\s*(?:function\s*(?:(?:[a-zA-
Z_$]|\\u[0-9a-fA-F]{4})(?:[\w$_]|\\u[0-9a-fA-F]{4})*)?)\s*[(](?:\s*(?:[a-zA-Z_$]|\\u[0-9a-fA-F]{4})(?:[\w$_]|\\u[0-9a-fA-F]{4})*\s*)?(?:[,]\s*(?:[a-zA-Z_$]|\\u[0-9a-fA-F]{4})(?:[\w$_]|\\u[0-9a-fA-
F]{4})*\s*)*[)]\s*[{])|((?:@#[()])|((?:[.]?\s*(?:[a-zA-Z_$]|\\u[0-9a-fA-F]{4})(?:[\w$_]|\\u[0-9a-fA-F]{4})*))|([,;])|((?:[!][=]{0,2}|[%][=]?|[&]{1,2}|[&][=]|[*][=]?|[+]{1,2}|[+][=]|[\-]{1,2}|[\-
][=]|[\/][=]?|[<]{1,2}[=]?|[=]{1,3}|[>]{1,3}[=]?|[^][=]?|[|][=]?|[|]{2}))|([{}])/g
```

It can't be that easy?

- Arrays are hard
- [][0[0,0[0]]] which is an array? and which is a object accessor?
- How the hell do you write a regex for that?
- This question took many months to solve
- Rewrite Arrays first then match Object accessors

```
/([\r\n]+)|(\s*for\s*[(]\s*(?:var\s+)?(?:[a-zA-Z_$]|\\u[0-9a-fA-F]{4})(?:[\w$_]|\\u[0-9a-fA-
F]{4})*\s+in\s*(?:(?:(?:['](?:\\{2}|\\[']|[^'])*['])|(?:["](?:\\{2}|\\["]|[^"])*["]))|(?:[\/](?:\[(?:\\[\]])+\]|\\[\/]|[^\/*])(?:\[(?:\\[\]]|[^\]])+|\\[\/]|[^\/])*?[\/](?:[a-zA-Z]*))|(?:(?:[.]?\s*(?:[a-zA-Z_$]|\\u[0-9a-fA-
F]{4})(?:[\w$_]|\\u[illegible]{2}|\\[']|[^'])*['])|(?:["](?:\\{2}|\\["]|[^"])*["]))|(?:[\/](?:\[(?:\\[\]])+\]|\\[\/]|[^\/*])(?:\[(?:\\[\]]|[^\]])+|\\[\/]|[^\/])*?[\/](?:[a-zA-
Z]*)))*[}]|[(](?:.|(?:(?:['](?:\\{2}|\\[']|[^'])*['])|(?:["](?:\\{2}|\\["]|[^"])*["]))|(?:[\/](?:\[(?:\\[\]])+\]|\\[\/]|[^\/*])(?:\[(?:\\[\]]|[^\]])+|\\[\/]|[^\/])*?[\/](?:[a-zA-
Z]*)))*[)]))\s*[)]\s*[{]?)|(\s*in(?:stanceof)?(?=[\/\d"'\[\s\(\{]))|((?:(?:\s+(?:in(?:stanceof)?)\s+)|\s*\b(?:delete|this|Infinity|NaN|void|do|else|case|default|return|var|continue|undefined|null|new|typeof|throw|br
eak|try|finally|true|false)\b\s*|\s*\b(?:if|else\s\s*if|with|while|for|switch|catch)\b\s*(?=[(]))|([,\{]\s*(?:(?:(?:['](?:\\{2}|\\[']|[^'])*['])|(?:["](?:\\{2}|\\["]|[^"])*["]))|(?:[0][xX][0-9a-fA-F]*)|(?:[0]|[1-
9]\d+)?(?:[.]?\d+)+(?:[eE][+-]?\d+)?|(?:[a-zA-Z_$]|\\u[0-9a-fA-F]{4})(?:[\w$_]|\\u[0-9a-fA-
F]{4})*)\s*(?=[:]))|((?:(?:['](?:\\{2}|\\[']|[^'])*['])|(?:["](?:\\{2}|\\["]|[^"])*["])))|((?:(?:[:]|(?:(?:^\s*|\s*$)|[,]|[;\n\r]+)|(?:[!][=]{0,2}|[%][=]?|[&]{1,2}|[&][=]|[*][=]?|[+]{1,2}|[+][=]|[\-]{1,2}|[\-
][=]|[\/][=]?|[<]{1,2}[=]?|[=]{1,3}|[>]{1,3}[=]?|[\^][=]?|[|][=]?|[|]{2})|[(]+)\s*(?:[\/](?:\[(?:\\[\]])+\]|\\[\/]|[^\/*])(?:\[(?:\\[\]]|[^\]])+|\\[\/]|[^\/])*?[\/](?:[a-zA-
Z]*)))\s*(?:(?:(?:^\s*|\s*$)|[,]|[;\n\r]+)|(?:[!][=]{0,2}|[%][=]?|[&]{1,2}|[&][=]|[*][=]?|[+]{1,2}|[+][=]|[\-]{1,2}|[\-
][=]|[\/][=]?|[<]{1,2}[=]?|[=]{1,3}|[>]{1,3}[=]?|[\^][=]?|[|][=]?|[|]{2})|[)]+|(?=\s*[\[.\}\]]))|((?:[0][xX][0-9a-fA-F]*)|(?:[0]|[1-9]\d+)?(?:[.]?\d+)+(?:[eE][+-]?\d+)?)|(\s*[\[])|(\s*[\]])|(\s*(?:function\s*(?:(?:[a-zA-
Z_$]|\\u[0-9a-fA-F]{4})(?:[\w$_]|\\u[0-9a-fA-F]{4})*)?)\s*[(](?:\s*(?:[a-zA-Z_$]|\\u[0-9a-fA-F]{4})(?:[\w$_]|\\u[0-9a-fA-F]{4})*\s*)?(?:[,]\s*(?:[a-zA-Z_$]|\\u[0-9a-fA-F]{4})(?:[\w$_]|\\u[0-9a-fA-
F]{4})*\s*)*[)]\s*[{])|((?:@#[(]))|((?:[.]?\s*(?:[a-zA-Z_$]|\\u[0-9a-fA-F]{4})(?:[\w$_]|\\u[0-9a-fA-F]{4})*))|([,;])|((?:[!][=]{0,2}|[%][=]?|[&]{1,2}|[&][=]|[*][=]?|[+]{1,2}|[+][=]|[\-]{1,2}|[\-
][=]|[\/][=]?|[<]{1,2}[=]?|[=]{1,3}|[>]{1,3}[=]?|[\^][=]?|[|][=]?|[|]{2}))|([}])/g
```

Matching arrays

In: [][0[0,0[0]]]

Out:JSREG_A()[JSREG_FUNC.gp(0[JSREG_FUNC.
gp(0,0[JSREG_FUNC.gp(0)])])];

Array constructor

Prop checker function, force $ prefix and $ suffix

/([\r\n]+)|(\s*for\s*[(]\s*(?:var\s+)?(?:[a-zA-Z_$]|\\u[0-9a-fA-F]{4})(?:[\w$_]|\\u[0-9a-fA-F]{4})*\s+in\s*(?:(?:(?:[']|(?:\\{2}|\\[']|[^'])*[']))|(?:["]|(?:\\{2}|\\["]|[^"])*["])))|(?:[\/](?:\[(?:\\[\]]|[^\]])+\]|\\[\/]|[^\/*])(?:\[(?:\\[\]]|[^\]])+|\\[\/]|[^\/])*?[\/](?:[a-zA-Z]*)))|(?:(?:[.]?\s*(?:[a-zA-Z_$]|\\u[0-9a-fA-F]{4})(?:[\w$_]|\\u[0-9a-fA-F]{4}))*)+)|([{](?:.|(?:(?:[']|(?:\\{2}|\\[']|[^'])*[']))|(?:["]|(?:\\{2}|\\["]|[^"])*["])))|(?:[\/](?:\[(?:\\[\]]|[^\]])+\]|\\[\/]|[^\/*])(?:\[(?:\\[\]]|[^\]])+|\\[\/]|[^\/])*?[\/](?:[a-zA-Z]*)))*[}]|[(](?:..|(?:(?:[']|(?:\\{2}|\\[']|[^'])*[']))|(?:["]|(?:\\{2}|\\["]|[^"])*["])))|(?:[\/](?:\[(?:\\[\]]|[^\]])+\]|\\[\/]|[^\/*])(?:\[(?:\\[\]]|[^\]])+|\\[\/]|[^\/])*?[\/](?:[a-zA-Z]*)))*[)]|[[](?:..|(?:(?:[']|(?:\\{2}|\\[']|[^'])*[']))|(?:["]|(?:\\{2}|\\["]|[^"])*["])))|(?:[\/](?:\[(?:\\[\]]|[^\]])+\]|\\[\/]|[^\/*])(?:\[(?:\\[\]]|[^\]])+|\\[\/]|[^\/])*?[\/](?:[a-zA-Z]*)))*[]]\s*[)]\s*[{]?)|(\s*in(?:stanceof)?(?=[\/\d"'\[\s\(\{])))|((?:(?:\s+(?:in(?:stanceof)?)\s+)|\s*\b(?:delete|this|Infinity|NaN|void|do|else|case|default|return|var|continue|undefined|null|new|typeof|throw|break|try|finally|true|false)\b\s*|\s*\b(?:if|else\s\s*if|with|while|for|switch|catch)\b\s*(?=[({])))|({,\{]\s*(?:(?:(?:[']|(?:\\{2}|\\[']|[^'])*[']))|(?:["]|(?:\\{2}|\\["]|[^"])*["])))|(?:[0][xX][0-9a-fA-F]*)|(?:[0]|[1-9]\d+)?(?:[.]?\d+)+(?:[eE][+-]?\d+)?|(?:[a-zA-Z_$]|\\u[0-9a-fA-F]{4})(?:[\w$_]|\\u[0-9a-fA-F]{4})*)\s*(?=[:]))|((?:(?:[']|(?:\\{2}|\\[']|[^'])*[']))|(?:["]|(?:\\{2}|\\["]|[^"])*["])))|((?:(?:[:]|(?:(?:^\s*|\s*$)|[,]|[;\n\r]+)|(?:[!]|[=]{0,2}|[%]|[=]?|[&]{1,2}|[&][=]|[*][=]?|[+]{1,2}|[+][=]|[\-]{1,2}|[\-][=]|[\/][=]?|[<]{1,2}[=]?|[=]{1,3}|[>]{1,3}[=]?|[^]|[=]?|[|][=]?|[|]{2}))|([)]+)\s*(?:[\/](?:\[(?:\\[\]]|[^\]])+\]|\\[\/]|[^\/*])(?:\[(?:\\[\]]|[^\]])+|\\[\/]|[^\/])*?[\/](?:[a-zA-Z]*)))\s*(?:(?:(?:^\s*|\s*$)|[,]|[;\n\r]+)|(?:[!]|[=]{0,2}|[%]|[=]?|[&]{1,2}|[&][=]|[*][=]?|[+]{1,2}|[+][=]|[\-]{1,2}|[\-][=]|[\/][=]?|[<]{1,2}[=]?|[=]{1,3}|[>]{1,3}[=]?|[^]|[=]?|[|][=]?|[|]{2}))|([)]+|(?=\s*[\[.\}\]])))|((?:[0][xX][0-9a-fA-F]*)|(?:[0]|[1-9]\d+)?(?:[.]?\d+)+(?:[eE][+-]?\d+)?)|(\s*[\[])|(\s*[\]])|(\s*(?:function\s*(?:(?:[a-zA-Z_$]|\\u[0-9a-fA-F]{4})(?:[\w$_]|\\u[0-9a-fA-F]{4}))*)?\s*[(]\s*(?:\s*(?:[a-zA-Z_$]|\\u[0-9a-fA-F]{4})(?:[\w$_]|\\u[0-9a-fA-F]{4}))*\s*)?(?:[,]\s*(?:[a-zA-Z_$]|\\u[0-9a-fA-F]{4})(?:[\w$_]|\\u[0-9a-fA-F]{4}))*\s*[)]\s*[{])|((?:@#[()]))|((?:[.]?\s*(?:[a-zA-Z_$]|\\u[0-9a-fA-F]{4})(?:[\w$_]|\\u[0-9a-fA-F]{4})*))|([,;])|((?:[!]|[=]{0,2}|[%]|[=]?|[&]{1,2}|[&][=]|[*][=]?|[+]{1,2}|[+][=]|[\-]{1,2}|[\-][=]|[\/][=]?|[<]{1,2}[=]?|[=]{1,3}|[>]{1,3}[=]?|[^]|[=]?|[|][=]?|[|]{2}))|([{}])/g

Matching arrays cont.

