Desugaring을 이용한 JavaScript 모듈 시스템

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Module System for JavaScript

Traditionally there was no module system for JavaScript, and every code runs in a global scope (which one cannot fully control). Consequently...

- JavaScript *module pattern* was emerged.
- Libraries frantically avoided frequently-used names like $.
- Subsets of JavaScript, like ADSafe, FBJS and Caja, were used to secure JavaScript from third parties.
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The result: EPIC FAIL.
“Official” Module System for JavaScript

Due to much demand, JavaScript is finally going to get a module system in the next major revision.

```javascript
module Math {
    export function sum(x, y) {
        return x + y;
    }
    export var pi = 3.141593;
}

module MathEx = require('http://example.com/mathex.js');

import Math.*;
import MathEx.gcd;
alert(sum(gcd(32, 48), pi));
```
Roads to a Formal Specification

JavaScript has been well known for its unusual semantics:

- There are strange scoping rules which allow the use of functions before their definitions.
- Modules retain this strange semantics, too.

In order to fully understand this module system we need a formal specification.
Our Work

We recently formalized the module system for JavaScript, in terms of desugaring rules from JavaScript with modules to the $\lambda_{JS}$ core language:

$$\text{desugar}[\text{stmt} \cdots] =$$

$$\text{let } (\text{$\$global = \text{ref } \{“Object”: \cdots, “Array”: \cdots, \cdots \}})$$

$$\text{let } (\text{$\Object = (\text{deref } \$global)[“Object”],}$$
$$\text{$\Array = (\text{deref } \$global)[“Array”], \cdots})$$

$$\text{let } (\text{this = $\$global})$$

$$\text{desugar}_I[\text{stmt} \cdots](\text{Env[stmt} \cdots]);$$

$$\text{desugar}_S[\text{stmt} \cdots](\text{Env}[\text{stmt} \cdots]);$$

$$\text{desugar}_R[\text{stmt} \cdots](\epsilon * \text{Env}[\text{stmt} \cdots]))$$
Future Work

- Implement and test our formalization in order to show its faithfulness; and
- Derive a practical desugaring of modules to plain JavaScript, not only to $\lambda_{JS}$