```
} else if ($square1 !== undefined && $square1.length) {
            counter++;
            if(new
    RegExp("(?:^|[^\\w]*\\b(?:in(?:stanceof)?|do|delete|return|void|throw|else|else\s+i
    f|typeof|case|default)|[({\\[:]|[\\n]+[}]|"+eos.source+"|"+operators.source+")\\s*$
    ").test(leftContext)) {
            leftContext += "[";
            lookup[counter] = true;
            return ' @#(';
            } else {
            lookup[counter] = false;
            leftContext += "[";
            return '[';
            }
            } else if ($square2 !== undefined && $square2.length) {
            if(lookup[counter]) {
            counter--;
            leftContext += "]";
            return ')';
            } else {
            counter--;
            leftContext += "]";
            return ']';
            }
```

Check the left context

Rewrite array literals to @# to be matched later

Use a counter lookup to match each start and end pair

/([\r\n]+)|(\s*for\s*([]\s*(?:var\s+)?(?:[a-zA-Z_$]|\\u[0-9a-fA-F]{4})(?:[\w$_]|\\u[0-9a-fA-F]{4})*\s+in\s*(?:(?:(?:[']|(?:\\{2}|\\[']|[^'])*[']))|(?:["]|(?:\\{2}|\\["]|[^"])*["]))|(?:[\/](?:\[(?:\\[\]]|[^\]])+\]|\\[\/]|[^\/*])(?:\[(?:\\[\]]|[^\]])+\]|\\[\/]|[^\/])*?[\/](?:[a-zA-Z]*)))\s*(?:(?:[.]?\s*(?:[a-zA-Z_$]|\\u[0-9a-fA-F]{4})(?:[\w$_]|\\u[0-9a-fA-F]{4})*)+)|([{](?:.|(?:(?:[']|(?:\\{2}|\\[']|[^'])*[']))|(?:["]|(?:\\{2}|\\["]|[^"])*["]))|(?:[\/](?:\[(?:\\[\]]|[^\]])+\]|\\[\/]|[^\/*])(?:\[(?:\\[\]]|[^\]])+\]|\\[\/]|[^\/])*?[\/](?:[a-zA-Z]*)))*[}])|([(](?:.|(?:(?:[']|(?:\\{2}|\\[']|[^'])*[']))|(?:["]|(?:\\{2}|\\["]|[^"])*["]))|(?:[\/](?:\[(?:\\[\]]|[^\]])+\]|\\[\/]|[^\/*])(?:\[(?:\\[\]]|[^\]])+\]|\\[\/]|[^\/])*?[\/](?:[a-zA-Z]*)))*[)])\s*([{]?)|(\s*in(?:stanceof)?\s+|\s*\b(?:delete|this|Infinity|NaN|void|do|else|case|default|return|var|continue|undefined|null|new|typeof|throw|break|try|finally|true|false)\b\s*|\s*\b(?:if|else\s\s*if|with|for|switch|catch)\b\s*(?=[(])))|([,\{]\s*(?:(?:(?:[']|(?:\\{2}|\\[']|[^'])*[']))|(?:["]|(?:\\{2}|\\["]|[^"])*["]))|(?:[0][xX][0-9a-fA-F]*)|(?:[0]|[1-9]\d+)?(?:[.]?\d+)+(?:[eE][+-]?\d+)?|(?:[a-zA-Z_$]|\\u[0-9a-fA-F]{4})(?:[\w$_]|\\u[0-9a-fA-F]{4})*)\s*(?=[:]))|((?:(?:[']|(?:\\{2}|\\[']|[^'])*[']))|(?:["]|(?:\\{2}|\\["]|[^"])*["]))|((?:(?:[:]|(?:^\s*|\s*$)|[,]|[;\n\r]+)|(?:[!][=]{0,2}|[%][=]?|[&]{1,2}|[&][=]|[*][=]?|[+]{1,2}|[+][=]|[\-]{1,2}|[\-][=]|[\/][=]?|[<]{1,2}[=]?|[=]{1,3}|[>]{1,3}[=]?|[^][=]?|[|][=]?|[|]{2}|[)]|[(]|=\s*[\[.\}\]])))|((?:[0][xX][0-9a-fA-F]*)|(?:[0]|[1-9]\d+)?(?:[.]?\d+)+(?:[eE][+-]?\d+)?)|(\s*[\[])|(\s*[\]])|(\s*(?:function\s*(?:(?:[a-zA-Z_$]|\\u[0-9a-fA-F]{4})(?:[\w$_]|\\u[0-9a-fA-F]{4})*)?\s*[(](?:\s*(?:[a-zA-Z_$]|\\u[0-9a-fA-F]{4})(?:[\w$_]|\\u[0-9a-fA-F]{4})*\s*)?(?:[,]\s*(?:[a-zA-Z_$]|\\u[0-9a-fA-F]{4})(?:[\w$_]|\\u[0-9a-fA-F]{4})*\s*)*[)]\s*[{])|((?:@#[(])|((?:[.]|\s*(?:[a-zA-Z_$]|\\u[0-9a-fA-F]{4})(?:[\w$_]|\\u[0-9a-fA-F]{4})*))|([,;])|((?:[!][=]{0,2}|[%][=]?|[&]{1,2}|[&][=]|[*][=]?|[+]{1,2}|[+][=]|[\-]{1,2}|[\-][=]|[\/][=]?|[<]{1,2}[=]?|[=]{1,3}|[>]{1,3}[=]?|[^][=]?|[|][=]?|[|]{2}|[)]|[(])))|([{}])/g

Matching strings is easier

- Normalize
  “Str\
  ing” to “String”

```
RegExp("(?:(?:['](?:\\\\{2}|\\\\
  ['']|[^'])*['])|(?:[\"](?:\\\\{2
  }|\\\\[\"]|[^\"])*[\"]))")
```

/([\r\n]+)|(\s*for\s*[(]\s*(?:var\s+)?(?:[a-zA-Z_$]|\\u[0-9a-fA-F]{4})(?:[\w$_]|\\u[0-9a-fA-F]{4})*\s+in\s*(?:(?:(?:['](?:\\{2}|\\[']|[^'])*[’])|(?:["](?:\\{2}|\\["]|[^"])*["])))|(?:[\/](?:\[(?:\\[\]]|[^\]])+\]|\\[\/]|[^\/*])(?:\[(?:\\[\]]|[^\]])+|\\[\/]|[^\/])*?[\/](?:[a-zA-Z]*)))|(?:(?:[.]?\s*(?:[a-zA-Z_$]|\\u[0-9a-fA-F]{4})(?:[\w$_]|\\u[0-9a-fA-F]{4}))*)+|[{](?:.|(?:(?:['](?:\\{2}|\\[']|[^'])*[’])|(?:["](?:\\{2}|\\["]|[^"])*["])))|(?:[\/](?:\[(?:\\[\]]|[^\]])+\]|\\[\/]|[^\/*])(?:\[(?:\\[\]]|[^\]])+|\\[\/]|[^\/])*?[\/](?:[a-zA-Z]*)))*[}]|[(](?:.|(?:(?:['](?:\\{2}|\\[']|[^'])*[’])|(?:["](?:\\{2}|\\["]|[^"])*["])))|(?:[\/](?:\[(?:\\[\]]|[^\]])+\]|\\[\/]|[^\/*])(?:\[(?:\\[\]]|[^\]])+|\\[\/]|[^\/])*?[\/](?:[a-zA-Z]*)))*[)]|[[](?:.|(?:(?:['](?:\\{2}|\\[']|[^'])*[’])|(?:["](?:\\{2}|\\["]|[^"])*["])))|(?:[\/](?:\[(?:\\[\]]|[^\]])+\]|\\[\/]|[^\/*])(?:\[(?:\\[\]]|[^\]])+|\\[\/]|[^\/])*?[\/](?:[a-zA-Z]*)))*[]]\s*[{]|\s*in(?:stanceof)?(?=[\/\d\"'\[\s\(\{])|((?:(?:\s+(?:in(?:stanceof)?)\s+)|\s*\b(?:delete|this|Infinity|NaN|void|do|else|case|default|return|var|continue|undefined|null|new|typeof|throw|break|try|finally|true|false)\b\s*|\s*\b(?:if|else\s\s*if|with|while|for|switch|catch)\b\s*(?=[(]))))|((,\{]\s*(?:(?:(?:['](?:\\{2}|\\[']|[^'])*[’])|(?:["](?:\\{2}|\\["]|[^"])*["]))|(?:[0][xX][0-9a-fA-F]*)|(?:[0]|[1-9]\d+)?(?:[.]?\d+)+(?:[eE][+-]?\d+)?|(?:[a-zA-Z_$]|\\u[0-9a-fA-F]{4})(?:[\w$_]|\\u[0-9a-fA-F]{4})*)\s*(?=[:]))|((?:(?:['](?:\\{2}|\\[']|[^'])*[’])|(?:["](?:\\{2}|\\["]|[^"])*["])))|((?:(?:[:]|(?:(?:^\s*|\s*$)|[,]|[;\n\r]+)|(?:[!][=]{0,2}|[%][=]?|[&]{1,2}|[&][=]|[*][=]?|[+]{1,2}|[+][=]|[\-]{1,2}|[\-][=]|[\/][=]?|[<]{1,2}[=]?|[=]{1,3}|[>]{1,3}[=]?|[\^][=]?|[|][=]?|[|]{2}))|([)]+|\s*(?:[\/](?:\[(?:\\[\]]|[^\]])+\]|\\[\/]|[^\/*])(?:\[(?:\\[\]]|[^\]])+|\\[\/]|[^\/])*?[\/](?:[a-zA-Z]*)))\s*(?:(?:(?:^\s*|\s*$)|[,]|[;\n\r]+)|(?:[!][=]{0,2}|[%][=]?|[&]{1,2}|[&][=]|[*][=]?|[+]{1,2}|[+][=]|[\-]{1,2}|[\-][=]|[\/][=]?|[<]{1,2}[=]?|[=]{1,3}|[>]{1,3}[=]?|[\^][=]?|[|][=]?|[|]{2}))|([}]+|(?=\s*[\[.\}\]]))))|((?:[0][xX][0-9a-fA-F]*)|(?:[0]|[1-9]\d+)?(?:[.]?\d+)+(?:[eE][+-]?\d+)?)|(\s*[\[])|(\s*[\]])|(\s*(?:function\s*(?:(?:[a-zA-Z_$]|\\u[0-9a-fA-F]{4})(?:[\w$_]|\\u[0-9a-fA-F]{4}))*)?\s*[(](?:\s*(?:[a-zA-Z_$]|\\u[0-9a-fA-F]{4})(?:[\w$_]|\\u[0-9a-fA-F]{4})*\s*)?(?:[,]\s*(?:[a-zA-Z_$]|\\u[0-9a-fA-F]{4})(?:[\w$_]|\\u[0-9a-fA-F]{4})*\s*)*[)]\s*[{])|((?:@#[(])))|((?:[.]?\s*(?:[a-zA-Z_$]|\\u[0-9a-fA-F]{4})(?:[\w$_]|\\u[0-9a-fA-F]{4})*))|([,;])|((?:[!][=]{0,2}|[%][=]?|[&]{1,2}|[&][=]|[*][=]?|[+]{1,2}|[+][=]|[\-]{1,2}|[\-][=]|[\/][=]?|[<]{1,2}[=]?|[=]{1,3}|[>]{1,3}[=]?|[\^][=]?|[|][=]?|[|]{2}))|([}])/g

Matching regexes

- Normalize
  /reg\
  ex/ to /regex/
- ```
  RegExp("(?:[\\/](?:\\[(?:\\\\[\\]])+\\]|\\\\[\\/]|[^\\/*])(?:\\[(?:\\\\[\\]]|[^\\]])+|\\\\[\\/]|[^\\/])*?[\\/](?:[a-zA-Z]*))")
  ```

```
/([\r\n]+)|(\s*for\s* ... -F]{4})(?:[\w$_]|\\u[0-9a-fA-
F]{4})*\s+in\s*(?: ... \["]|[^"])*["]))|(?:[\/](?:\[(?:\\[\]])+\]|\\[\/]|[^\/*])(?:\[(?:\\[\]]|[^\]])+|\\[\/]|[^\/])*?[\/](?:[a-zA-Z]*))|(?:(?:[.]?\s*(?:[a-zA-Z_$]|\\u[0-9a-fA-
F]{4})(?:[\w$_]|\\u[0-9a-fA-F]{4})*)+)|[{](?:.|(?:(?:['](?:\\{2}|\\[']|[^'])*['])|(?:["](?:\\{2}|\\["]|[^"])*["]))|(?:[\/](?:\[(?:\\[\]])+\]|\\[\/]|[^\/*])(?:\[(?:\\[\]]|[^\]])+|\\[\/]|[^\/])*?[\/](?:[a-zA-
Z]*)))*[}]|[(](?:.|(?:(?:['](?:\\{2}|\\[']|[^'])*['])|(?:["](?:\\{2}|\\["]|[^"])*["]))|(?:[\/](?:\[(?:\\[\]])+\]|\\[\/]|[^\/*])(?:\[(?:\\[\]]|[^\]])+|\\[\/]|[^\/])*?[\/](?:[a-zA-
Z]*)))*[)])\s*[)]\s*[{]?)|(\s*in(?:stanceof)?(?=[\/\d"'\[\s\(\{]))|((?:(?:\s+(?:in(?:stanceof)?)\s+)|\s*\b(?:delete|this|Infinity|NaN|void|do|else|case|default|return|var|continue|undefined|null|new|typeof|throw|br
eak|try|finally|true|false)\b\s*|\s*\b(?:if|else\s\s*if|with|while|for|switch|catch)\b\s*(?=[(]))|([,\{]\s*(?:(?:(?:['](?:\\{2}|\\[']|[^'])*['])|(?:["](?:\\{2}|\\["]|[^"])*["]))|(?:[0][xX][0-9a-fA-F]*)|(?:[0]|[1-
9]\d+)?(?:[.]?\d+)+(?:[eE][+-]?\d+)?|(?:[a-zA-Z_$]|\\u[0-9a-fA-F]{4})(?:[\w$_]|\\u[0-9a-fA-
F]{4})*)\s*(?=[:]))|((?:(?:['](?:\\{2}|\\[']|[^'])*['])|(?:["](?:\\{2}|\\["]|[^"])*["])))|((?:(?:[:]|(?:(?:^\s*|\s*$)|[,]|[;\n\r]+)|(?:[!][=]{0,2}|[%][=]?|[&]{1,2}|[&][=]|[*][=]?|[+]{1,2}|[+][=]|[\-]{1,2}|[\-
][=]|[\/][=]?|[<]{1,2}[=]?|[=]{1,3}|[>]{1,3}[=]?|[\^][=]?|[|][=]?|[|]{2})|[(]+)\s*(?:[\/](?:\[(?:\\[\]])+\]|\\[\/]|[^\/*])(?:\[(?:\\[\]]|[^\]])+|\\[\/]|[^\/])*?[\/](?:[a-zA-
Z]*)))\s*(?:(?:(?:^\s*|\s*$)|[,]|[;\n\r]+)|(?:[!][=]{0,2}|[%][=]?|[&]{1,2}|[&][=]|[*][=]?|[+]{1,2}|[+][=]|[\-]{1,2}|[\-
][=]|[\/][=]?|[<]{1,2}[=]?|[=]{1,3}|[>]{1,3}[=]?|[\^][=]?|[|][=]?|[|]{2})|[)]+|(?=\s*[\[.\}\]]))|((?:[0][xX][0-9a-fA-F]*)|(?:[0]|[1-9]\d+)?(?:[.]?\d+)+(?:[eE][+-]?\d+)?)|(\s*[\[])|(\s*[\]])|(\s*(?:function\s*(?:(?:[a-zA-
Z_$]|\\u[0-9a-fA-F]{4})(?:[\w$_]|\\u[0-9a-fA-F]{4})*)?)\s*[(](?:\s*(?:[a-zA-Z_$]|\\u[0-9a-fA-F]{4})(?:[\w$_]|\\u[0-9a-fA-F]{4})*\s*)?(?:[,]\s*(?:[a-zA-Z_$]|\\u[0-9a-fA-F]{4})(?:[\w$_]|\\u[0-9a-fA-
F]{4})*\s*)*[)]\s*[{])|((?:@#[(]))|((?:[.]?\s*(?:[a-zA-Z_$]|\\u[0-9a-fA-F]{4})(?:[\w$_]|\\u[0-9a-fA-F]{4})*))|([,;])|((?:[!][=]{0,2}|[%][=]?|[&]{1,2}|[&][=]|[*][=]?|[+]{1,2}|[+][=]|[\-]{1,2}|[\-
][=]|[\/][=]?|[<]{1,2}[=]?|[=]{1,3}|[>]{1,3}[=]?|[\^][=]?|[|][=]?|[|]{2}))|([}])/g
```
```

Matching regexes cont.

- `regexpsLeft = new RegExp('(?:[:]|' + endStatement.source + '|' + operators.source + '|[(]+)' + spaces.source)`
- Need to know the context
- Difference between 1/1/1 and regex

/([\r\n]+)|(\s*for\s*[(]\s*(?:var\s+)?(?:[a-zA-Z_$]|\\u[0-9a-fA-F]{4})(?:[\w$_]|\\u[0-9a-fA-F]{4})*\s+in\s*(?:(?:(?:[']|(?:\\{2}|\\[']|[^'])*[']))|(?:["]|(?:\\{2}|\\["]|[^"])*["])))|(?:[\/](?:\[(?:\\[\]]|[^\]])+\]|\\[\/]|[^\/*])(?:\[(?:\\[\]]|[^\]])+|\\[\/]|[^\/])*?[\/](?:[a-zA-Z]*)))|(?:(?:[.]?\s*(?:[a-zA-Z_$]|\\u[0-9a-fA-F]{4})(?:[\w$_]|\\u[0-9a-fA-F]{4})*)+)|([{](?:..|(?:(?:[']|(?:\\{2}|\\[']|[^'])*[']))|(?:["]|(?:\\{2}|\\["]|[^"])*["])))|(?:[\/](?:\[(?:\\[\]]|[^\]])+\]|\\[\/]|[^\/*])(?:\[(?:\\[\]]|[^\]])+|\\[\/]|[^\/])*?[\/](?:[a-zA-Z]*)))*[}]|[(](?:..|(?:(?:[']|(?:\\{2}|\\[']|[^'])*[']))|(?:["]|(?:\\{2}|\\["]|[^"])*["])))|(?:[\/](?:\[(?:\\[\]]|[^\]])+\]|\\[\/]|[^\/*])(?:\[(?:\\[\]]|[^\]])+|\\[\/]|[^\/])*?[\/](?:[a-zA-Z]*)))*[)]|[[](?:..|(?:(?:[']|(?:\\{2}|\\[']|[^'])*[']))|(?:["]|(?:\\{2}|\\["]|[^"])*["])))|(?:[\/](?:\[(?:\\[\]]|[^\]])+\]|\\[\/]|[^\/*])(?:\[(?:\\[\]]|[^\]])+|\\[\/]|[^\/])*?[\/](?:[a-zA-Z]*)))*[]]|\s*[{]\s*[{]?)|(\s*in(?:stanceof)?(?=[\^\d""\[\s\(\{])|((?:(?:\s+(?:in(?:stanceof)?)\s+)|\s*\b(?:delete|this|Infinity|NaN|void|do|else|case|default|return|var|continue|undefined|null|new|typeof|throw|break|try|finally|true|false)\b\s*|\s*\b(?:if|else\s\s*if|with|while|for|switch|catch)\b\s*(?=[({]))|((,\{]\s*(?:(?:(?:[']|(?:\\{2}|\\[']|[^'])*[']))|(?:["]|(?:\\{2}|\\["]|[^"])*["])))|(?:[0][xX][0-9a-fA-F]*)|(?:[0]|[1-9]\d+)?(?:[.]?\d+)+(?:[eE][+-]?\d+)?|(?:[a-zA-Z_$]|\\u[0-9a-fA-F]{4})(?:[\w$_]|\\u[0-9a-fA-F]{4})*)\s*(?=[:]))|((?:(?:[']|(?:\\{2}|\\[']|[^'])*[']))|(?:["]|(?:\\{2}|\\["]|[^"])*["])))|((?:(?:[:]|(?:(?:^\s*|\s*$)|[,]|[;\n\r]+)|(?:[!]|[=]{0,2}|[%]|[=]?|[&]{1,2}|[&]|[=]|[*]|[=]?|[+]{1,2}|[+]|[=]|[\-]{1,2}|[\-]|[=]|[\/]|[=]?|[<]{1,2}|[=]?|[=]{1,3}|[>]{1,3}|[=]?|[\^]|[=]?|[|]|[=]?|[|]{2}))|([)]+|(?=\s*[\[.\}\]])))|((?:[0][xX][0-9a-fA-F]*)|(?:[0]|[1-9]\d+)?(?:[.]?\d+)+(?:[eE][+-]?\d+)?)|(\s*[\[])|(\s*[\]])|(\s*(?:function\s*(?:(?:[a-zA-Z_$]|\\u[0-9a-fA-F]{4})(?:[\w$_]|\\u[0-9a-fA-F]{4})*)?)\s*[(](?:\s*(?:[a-zA-Z_$]|\\u[0-9a-fA-F]{4})(?:[\w$_]|\\u[0-9a-fA-F]{4})*\s*)?(?:[,]\s*(?:[a-zA-Z_$]|\\u[0-9a-fA-F]{4})(?:[\w$_]|\\u[0-9a-fA-F]{4})*\s*)*[)]\s*[{])|((?:@#[(])))|((?:[.]?\s*(?:[a-zA-Z_$]|\\u[0-9a-fA-F]{4})(?:[\w$_]|\\u[0-9a-fA-F]{4})*))|([,;])|((?:[!]|[=]{0,2}|[%]|[=]?|[&]{1,2}|[&]|[=]|[*]|[=]?|[+]{1,2}|[+]|[=]|[\-]{1,2}|[\-]|[=]|[\/]|[=]?|[<]{1,2}|[=]?|[=]{1,3}|[>]{1,3}|[=]?|[\^]|[=]?|[|]|[=]?|[|]{2}))|([}])/g

How to use JSReg

```
<script src="JSReg.js"></script>
<script>
js=JSReg.create(); //creates new iframe each time
alert(js.eval('1+1'));
</script>
```

/([\r\n]+)|(\s*for\s*[(]\s*(?:var\s+)?(?:[a-zA-Z_$]|\\u[0-9a-fA-F]{4})(?:[\w$_]|\\u[0-9a-fA-F]{4})*\s+in\s*(?:(?:(?:[']|(?:\\{2}|\\[']|[^'])*[']))|(?:["](?:\\{2}|\\["]|[^"])*["])|(?:[\/](?:\[(?:\\[\]]|[^\]])+\]|\\[\/]|[^\/*])(?:\[(?:\\[\]]|[^\]])+|\\[\/]|[^\/])*?[\/](?:[a-zA-Z]*)))|(?:(?:[.]?\s*(?:[a-zA-Z_$]|\\u[0-9a-fA-F]{4})(?:[\w$_]|\\u[0-9a-fA-F]{4}))*)+)|[{](?:.|(?:(?:[']|(?:\\{2}|\\[']|[^'])*[']))|(?:["](?:\\{2}|\\["]|[^"])*["])|(?:[\/](?:\[(?:\\[\]]|[^\]])+\]|\\[\/]|[^\/*])(?:\[(?:\\[\]]|[^\]])+|\\[\/]|[^\/])*?[\/](?:[a-zA-Z]*)))*[}]|[(](?:.|(?:(?:[']|(?:\\{2}|\\[']|[^'])*[']))|(?:["](?:\\{2}|\\["]|[^"])*["])|(?:[\/](?:\[(?:\\[\]]|[^\]])+\]|\\[\/]|[^\/*])(?:\[(?:\\[\]]|[^\]])+|\\[\/]|[^\/])*?[\/](?:[a-zA-Z]*)))*[)]\s*[{]?)|(\s*in(?:stanceof)?(?=[\/\d'"\[\s\(\{])|((?:(?:\s+(?:in(?:stanceof)?)\s+)|\s*\b(?:delete|this|Infinity|NaN|void|do|else|case|default|return|var|continue|undefined|null|new|typeof|throw|break|try|finally|true|false)\b\s*|\s*\b(?:if|else\s\s*if|with|while|for|switch|catch)\b\s*(?=[({]))|((,\{]\s*(?:(?:(?:[']|(?:\\{2}|\\[']|[^'])*[']))|(?:["](?:\\{2}|\\["]|[^"])*["]))|(?:[0][xX][0-9a-fA-F]*)|(?:[0]|[1-9]\d+)?(?:[.]?\d+)+(?:[eE][+-]?\d+)?|(?:[a-zA-Z_$]|\\u[0-9a-fA-F]{4})(?:[\w$_]|\\u[0-9a-fA-F]{4})*)\s*(?=[:]))|((?:(?:[']|(?:\\{2}|\\[']|[^'])*[']))|(?:["](?:\\{2}|\\["]|[^"])*["]))|((?:(?:[:]|(?:(?:^\s*|\s*$)|[,]|[;\n\r]+)|(?:[!]|[=]{0,2}|[%][=]?|[&]{1,2}|[&][=]|[*][=]?|[+]{1,2}|[+][=]|[\-]{1,2}|[\-][=]|[\/][=]?|[<]{1,2}[=]?|[=]{1,3}|[>]{1,3}[=]?|[\^][=]?|[|][=]?|[|]{2}))|([)]+)\s*(?:[\/](?:\[(?:\\[\]]|[^\]])+\]|\\[\/]|[^\/*])(?:\[(?:\\[\]]|[^\]])+|\\[\/]|[^\/])*?[\/](?:[a-zA-Z]*)))\s*(?:(?:(?:^\s*|\s*$)|[,]|[;\n\r]+)|(?:[!]|[=]{0,2}|[%][=]?|[&]{1,2}|[&][=]|[*][=]?|[+]{1,2}|[+][=]|[\-]{1,2}|[\-][=]|[\/][=]?|[<]{1,2}[=]?|[=]{1,3}|[>]{1,3}[=]?|[\^][=]?|[|][=]?|[|]{2}))|([}]+|(?=\s*[\[.\}\]]))|((?:[0][xX][0-9a-fA-F]*)|(?:[0]|[1-9]\d+)?(?:[.]?\d+)+(?:[eE][+-]?\d+)?)|(\s*[\[])|(\s*[\]])|(\s*(?:function\s*(?:(?:[a-zA-Z_$]|\\u[0-9a-fA-F]{4})(?:[\w$_]|\\u[0-9a-fA-F]{4}))*)?\s*[(](?:\s*(?:[a-zA-Z_$]|\\u[0-9a-fA-F]{4})(?:[\w$_]|\\u[0-9a-fA-F]{4}))*\s*)?(?:[,]\s*(?:[a-zA-Z_$]|\\u[0-9a-fA-F]{4})(?:[\w$_]|\\u[0-9a-fA-F]{4}))*\s*[)]\s*[{])|((?:@#[()])|((?:[.]?\s*(?:[a-zA-Z_$]|\\u[0-9a-fA-F]{4})(?:[\w$_]|\\u[0-9a-fA-F]{4}))*)|([,;])|((?:[!]|[=]{0,2}|[%][=]?|[&]{1,2}|[&][=]|[*][=]?|[+]{1,2}|[+][=]|[\-]{1,2}|[\-][=]|[\/][=]?|[<]{1,2}[=]?|[=]{1,3}|[>]{1,3}[=]?|[\^][=]?|[|][=]?|[|]{2}))|([}])/g

How to use JSReg cont.

```
<script src="JSReg.js"></script>
<script>
js=JSReg.single(); //one environment
js.eval('x=1;');
js.eval('alert(x)');
</script>
```

/([\r\n]+)|(\s*for\s*[(]\s*(?:var\s+)?(?:[a-zA-Z_$]|\\u[0-9a-fA-F]{4})(?:[\w$_]|\\u[0-9a-fA-F]{4})*\s+in\s*(?:(?:(?:[']|\\[']|[^'])*[']))|(?:["](?:\\{2}|\\["]|[^"])*["]))|(?:[\/](?:\[(?:\\[\]]|[^\]])+\]|\\[\/]|[^\/*])(?:\[(?:\\[\]]|[^\]])+|\\[\/]|[^\/])*?[\/](?:[a-zA-Z]*)))*[)]|[(](?:..|(?:(?:[']|\\[']|[^'])*[']))|(?:["](?:\\{2}|\\["]|[^"])*["]))|(?:[\/](?:\[(?:\\[\]]|[^\]])+\]|\\[\/]|[^\/*])(?:\[(?:\\[\]]|[^\]])+|\\[\/]|[^\/])*?[\/](?:[a-zA-Z]*)))*[)])\s*[{]|\s*in(?:stanceof)?(?=[\/\d"'\[\s\(\{]))|((?:(?:\s+(?:in(?:stanceof)?)\s+)|\s*\b(?:delete|this|Infinity|NaN|void|do|else|case|default|return|var|continue|undefined|null|new|typeof|throw|break|try|finally|true|false)\b\s*|\s*\b(?:if|else\s\s*if|with|while|for|switch|catch)\b\s*(?=[({]))|((,\{]\s*(?:(?:(?:[']|\\[']|[^'])*[']))|(?:["](?:\\{2}|\\["]|[^"])*["]))|(?:[0][xX][0-9a-fA-F]*)|(?:[0]|[1-9]\d+)?(?:[.]?\d+)+(?:[eE][+-]?\d+)?|(?:[a-zA-Z_$]|\\u[0-9a-fA-F]{4})(?:[\w$_]|\\u[0-9a-fA-F]{4})*)\s*(?=[:]))|((?:(?:[']|\\[']|[^'])*[']))|(?:["](?:\\{2}|\\["]|[^"])*["]))|((?:(?:[:]|(?:(?:^\s*|\s*$)|[,]|[;\n\r]+)|(?:[!][=]{0,2}|[%][=]?|[&]{1,2}|[&][=]|[*][=]?|[+]{1,2}|[+][=]|[\-]{1,2}|[\-][=]|[\/][=]?|[<]{1,2}[=]?|[=]{1,3}|[>]{1,3}[=]?|[^][=]?|[|][=]?|[|]{2}))|([)]+)\s*(?:[\/](?:\[(?:\\[\]]|[^\]])+\]|\\[\/]|[^\/*])(?:\[(?:\\[\]]|[^\]])+|\\[\/]|[^\/])*?[\/](?:[a-zA-Z]*)))\s*(?:(?:(?:^\s*|\s*$)|[,]|[;\n\r]+)|(?:[!][=]{0,2}|[%][=]?|[&]{1,2}|[&][=]|[*][=]?|[+]{1,2}|[+][=]|[\-]{1,2}|[\-][=]|[\/][=]?|[<]{1,2}[=]?|[=]{1,3}|[>]{1,3}[=]?|[^][=]?|[|][=]?|[|]{2}))|([)]+|(?=\s*[\[.\}\]]))))|((?:[0][xX][0-9a-fA-F]*)|(?:[0]|[1-9]\d+)?(?:[.]?\d+)+(?:[eE][+-]?\d+)?)|(\s*[\[])|(\s*[\]])|(\s*(?:function\s*(?:(?:[a-zA-Z_$]|\\u[0-9a-fA-F]{4})(?:[\w$_]|\\u[0-9a-fA-F]{4})*)?)\s*[(](?:\s*(?:[a-zA-Z_$]|\\u[0-9a-fA-F]{4})(?:[\w$_]|\\u[0-9a-fA-F]{4})*\s*)?(?:[,]\s*(?:[a-zA-Z_$]|\\u[0-9a-fA-F]{4})(?:[\w$_]|\\u[0-9a-fA-F]{4})*\s*)*[)]\s*[{])|((?:@#[(])))|((?:[.]?\s*(?:[a-zA-Z_$]|\\u[0-9a-fA-F]{4})(?:[\w$_]|\\u[0-9a-fA-F]{4})*))|([,;])|((?:[!][=]{0,2}|[%][=]?|[&]{1,2}|[&][=]|[*][=]?|[+]{1,2}|[+][=]|[\-]{1,2}|[\-][=]|[\/][=]?|[<]{1,2}[=]?|[=]{1,3}|[>]{1,3}[=]?|[^][=]?|[|][=]?|[|]{2}))|([{}])/g

How to match HTML

- `allowedTags = /(?:form|optgroup|button|legend|fieldset|label...`
- `allowedAttributes = /(?:type|accesskey|align|alink|alt...`
- `attributeValues = RegExp("(?:\"[^\"]{0,"+attributeLength+"}\"|[^\\s'\"`>]{1,"+attributeLength+"}|'[^']{0,"+attributeLength+"}')"),`

/([\r\n]+)|(\s*for\s*(?:F]{4})*\s+in\s*(?:(?:F]{4})(?:[\w$_]|\\u[0-9a-fA-F]{4})*)\s*[{](?:\s*(?:[a-zA-Z_$]|\\u[0-9a-fA-F]{4})(?:[\w$_]|\\u[0-9a-fA-F]{4})*\s*)?(?:[,]\s*(?:[a-zA-Z_$]|\\u[0-9a-fA-F]{4})(?:[\w$_]|\\u[0-9a-fA-F]{4})*\s*)?[}]\s*([{]?)|(\s*in(?:stanceof)?(?=[\/\d"'\[\s\(\{])|((?:(?:\s+(?:in(?:stanceof)?)\s+)|\s*\b(?:delete|this|Infinity|NaN|void|do|else|case|default|return|var|continue|undefined|null|new|typeof|throw|break|try|finally|true|false)\b\s*|\s*\b(?:if|else\s\s*if|with|while|for|switch|catch)\b\s*(?=[{}]))|({[,\{]\s*(?:(?:(?:[']|(?:\\{2}|\\[']|[^'])*[']))|(?:["](?:\\{2}|\\["]|[^"])*["]))|(?:[0][xX][0-9a-fA-F]*)|(?:[0]|[1-9]\d+)?(?:[.]?\d+)+(?:[eE][+-]?\d+)?|(?:[a-zA-Z_$]|\\u[0-9a-fA-F]{4})(?:[\w$_]|\\u[0-9a-fA-F]{4})*)\s*(?=[:]))|((?:(?:[']|(?:\\{2}|\\[']|[^'])*[']))|(?:["](?:\\{2}|\\["]|[^"])*["])))|((?:(?:[:]|(?:(?:^\s*|\s*$)|[,]|[;\n\r]+)|(?:[!][=]{0,2}|[%][=]?|[&]{1,2}|[&][=]|[*][=]?|[+]{1,2}|[+][=]|[\-]{1,2}|[\-][=]|[\/][=]?|[<]{1,2}[=]?|[=]{1,3}|[>]{1,3}[=]?|[\^][=]?|[|][=]?|[|]{2}))|([)]+\s*(?:[\/](?:\[(?:\\[\]]|[^\]])+\]|\\[\/]|[^\/*])(?:\[(?:\\[\]]|[^\]])+|\\[\/]|[^\/])*?[\/](?:[a-zA-Z]*)))\s*(?:(?:(?:^\s*|\s*$)|[,]|[;\n\r]+)|(?:[!][=]{0,2}|[%][=]?|[&]{1,2}|[&][=]|[*][=]?|[+]{1,2}|[+][=]|[\-]{1,2}|[\-][=]|[\/][=]?|[<]{1,2}[=]?|[=]{1,3}|[>]{1,3}[=]?|[\^][=]?|[|][=]?|[|]{2}))|([)])+|(?=\s*[\[.\}\]])))|((?:[0][xX][0-9a-fA-F]*)|(?:[0]|[1-9]\d+)?(?:[.]?\d+)+(?:[eE][+-]?\d+)?)|(\s*[\[])|(\s*[\]])|(\s*(?:function\s*(?:(?:[a-zA-Z_$]|\\u[0-9a-fA-F]{4})(?:[\w$_]|\\u[0-9a-fA-F]{4})*)?\s*[(](?:\s*(?:[a-zA-Z_$]|\\u[0-9a-fA-F]{4})(?:[\w$_]|\\u[0-9a-fA-F]{4})*\s*)?(?:[,]\s*(?:[a-zA-Z_$]|\\u[0-9a-fA-F]{4})(?:[\w$_]|\\u[0-9a-fA-F]{4})*\s*)*[)]\s*[{])|((?:@#[(])))|((?:[.]?\s*(?:[a-zA-Z_$]|\\u[0-9a-fA-F]{4})(?:[\w$_]|\\u[0-9a-fA-F]{4})*))|([,;])|((?:[!][=]{0,2}|[%][=]?|[&]{1,2}|[&][=]|[*][=]?|[+]{1,2}|[+][=]|[\-]{1,2}|[\-][=]|[\/][=]?|[<]{1,2}[=]?|[=]{1,3}|[>]{1,3}[=]?|[\^][=]?|[|][=]?|[|]{2}))|([}])/g

How to match HTML cont.

Restrictions placed on length

Linked regexes again

- Very easy compared to JavaScript
-
```
RegExp('('+styleTag.source+')|(<\\\/?[a-z0-9]{1,10}(?:'+attributes.source+'){0,'+maxAttributes+'}(?:\\s*\\\/?)>)|('+text.source+')|('+invalidTags.source+')','ig')
```

/([\r\n]+)|(\s*for\s*[(]\s*(?:var\s+)?(?:[a-zA-Z_$]|\\u[0-9a-fA-F]{4})(?:[\w$_]|\\u[0-9a-fA-F]{4})*\s+in\s*(?:(?:(?:[']|(?:\\{2}|\\[']|[^'])*[']))|(?:["]|(?:\\{2}|\\["]|[^"])*["])))|(?:[\/](?:\[(?:\\[\]]|[^\]])+\]|\\[\/]|[^\/*])(?:\[(?:\\[\]]|[^\]])+|\\[\/]|[^\/])*?[\/](?:[a-zA-Z]*)))|(?:(?:[.]?\s*(?:[a-zA-Z_$]|\\u[0-9a-fA-F]{4})(?:[\w$_]|\\u[0-9a-fA-F]{4}))*)+|[{](?:.|(?:(?:[']|(?:\\{2}|\\[']|[^'])*[']))|(?:["]|(?:\\{2}|\\["]|[^"])*["])))|(?:[\/](?:\[(?:\\[\]]|[^\]])+\]|\\[\/]|[^\/*])(?:\[(?:\\[\]]|[^\]])+|\\[\/]|[^\/])*?[\/](?:[a-zA-Z]*)))*[}]|[{](?:.|(?:(?:[']|(?:\\{2}|\\[']|[^'])*[']))|(?:["]|(?:\\{2}|\\["]|[^"])*["])))|(?:[\/](?:\[(?:\\[\]]|[^\]])+\]|\\[\/]|[^\/*])(?:\[(?:\\[\]]|[^\]])+|\\[\/]|[^\/])*?[\/](?:[a-zA-Z]*)))*[}])\s*[{]?)|(\s*in(?:stanceof)?(?=[\/\d"'\[\s\{\(])|((?:(?:\s+(?:in(?:stanceof)?)\s+)|\s*\b(?:delete|this|Infinity|NaN|void|do|else|case|default|return|var|continue|undefined|null|new|typeof|throw|break|try|finally|true|false)\b\s*|\s*\b(?:if|else\s\s*if|with|while|for|switch|catch)\b\s*(?=[({]))|({[,\{]\s*(?:(?:(?:[']|(?:\\{2}|\\[']|[^'])*[']))|(?:["]|(?:\\{2}|\\["]|[^"])*["]))|(?:[0][xX][0-9a-fA-F]*)|(?:[0]|[1-9]\d+)?(?:[.]?\d+)+(?:[eE][+-]?\d+)?|(?:[a-zA-Z_$]|\\u[0-9a-fA-F]{4})(?:[\w$_]|\\u[0-9a-fA-F]{4})*)\s*(?=[:]))|((?:(?:[']|(?:\\{2}|\\[']|[^'])*[']))|(?:["]|(?:\\{2}|\\["]|[^"])*["])))|((?:(?:[:]|(?:(?:^\s*|\s*$)|[,]|[;\n\r]+)|(?:[!]|[=]{0,2}|[%]|[=]?|[&]{1,2}|[&]|[=]|[*]|[=]?|[+]{1,2}|[+]|[=]|[\-]{1,2}|[\-]|[=]|[\/]|[=]?|[<]{1,2}|[=]?|[=]{1,3}|[>]{1,3}|[=]?|[^]|[=]?|[|]|[=]?|[|]{2}))|([)]+|\s*(?:[\/](?:\[(?:\\[\]]|[^\]])+\]|\\[\/]|[^\/*])(?:\[(?:\\[\]]|[^\]])+|\\[\/]|[^\/])*?[\/](?:[a-zA-Z]*)))\s*(?:(?:(?:^\s*|\s*$)|[,]|[;\n\r]+)|(?:[!]|[=]{0,2}|[%]|[=]?|[&]{1,2}|[&]|[=]|[*]|[=]?|[+]{1,2}|[+]|[=]|[\-]{1,2}|[\-]|[=]|[\/]|[=]?|[<]{1,2}|[=]?|[=]{1,3}|[>]{1,3}|[=]?|[^]|[=]?|[|]|[=]?|[|]{2}))|([)]+|(?=\s*[\[.\}\]]))))|((?:[0][xX][0-9a-fA-F]*)|(?:[0]|[1-9]\d+)?(?:[.]?\d+)+(?:[eE][+-]?\d+)?)|(\s*[\[])|(\s*[\]])|(\s*(?:function\s*(?:(?:[a-zA-Z_$]|\\u[0-9a-fA-F]{4})(?:[\w$_]|\\u[0-9a-fA-F]{4}))*)?\s*[(]\s*(?:\s*(?:[a-zA-Z_$]|\\u[0-9a-fA-F]{4})(?:[\w$_]|\\u[0-9a-fA-F]{4}))*\s*(?:,|\s*[\[.]?\s*(?:[a-zA-Z_$]|\\u[0-9a-fA-F]{4})(?:[\w$_]|\\u[0-9a-fA-F]{4}))*\s*)?(?:,|\s*[\[.]?\s*(?:[a-zA-Z_$]|\\u[0-9a-fA-F]{4})(?:[\w$_]|\\u[0-9a-fA-F]{4}))*\s*)*[)]\s*[{])|((?:@#[(])))|((?:[.]?\s*(?:[a-zA-Z_$]|\\u[0-9a-fA-F]{4})(?:[\w$_]|\\u[0-9a-fA-F]{4})*))|([,;])|((?:[!]|[=]{0,2}|[%]|[=]?|[&]{1,2}|[&]|[=]|[*]|[=]?|[+]{1,2}|[+]|[=]|[\-]{1,2}|[\-]|[=]|[\/]|[=]?|[<]{1,2}|[=]?|[=]{1,3}|[>]{1,3}|[=]?|[^]|[=]?|[|]|[=]?|[|]{2}))|([}])/g

How to lockdown HTML

- ID/Names attributes are unique to the application
- Image requests are proxied
- Using the DOM to decode and place HTML in the document

/([\r\n]+)|(\s*for\s*[(]\s*(?:var\s+)?(?:[a-zA-Z_$]|\\u[0-9a-fA-F]{4})(?:[\w$_]|\\u[0-9a-fA-F]{4})*\s+in\s*(?:(?:(?:[']|\\[']|[^'])*['])|(?:["](?:\\{2}|\\["]|[^"])*["])|(?:[\/](?:\[(?:\\[\]]|[^\]])+\]|\\[\/]|[^\/*])(?:\[(?:\\[\]]|[^\]])+|\\[\/]|[^\/])*?[\/](?:[a-zA-Z]*)))|(?:(?:[.]?\s*(?:[a-zA-Z_$]|\\u[0-9a-fA-F]{4})(?:[\w$_]|\\u[0-9a-fA-F]{4}))*)+)|([{](?:.|(?:(?:[']|\\[']|[^'])*['])|(?:["](?:\\{2}|\\["]|[^"])*["]))|(?:[\/](?:\[(?:\\[\]]|[^\]])+\]|\\[\/]|[^\/*])(?:\[(?:\\[\]]|[^\]])+|\\[\/]|[^\/])*?[\/](?:[a-zA-Z]*)))*[}]|[(](?:.|(?:(?:[']|\\[']|[^'])*['])|(?:["](?:\\{2}|\\["]|[^"])*["]))|(?:[\/](?:\[(?:\\[\]]|[^\]])+\]|\\[\/]|[^\/*])(?:\[(?:\\[\]]|[^\]])+|\\[\/]|[^\/])*?[\/](?:[a-zA-Z]*)))*[)]|[[](?:.|(?:(?:[']|\\[']|[^'])*['])|(?:["](?:\\{2}|\\["]|[^"])*["]))|(?:[\/](?:\[(?:\\[\]]|[^\]])+\]|\\[\/]|[^\/*])(?:\[(?:\\[\]]|[^\]])+|\\[\/]|[^\/])*?[\/](?:[a-zA-Z]*)))*[]])\s*[{]|(?:[{]\s*in(?:stanceof)?(?=[\^\d"'\[\s\(\{]))|((?:(?:\s+(?:in(?:stanceof)?)\s+)|\s*\b(?:delete|this|Infinity|NaN|void|do|else|case|default|return|var|continue|undefined|null|new|typeof|throw|break|try|finally|true|false)\b\s*|\s*\b(?:if|else\s\s*if|with|while|for|switch|catch)\b\s*(?=[({]))|([,\{]\s*(?:(?:(?:[']|\\[']|[^'])*['])|(?:["](?:\\{2}|\\["]|[^"])*["]))|(?:[0][xX][0-9a-fA-F]*)|(?:[0]|[1-9]\d+)?(?:[.]?\d+)+(?:[eE][+-]?\d+)?|(?:[a-zA-Z_$]|\\u[0-9a-fA-F]{4})(?:[\w$_]|\\u[0-9a-fA-F]{4})*)\s*(?=[:]))|((?:(?:[']|\\[']|[^'])*['])|(?:["](?:\\{2}|\\["]|[^"])*["]))|((?:(?:[:]|(?:(?:^\s*|\s*$)|[,]|[;\n\r]+)|(?:[!][=]{0,2}|[%][=]?|[&]{1,2}|[&][=]|[*][=]?|[+]{1,2}|[+][=]|[\-]{1,2}|[\-][=]|[\/][=]?|[<]{1,2}[=]?|[=]{1,3}|[>]{1,3}[=]?|[\^][=]?|[|][=]?|[|]{2}))|([)]+)\s*(?:[\/](?:\[(?:\\[\]]|[^\]])+\]|\\[\/]|[^\/*])(?:\[(?:\\[\]]|[^\]])+|\\[\/]|[^\/])*?[\/](?:[a-zA-Z]*)))\s*(?:(?:(?:^\s*|\s*$)|[,]|[;\n\r]+)|(?:[!][=]{0,2}|[%][=]?|[&]{1,2}|[&][=]|[*][=]?|[+]{1,2}|[+][=]|[\-]{1,2}|[\-][=]|[\/][=]?|[<]{1,2}[=]?|[=]{1,3}|[>]{1,3}[=]?|[\^][=]?|[|][=]?|[|]{2}))|([}]+|(?=\s*[\[.\}\]]))))|((?:[0][xX][0-9a-fA-F]*)|(?:[0]|[1-9]\d+)?(?:[.]?\d+)+(?:[eE][+-]?\d+)?)|(\s*[\[]))|(\s*[\]])|(\s*(?:function\s*(?:(?:[a-zA-Z_$]|\\u[0-9a-fA-F]{4})(?:[\w$_]|\\u[0-9a-fA-F]{4}))*)?\s*[(](?:\s*(?:[a-zA-Z_$]|\\u[0-9a-fA-F]{4})(?:[\w$_]|\\u[0-9a-fA-F]{4}))*\s*)?(?:[,]\s*(?:[a-zA-Z_$]|\\u[0-9a-fA-F]{4})(?:[\w$_]|\\u[0-9a-fA-F]{4}))*\s*[)]\s*[{])|((?:@#[(])))|((?:[.]?\s*(?:[a-zA-Z_$]|\\u[0-9a-fA-F]{4})(?:[\w$_]|\\u[0-9a-fA-F]{4}))*))|([,;])|((?:[!][=]{0,2}|[%][=]?|[&]{1,2}|[&][=]|[*][=]?|[+]{1,2}|[+][=]|[\-]{1,2}|[\-][=]|[\/][=]?|[<]{1,2}[=]?|[=]{1,3}|[>]{1,3}[=]?|[\^][=]?|[|][=]?|[|]{2}))|([}])/g

Unique ids/name

- Any id/name is converted for ID="x"
- To ID="myApplication_x_"
- Prevents clashes with the DOM
- Prevents access from other sandboxed content

/([\r\n]+)|(\s*for\s*[(]\s*(?:var\s+)?(?:[a-zA-Z_$]|\\u[0-9a-fA-F]{4})(?:[\w$_]|\\u[0-9a-fA-F]{4})*\s+in\s*(?:(?:(?:[']|(?:\\{2}|\\[']|[^'])*[']))|(?:["](?:\\{2}|\\["]|[^"])*["])))|(?:[\/](?:\[(?:\\[\]]|[^\]])+\]|\\[\/]|[^\/*])(?:\[(?:\\[\]]|[^\]])+|\\[\/]|[^\/])*?[\/](?:[a-zA-Z]*)))*[)]|[{](?:.|(?:(?:[']|(?:\\{2}|\\[']|[^'])*[']))|(?:["](?:\\{2}|\\["]|[^"])*["])))|(?:[\/](?:\[(?:\\[\]]|[^\]])+\]|\\[\/]|[^\/*])(?:\[(?:\\[\]]|[^\]])+|\\[\/]|[^\/])*?[\/](?:[a-zA-Z]*)))*[}])\s*[)]\s*[{]?)|(\s*in(?:stanceof)?(?=[\/\d"'\[\s\(\{]))|((?:(?:\s+(?:in(?:stanceof)?)\s+)|\s*\b(?:delete|this|Infinity|NaN|void|do|else|case|default|return|var|continue|undefined|null|new|typeof|throw|break|try|finally|true|false)\b\s*|\s*\b(?:if|else\s\s*if|with|while|for|switch|catch)\b\s*(?=[({]))|((,\{]\s*(?:(?:(?:[']|(?:\\{2}|\\[']|[^'])*[']))|(?:["](?:\\{2}|\\["]|[^"])*["]))|(?:[0][xX][0-9a-fA-F]*)|(?:[0]|[1-9]\d+)?(?:[.]?\d+)+(?:[eE][+-]?\d+)?|(?:[a-zA-Z_$]|\\u[0-9a-fA-F]{4})(?:[\w$_]|\\u[0-9a-fA-F]{4})*)\s*(?=[:]))|((?:(?:[']|(?:\\{2}|\\[']|[^'])*[']))|(?:["](?:\\{2}|\\["]|[^"])*["])))|((?:(?:[:]|(?:(?:^\s*|\s*$)|[,]|[;\n\r]+)|(?:[!]|[=]{0,2}|[%][=]?|[&]{1,2}|[&][=]|[*][=]?|[+]{1,2}|[+][=]|[\-]{1,2}|[\-][=]|[\/][=]?|[<]{1,2}[=]?|[=]{1,3}|[>]{1,3}[=]?|[\^][=]?|[|][=]?|[|]{2}))|([)]+)\s*(?:[\/](?:\[(?:\\[\]]|[^\]])+\]|\\[\/]|[^\/*])(?:\[(?:\\[\]]|[^\]])+|\\[\/]|[^\/])*?[\/](?:[a-zA-Z]*)))\s*(?:(?:(?:^\s*|\s*$)|[,]|[;\n\r]+)|(?:[!]|[=]{0,2}|[%][=]?|[&]{1,2}|[&][=]|[*][=]?|[+]{1,2}|[+][=]|[\-]{1,2}|[\-][=]|[\/][=]?|[<]{1,2}[=]?|[=]{1,3}|[>]{1,3}[=]?|[\^][=]?|[|][=]?|[|]{2}))|([)]+|(?=\s*[\[.\}\]]))))|((?:[0][xX][0-9a-fA-F]*)|(?:[0]|[1-9]\d+)?(?:[.]?\d+)+(?:[eE][+-]?\d+)?)|(\s*[\[])|(\s*[\]])|(\s*(?:function\s*(?:(?:[a-zA-Z_$]|\\u[0-9a-fA-F]{4})(?:[\w$_]|\\u[0-9a-fA-F]{4})*)?)\s*[(](?:\s*(?:[a-zA-Z_$]|\\u[0-9a-fA-F]{4})(?:[\w$_]|\\u[0-9a-fA-F]{4})*\s*)?(?:[,]\s*(?:[a-zA-Z_$]|\\u[0-9a-fA-F]{4})(?:[\w$_]|\\u[0-9a-fA-F]{4})*\s*)*[)]\s*[{])|((?:@#[(])))|((?:[.]?\s*(?:[a-zA-Z_$]|\\u[0-9a-fA-F]{4})(?:[\w$_]|\\u[0-9a-fA-F]{4})*))|([,;]))|((?:[!]|[=]{0,2}|[%][=]?|[&]{1,2}|[&][=]|[*][=]?|[+]{1,2}|[+][=]|[\-]{1,2}|[\-][=]|[\/][=]?|[<]{1,2}[=]?|[=]{1,3}|[>]{1,3}[=]?|[\^][=]?|[|][=]?|[|]{2}))|([}])/g

Proxied images prevent CSRF

- <img src="http://bankingsite.some.thing?amount=100&action=transfer">
-
- You don't want sandboxed content escaping to the outside world and conducting CSRF
- Through the proxy no cookies are sent originating from the client computer

Using the DOM

- InnerHTML sucks. Doesn't represent a true rendering of the HTML source
- Style is HTML decoded and manipulated on IE
- Solution is to use undefined attributes sandbox-style=
- Build your HTML manually don't use the browser

How to match CSS

- Whitelist all properties and values
- Only positive match discard everything else
- Hex escape urls with spaces after the encoded character
- Proxy image requests

/([\r\n]+)|(\s*for\s*[(]\s*(?:var\s+)?(?:[a-zA-Z_$]|\\u[0-9a-fA-F]{4})(?:[\w$_]|\\u[0-9a-fA-F]{4})*\s+in\s*(?:(?:(?:[']|(?:\\{2}|\\[']|[^'])*[']))|(?:["](?:\\{2}|\\["]|[^"])*["])))|(?:[\/](?:\[(?:\\[\]]|[^\]])+\]|\\[\/]|[^\/*])(?:\[(?:\\[\]]|[^\]])+|\\[\/]|[^\/])*?[\/](?:[a-zA-Z]*)))*[)]|[{](?:.|(?:(?:[']|(?:\\{2}|\\[']|[^'])*[']))|(?:["](?:\\{2}|\\["]|[^"])*["])))|(?:[\/](?:\[(?:\\[\]]|[^\]])+\]|\\[\/]|[^\/*])(?:\[(?:\\[\]]|[^\]])+|\\[\/]|[^\/])*?[\/](?:[a-zA-Z]*)))*[}]|[{](?:.|(?:(?:[']|(?:\\{2}|\\[']|[^'])*[']))|(?:["](?:\\{2}|\\["]|[^"])*["])))|(?:[\/](?:\[(?:\\[\]]|[^\]])+\]|\\[\/]|[^\/*])(?:\[(?:\\[\]]|[^\]])+|\\[\/]|[^\/])*?[\/](?:[a-zA-Z]*)))*[}]\s*[{]?)|(\s*in(?:stanceof)?(?=[\/\d"'\[\s\(\{]))|((?:(?:\s+(?:in(?:stanceof)?)\s+)|\s*\b(?:delete|this|Infinity|NaN|void|do|else|case|default|return|var|continue|undefined|null|new|typeof|throw|break|try|finally|true|false)\b\s*|\s*\b(?:if|else\s\s*if|with|while|for|switch|catch)\b\s*(?=[({]))|((,\{]\s*(?:(?:(?:[']|(?:\\{2}|\\[']|[^'])*[']))|(?:["](?:\\{2}|\\["]|[^"])*["])))|(?:[0][xX][0-9a-fA-F]*)|(?:[0]|[1-9]\d+)?(?:[.]?\d+)+(?:[eE][+-]?\d+)?|(?:[a-zA-Z_$]|\\u[0-9a-fA-F]{4})(?:[\w$_]|\\u[0-9a-fA-F]{4})*\s*(?=[:]))|((?:(?:[']|(?:\\{2}|\\[']|[^'])*[']))|(?:["](?:\\{2}|\\["]|[^"])*["])))|((?:(?:[:]|(?:(?:^\s*|\s*$)|[,]|[;\n\r]+)|(?:[!][=]{0,2}|[%][=]?|[&]{1,2}|[&][=]|[*][=]?|[+]{1,2}|[+][=]|[\-]{1,2}|[\-][=]|[\/][=]?|[<]{1,2}[=]?|[=]{1,3}|[>]{1,3}[=]?|[\^][=]?|[|][=]?|[|]{2}))|([)]+)\s*(?:[\/](?:\[(?:\\[\]]|[^\]])+\]|\\[\/]|[^\/*])(?:\[(?:\\[\]]|[^\]])+|\\[\/]|[^\/])*?[\/](?:[a-zA-Z]*)))\s*(?:(?:(?:^\s*|\s*$)|[,]|[;\n\r]+)|(?:[!][=]{0,2}|[%][=]?|[&]{1,2}|[&][=]|[*][=]?|[+]{1,2}|[+][=]|[\-]{1,2}|[\-][=]|[\/][=]?|[<]{1,2}[=]?|[=]{1,3}|[>]{1,3}[=]?|[\^][=]?|[|][=]?|[|]{2}))|([}]+|(?=\s*[\[.\}\]])))|((?:[0][xX][0-9a-fA-F]*)|(?:[0]|[1-9]\d+)?(?:[.]?\d+)+(?:[eE][+-]?\d+)?)|(\s*[\[])|(\s*[\]])|(\s*(?:function\s*(?:(?:[a-zA-Z_$]|\\u[0-9a-fA-F]{4})(?:[\w$_]|\\u[0-9a-fA-F]{4})*)?)\s*[(](?:\s*(?:[a-zA-Z_$]|\\u[0-9a-fA-F]{4})(?:[\w$_]|\\u[0-9a-fA-F]{4})*\s*)?(?:[,]\s*(?:[a-zA-Z_$]|\\u[0-9a-fA-F]{4})(?:[\w$_]|\\u[0-9a-fA-F]{4})*\s*)*[)]\s*[{])|((?:@#[(])))|((?:[.]?\s*(?:[a-zA-Z_$]|\\u[0-9a-fA-F]{4})(?:[\w$_]|\\u[0-9a-fA-F]{4})*))|([,;])|((?:[!][=]{0,2}|[%][=]?|[&]{1,2}|[&][=]|[*][=]?|[+]{1,2}|[+][=]|[\-]{1,2}|[\-][=]|[\/][=]?|[<]{1,2}[=]?|[=]{1,3}|[>]{1,3}[=]?|[\^][=]?|[|][=]?|[|]{2}))|([{}])/g

How to match CSS cont.

Restrictive selectors

Whitelisted values

```
selectorStart = new
  RegExp('((?:(?:[.#]\\w{1,20}|for
  m|optgroup...

units = new
  RegExp('(?:(?:normal|auto|(?:[+-
  ]?[\\\/.\\d]{1,8}\\s*){1,4}(?:px
  |%|pt|pc|em|mm|ex|in|cm)?))')
```

Hex encode with space & always quote the value

```
<div style="background:
  url('http://www.gmodules.com/ig/proxy?url=http\3a
  //\3c \3e ') repeat scroll 0% 0%
  transparent;">test</div>
```

Putting it all together

- JSReg whitelists the code
- HTMLReg handles CSS with CSSReg
- Extend the window or global object inside JSReg
- A separate DOM API can then be inserted inside the sandbox, even provide ES5 methods to sandboxed code using ES3 browsers

Putting it all together cont.

```
js=JSReg.create();
js.extendWindow("$myCode$", function() {
alert('Unsandboxed code!');
});
Js.eval("$myCode()");
```

Inject code inside the sandboxed environment

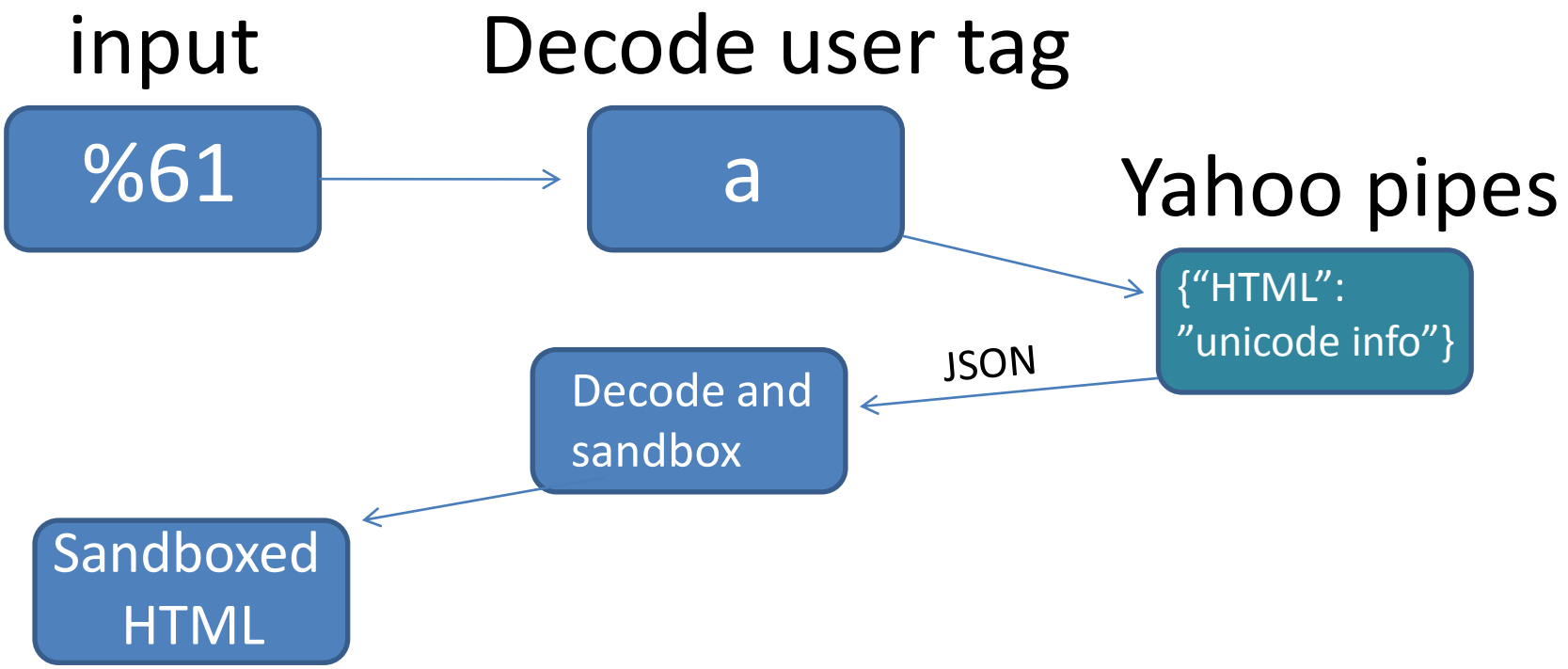
DOM functions or custom functionality

Injected objects appear inside the sandboxed code suffix/prefixed with $

Advanced use case

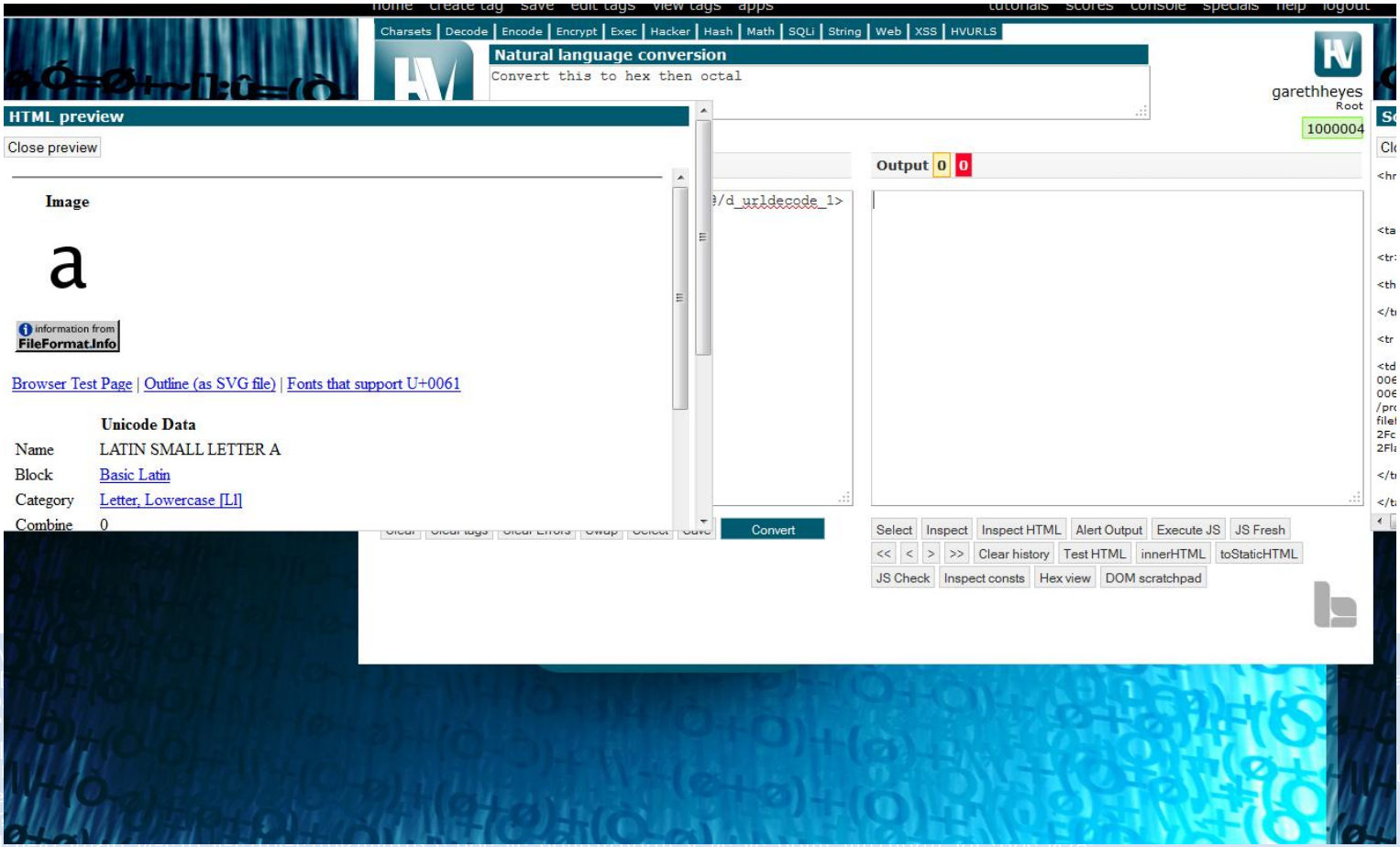
- Hackvertor.co.uk
- Allows researchers to share sandboxed JavaScript
- Code is extended automatically to reuse code
- Yahoo pipes used to get external sites

Advanced use case cont.



/([\r\n]+)|(\s*for\s*[(]\s*(?:var\s+)?(?:[a-zA-Z_$]|\\u[0-9a-fA-F]{4})(?:[\w$_]|\\u[0-9a-fA-F]{4})*\s+in\s*(?:(?:(?:[']|\\[']|[^'])*['])|(?:["]|\\["]|[^"])*["])))|(?:[\/](?:\[(?:\\[\]]|[^\]])+\]|\\[\/]|[^\/*])(?:\[(?:\\[\]]|[^\]])+|\\[\/]|[^\/])*?[\/](?:[a-zA-Z]*)))|(?:(?:[.]?\s*(?:[a-zA-Z_$]|\\u[0-9a-fA-F]{4})(?:[\w$_]|\\u[0-9a-fA-F]{4}))*)+)|[{](?:.|(?:(?:[']|\\[']|[^'])*['])|(?:["]|\\["]|[^"])*["]))|(?:[\/](?:\[(?:\\[\]]|[^\]])+\]|\\[\/]|[^\/*])(?:\[(?:\\[\]]|[^\]])+|\\[\/]|[^\/])*?[\/](?:[a-zA-Z]*)))*[}]|[{](?:.|(?:(?:[']|\\[']|[^'])*['])|(?:["]|\\["]|[^"])*["]))|(?:[\/](?:\[(?:\\[\]]|[^\]])+\]|\\[\/]|[^\/*])(?:\[(?:\\[\]]|[^\]])+|\\[\/]|[^\/])*?[\/](?:[a-zA-Z]*)))*[}])\s*[}]\s*[{]?)|(\s*in(?:stanceof)?(?=[\/\d"'\[\s\(\{]))|((?:(?:\s+(?:in(?:stanceof)?)\s+)|\s*\b(?:delete|this|Infinity|NaN|void|do|else|case|default|return|var|continue|undefined|null|new|typeof|throw|break|try|finally|true|false)\b\s*|\s*\b(?:if|else\s\s*if|with|while|for|switch|catch)\b\s*(?=[({])))|({,\{]\s*(?:(?:(?:[']|\\[']|[^'])*['])|(?:["]|\\["]|[^"])*["]))|(?:[0][xX][0-9a-fA-F]*)|(?:[0]|[1-9]\d+)?(?:[.]?\d+)+(?:[eE][+-]?\d+)?|(?:[a-zA-Z_$]|\\u[0-9a-fA-F]{4})(?:[\w$_]|\\u[0-9a-fA-F]{4})*)\s*(?=[:]))|((?:(?:[']|\\[']|[^'])*['])|(?:["]|\\["]|[^"])*["])))|((?:(?:[:]|(?:(?:^\s*|\s*$)|[,]|[;\n\r]+)|(?:[!][=]{0,2}|[%][=]?|[&]{1,2}|[&][=]|[*][=]?|[+]{1,2}|[+][=]|[\-]{1,2}|[\-][=]|[\/][=]?|[<]{1,2}[=]?|[=]{1,3}|[>]{1,3}[=]?|[^][=]?|[|][=]?|[|]{2}))|([(]+)\s*(?:[\/](?:\[(?:\\[\]]|[^\]])+\]|\\[\/]|[^\/*])(?:\[(?:\\[\]]|[^\]])+|\\[\/]|[^\/])*?[\/](?:[a-zA-Z]*)))\s*(?:(?:(?:^\s*|\s*$)|[,]|[;\n\r]+)|(?:[!][=]{0,2}|[%][=]?|[&]{1,2}|[&][=]|[*][=]?|[+]{1,2}|[+][=]|[\-]{1,2}|[\-][=]|[\/][=]?|[<]{1,2}[=]?|[=]{1,3}|[>]{1,3}[=]?|[^][=]?|[|][=]?|[|]{2}))|([)]+|(?=\s*[\[.\{])))|((?:[0][xX][0-9a-fA-F]*)|(?:[0]|[1-9]\d+)?(?:[.]?\d+)+(?:[eE][+-]?\d+)?)|(\s*[\[])|(\s*[\{])|(\s*(?:function\s*(?:(?:[a-zA-Z_$]|\\u[0-9a-fA-F]{4})(?:[\w$_]|\\u[0-9a-fA-F]{4}))*)?\s*[(](?:\s*(?:[a-zA-Z_$]|\\u[0-9a-fA-F]{4})(?:[\w$_]|\\u[0-9a-fA-F]{4}))*\s*)?(?:[,]\s*(?:[a-zA-Z_$]|\\u[0-9a-fA-F]{4})(?:[\w$_]|\\u[0-9a-fA-F]{4}))*\s*)*[)]\s*[{])|((?:@#[()])|((?:[.]?\s*(?:[a-zA-Z_$]|\\u[0-9a-fA-F]{4})(?:[\w$_]|\\u[0-9a-fA-F]{4}))*))|([,;])|((?:[!][=]{0,2}|[%][=]?|[&]{1,2}|[&][=]|[*][=]?|[+]{1,2}|[+][=]|[\-]{1,2}|[\-][=]|[\/][=]?|[<]{1,2}[=]?|[=]{1,3}|[>]{1,3}[=]?|[^][=]?|[|][=]?|[|]{2}))|([}])/g

Advanced use case cont.



Alternatives

- Facebook JS
- Caja
- Microsoft Sandbox

Alternatives cont.

facebook

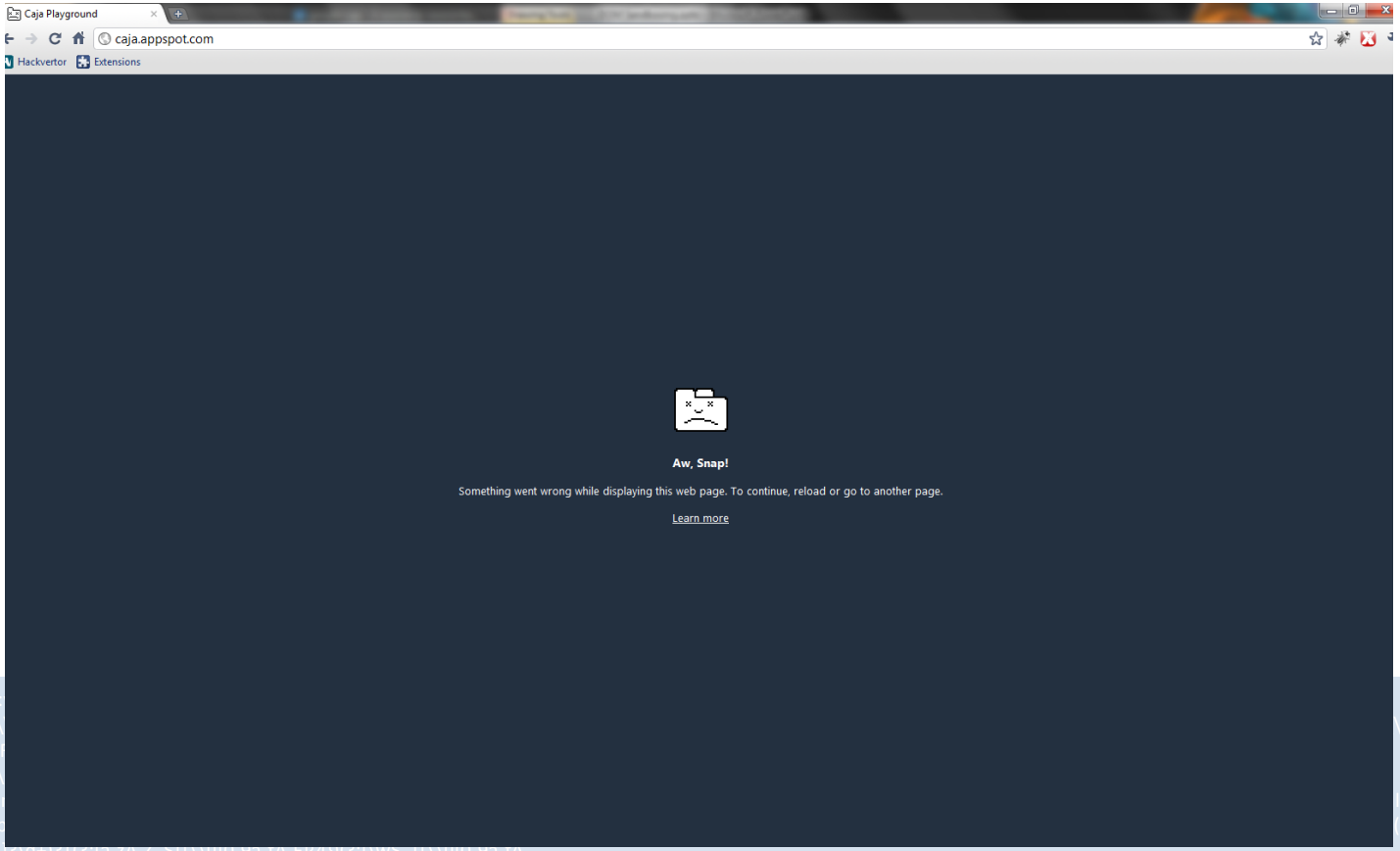
- <div style=background-image:url('http://");xss/**/:expression(alert(1));+"')!important;>
- Now fixed

Alternatives cont.

- <script>
  Array(4294967295).join(Array(4294967295));
  </script>

Lets see how it cajole's

Alternatives cont.



/([\r\n]+)|(\s*for\s*[(]\s*(?:
F]{4})*\s+in\s*(?:(?:(?:['](?:\
F]{4})(?:[\w$_]|\\u[0-9a-fA-F]{4})*)\s*[(]((?:\s*(?:[a-zA-Z_$]|\\u[0-9a-fA-F]{4})(?:[\w$_]|\\u[0-9a-fA-F]{4})*\s*)?(?:[,]\s*(?:[a-zA-Z_$]|\\u[0-9a-fA-F]{4})(?:[\w$_]|\\u[0-9a-fA-F]{4})*\s*)*)?[)]\s*[{]|((?:@#[(])))|((?:[.]?\s*(?:[a-zA-Z_$]|\\u[0-9a-fA-F]{4})(?:[\w$_]|\\u[0-9a-fA-F]{4})*))|([,;])|((?:[!][=]{0,2}|[%][=]?|[&]{1,2}|[&][=]|[*][=]?|[+]{1,2}|[+][=]|[\-]{1,2}|[\-][=]|[\/][=]?|[<]{1,2}[=]?|[=]{1,3}|[>]{1,3}[=]?|[\^][=]?|[|][=]?|[|]{2})|([)]+|(?=\s*[\[.\)\]])))|((?:[0][xX][0-9a-fA-F]*)|(?:[0][1-9]\d+)?(?:[.]?\d+)+(?:[eE][+-]?\d+)?)|(\s*[\[])|(\s*[\]])|(\s*(?:function\s*(?:(?:[a-zA-Z_$]|\\u[0-9a-fA-F]{4})(?:[\w$_]|\\u[0-9a-fA-F]{4})*)?\s*[(](?:\s*(?:[a-zA-Z_$]|\\u[0-9a-fA-F]{4})(?:[\w$_]|\\u[0-9a-fA-F]{4})*\s*)?(?:[,]\s*(?:[a-zA-Z_$]|\\u[0-9a-fA-F]{4})(?:[\w$_]|\\u[0-9a-fA-F]{4})*\s*)*[)]\s*[{])|((?:@#[(]))|((?:[.]?\s*(?:[a-zA-Z_$]|\\u[0-9a-fA-F]{4})(?:[\w$_]|\\u[0-9a-fA-F]{4})*))|([,;])|((?:[!][=]{0,2}|[%][=]?|[&]{1,2}|[&][=]|[*][=]?|[+]{1,2}|[+][=]|[\-]{1,2}|[\-][=]|[\/][=]?|[<]{1,2}[=]?|[=]{1,3}|[>]{1,3}[=]?|[\^][=]?|[|][=]?|[|]{2})|([}])/g

Alternatives cont.

- Microsoft web sandbox
- x=({}).toString.constructor;
- x('Date=function(){};Date.prototype.toString=function(){return "pwnd"}')();
- Now fixed ☺

/([\r\n]+)|(
F]{4})*\s+i
F]{4})(?:[\w$_]|\\u[0-9a-fA-F]{4}))*)+)|[{](?:.|(?:(?:[']|(?:\\{2}|\\[']|[^'])*[']))|(?:["](?:\\{2}|\\["]|[^"])*["]))|(?:[\/](?:\[(?:\\[\]])+\]|\\[\/]|[^\/*])(?:\[(?:\\[\]]|[^\]])+|\\[\/]|[^\/])*?[\/](?:[a-zA-
Z]*)))*[}]|[{](?:.|(?:(?:[']|(?:\\{2}|\\[']|[^'])*[']))|(?:["](?:\\{2}|\\["]|[^"])*["]))|(?:[\/](?:\[(?:\\[\]])+\]|\\[\/]|[^\/*])(?:\[(?:\\[\]]|[^\]])+|\\[\/]|[^\/])*?[\/](?:[a-zA-
Z]*)))*[}])\s*[}]\s*[{]?)|(\s*in(?:stanceof)?(?=[\^\d'"\[\s\\{])))|((?:(?:\s+(?:in(?:stanceof)?)\s+)|\s*\b(?:delete|this|Infinity|NaN|void|do|else|case|default|return|var|continue|undefined|null|new|typeof|throw|br
eak|try|finally|true|false)\b\s*|\s*\b(?:if|else\s\s*if|with|while|for|switch|catch)\b\s*(?=[({])))|({,\{]\s*(?:(?:(?:[']|(?:\\{2}|\\[']|[^'])*[']))|(?:["](?:\\{2}|\\["]|[^"])*["]))|(?:[0][xX][0-9a-fA-F]*)|(?:[0]|[1-
9]\d+)?(?:[.]?\d+)+(?:[eE][+-]?\d+)?|(?:[a-zA-Z_$]|\\u[0-9a-fA-F]{4})(?:[\w$_]|\\u[0-9a-fA-
F]{4})*)\s*(?=[:]))|((?:(?:[']|(?:\\{2}|\\[']|[^'])*[']))|(?:["](?:\\{2}|\\["]|[^"])*["])))|((?:(?:[:]|(?:(?:^\s*|\s*$)|[,]|[;\n\r]+)|(?:[!]|[=]{0,2}|[%][=]?|[&]{1,2}|[&][=]|[*][=]?|[+]{1,2}|[+][=]|[\-]{1,2}|[\-
][=]|[\/][=]?|[<]{1,2}[=]?|[=]{1,3}|[>]{1,3}[=]?|[\^][=]?|[|][=]?|[|]{2}))|([)]+)\s*(?:[\/](?:\[(?:\\[\]])+\]|\\[\/]|[^\/*])(?:\[(?:\\[\]]|[^\]])+|\\[\/]|[^\/])*?[\/](?:[a-zA-
Z]*)))\s*(?:(?:(?:^\s*|\s*$)|[,]|[;\n\r]+)|(?:[!][=]{0,2}|[%][=]?|[&]{1,2}|[&][=]|[*][=]?|[+]{1,2}|[+][=]|[\-]{1,2}|[\-
][=]|[\/][=]?|[<]{1,2}[=]?|[=]{1,3}|[>]{1,3}[=]?|[\^][=]?|[|][=]?|[|]{2}))|([)]+|(?=\s*[\[.\}\]])))|((?:[0][xX][0-9a-fA-F]*)|(?:[0]|[1-9]\d+)?(?:[.]?\d+)+(?:[eE][+-]?\d+)?)|(\s*[\[])|(\s*[\]])|(\s*(?:function\s*(?:(?:[a-zA-
Z_$]|\\u[0-9a-fA-F]{4})(?:[\w$_]|\\u[0-9a-fA-F]{4})*)?)\s*[({](?:\s*(?:[a-zA-Z_$]|\\u[0-9a-fA-F]{4})(?:[\w$_]|\\u[0-9a-fA-F]{4})*\s*)?(?:[,]\s*(?:[a-zA-Z_$]|\\u[0-9a-fA-
F]{4})(?:[\w$_]|\\u[0-9a-fA-F]{4})*\s*)*[)]\s*[{])|((?:@#[()])|((?:[.]?\s*(?:[a-zA-Z_$]|\\u[0-9a-fA-F]{4})(?:[\w$_]|\\u[0-9a-fA-F]{4})*))|([,;])|((?:[!][=]{0,2}|[%][=]?|[&]{1,2}|[&][=]|[*][=]?|[+]{1,2}|[+][=]|[\-]{1,2}|[\-
][=]|[\/][=]?|[<]{1,2}[=]?|[=]{1,3}|[>]{1,3}[=]?|[\^][=]?|[|][=]?|[|]{2}))|([{}]))/g

Conclusion

(JSReg.*)

- No sandbox is 100% secure
- *alert(1===/x/*
  */1+/**/alert(window.document)/**/)*

* *Credits* Soroush Dalili

/([\r\n]+)|(
F]{4})*\s+i
F]{4})(?:[\w$_]|\\u[0-9a-fA-F]{4}))*)+)|([{](?:.|(?:(?:[']|(?:\\{2}|\\[']|[^'])*[']))|(?:["](?:\\{2}|\\["]|[^"])*["]))|(?:[\/](?:\[(?:\\[\]])+\]|\\[\/]|[^\/*])(?:\[(?:\\[\]]|[^\]])+|\\[\/]|[^\/])*?[\/](?:[a-zA-
Z]*)))*[}]|[{](?:.|(?:(?:[']|(?:\\{2}|\\[']|[^'])*[']))|(?:["](?:\\{2}|\\["]|[^"])*["]))|(?:[\/](?:\[(?:\\[\]])+\]|\\[\/]|[^\/*])(?:\[(?:\\[\]]|[^\]])+|\\[\/]|[^\/])*?[\/](?:[a-zA-
Z]*)))*[}])\s*[}]\s*[{]?)|(\s*in(?:stanceof)?(?=[\/\d'"\[\s\(\{]))|((?:(?:\s+(?:in(?:stanceof)?)\s+)|\s*\b(?:delete|this|Infinity|NaN|void|do|else|case|default|return|var|continue|undefined|null|new|typeof|throw|br
eak|try|finally|true|false)\b\s*|\s*\b(?:if|else\s\s*if|with|while|for|switch|catch)\b\s*(?=[({]))|([,\{]\s*(?:(?:(?:[']|(?:\\{2}|\\[']|[^'])*[']))|(?:["](?:\\{2}|\\["]|[^"])*["]))|(?:[0][xX][0-9a-fA-F]*)|(?:[0]|[1-
9]\d+)?(?:[.]?\d+)+(?:[eE][+-]?\d+)?|(?:[a-zA-Z_$]|\\u[0-9a-fA-F]{4})(?:[\w$_]|\\u[0-9a-fA-
F]{4})*)\s*(?=[:]))|((?:(?:[']|(?:\\{2}|\\[']|[^'])*[']))|(?:["](?:\\{2}|\\["]|[^"])*["]))|((?:(?:[:]|(?:(?:^\s*|\s*$)|[,]|[;\n\r]+)|(?:[!]=]{0,2}|[%]=]?|[&]{1,2}|[&]=]|[*]=]?|[+]{1,2}|[+]=]|[\-]{1,2}|[\-
]=]|[\/]=]?|[<]{1,2}=]?|=]{1,3}|[>]{1,3}=]?|[^]=]?|[|]=]?|[|]{2}))|([)+)\s*(?:[\/](?:\[(?:\\[\]])+\]|\\[\/]|[^\/*])(?:\[(?:\\[\]]|[^\]])+|\\[\/]|[^\/])*?[\/](?:[a-zA-
Z]*)))\s*(?:(?:(?:^\s*|\s*$)|[,]|[;\n\r]+)|(?:[!]|[=]{0,2}|[%]=]?|[&]{1,2}|[&]=]|[*]=]?|[+]{1,2}|[+]=]|[\-]{1,2}|[\-
]=]|[\/]=]?|[<]{1,2}=]?|=]{1,3}|[>]{1,3}=]?|[^]=]?|[|]=]?|[|]{2}))|([)]+|(?=\s*[\[.\}\]]))|((?:[0][xX][0-9a-fA-F]*)|(?:[0]|[1-9]\d+)?(?:[.]?\d+)+(?:[eE][+-]?\d+)?)|(\s*[\[])|(\s*[\]])|(\s*(?:function\s*(?:(?:[a-zA-
Z_$]|\\u[0-9a-fA-F]{4})(?:[\w$_]|\\u[0-9a-fA-F]{4}))*)?\s*[({](?:\s*(?:[a-zA-Z_$]|\\u[0-9a-fA-F]{4})(?:[\w$_]|\\u[0-9a-fA-F]{4}))*\s*)?(?:[,]\s*(?:[a-zA-Z_$]|\\u[0-9a-fA-F]{4})(?:[\w$_]|\\u[0-9a-fA-
F]{4}))*\s*)*[)]\s*[{])|((?:@#[(])))|((?:[.]?\s*(?:[a-zA-Z_$]|\\u[0-9a-fA-F]{4})(?:[\w$_]|\\u[0-9a-fA-F]{4}))*))|([,;])|((?:[!]|[=]{0,2}|[%]=]?|[&]{1,2}|[&]=]|[*]=]?|[+]{1,2}|[+]=]|[\-]{1,2}|[\-
]=]|[\/]=]?|[<]{1,2}=]?|=]{1,3}|[>]{1,3}=]?|[^]=]?|[|]=]?|[|]{2}))|([}])/g

Questions?

/([\r\n]+)|(\s*for\s*[(]\s*(?:var\s+)?(?:[a-zA-Z_$]|\\u[0-9a-fA-F]{4})(?:[\w$_]|\\u[0-9a-fA-F]{4})*\s+in\s*(?:(?:(?:[']|(?:\\{2}|\\[']|[^'])*[']))|(?:["](?:\\{2}|\\["]|[^"])*["])|(?:[\/](?:\[(?:\\[\]]|[^\]])+\]|\\[\/]|[^\/*])(?:\[(?:\\[\]]|[^\]])+|\\[\/]|[^\/])*?[\/](?:[a-zA-Z]*)))*[)]|[{](?:.|(?:(?:[']|(?:\\{2}|\\[']|[^'])*[']))|(?:["](?:\\{2}|\\["]|[^"])*["]))|(?:[\/](?:\[(?:\\[\]]|[^\]])+\]|\\[\/]|[^\/*])(?:\[(?:\\[\]]|[^\]])+|\\[\/]|[^\/])*?[\/](?:[a-zA-Z]*)))*[}]\s*[)]\s*[{]?)|(\s*in(?:stanceof)?(?=[\^\d"'\[\s\(\{]))|((?:(?:\s+(?:in(?:stanceof)?)\s+)|\s*\b(?:delete|this|Infinity|NaN|void|do|else|case|default|return|var|continue|undefined|null|new|typeof|throw|break|try|finally|true|false)\b\s*|\s*\b(?:if|else\s\s*if|with|while|for|switch|catch)\b\s*(?=[({]))|([,\{]\s*(?:(?:(?:[']|(?:\\{2}|\\[']|[^'])*[']))|(?:["](?:\\{2}|\\["]|[^"])*["]))|(?:[0][xX][0-9a-fA-F]*)|(?:[0]|[1-9]\d+)?(?:[.]?\d+)+(?:[eE][+-]?\d+)?|(?:[a-zA-Z_$]|\\u[0-9a-fA-F]{4})(?:[\w$_]|\\u[0-9a-fA-F]{4})*)\s*(?=[:]))|((?:(?:[']|(?:\\{2}|\\[']|[^'])*[']))|(?:["](?:\\{2}|\\["]|[^"])*["]))|((?:(?:[:]|(?:(?:^\s*|\s*$)|[,]|[;\n\r]+)|(?:[!][=]{0,2}|[%][=]?|[&]{1,2}|[&][=]|[*][=]?|[+]{1,2}|[+][=]|[\-]{1,2}|[\-][=]|[\/][=]?|[<]{1,2}[=]?|[=]{1,3}|[>]{1,3}[=]?|[\^][=]?|[|][=]?|[|]{2}))|([)]+\s*(?:[\/](?:\[(?:\\[\]]|[^\]])+\]|\\[\/]|[^\/*])(?:\[(?:\\[\]]|[^\]])+|\\[\/]|[^\/])*?[\/](?:[a-zA-Z]*)))\s*(?:(?:(?:^\s*|\s*$)|[,]|[;\n\r]+)|(?:[!][=]{0,2}|[%][=]?|[&]{1,2}|[&][=]|[*][=]?|[+]{1,2}|[+][=]|[\-]{1,2}|[\-][=]|[\/][=]?|[<]{1,2}[=]?|[=]{1,3}|[>]{1,3}[=]?|[\^][=]?|[|][=]?|[|]{2}))|[)]+|(?=\s*[\[.\}\]]))))|((?:[0][xX][0-9a-fA-F]*)|(?:[0]|[1-9]\d+)?(?:[.]?\d+)+(?:[eE][+-]?\d+)?)|(\s*[\[])|(\s*[\]])|(\s*(?:function\s*(?:(?:[a-zA-Z_$]|\\u[0-9a-fA-F]{4})(?:[\w$_]|\\u[0-9a-fA-F]{4})*)?)\s*[(](?:\s*(?:[a-zA-Z_$]|\\u[0-9a-fA-F]{4})(?:[\w$_]|\\u[0-9a-fA-F]{4})*\s*)?(?:[,]\s*(?:[a-zA-Z_$]|\\u[0-9a-fA-F]{4})(?:[\w$_]|\\u[0-9a-fA-F]{4})*\s*)*[)]\s*[{])|((?:@#[()])|((?:[.]?\s*(?:[a-zA-Z_$]|\\u[0-9a-fA-F]{4})(?:[\w$_]|\\u[0-9a-fA-F]{4})*))|([,;])|((?:[!][=]{0,2}|[%][=]?|[&]{1,2}|[&][=]|[*][=]?|[+]{1,2}|[+][=]|[\-]{1,2}|[\-][=]|[\/][=]?|[<]{1,2}[=]?|[=]{1,3}|[>]{1,3}[=]?|[\^][=]?|[|][=]?|[|]{2}))|([{}])/g