The JavaScript Language (Part 2)

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Objectives

- We will cover:
  - A subset of JavaScript…
  - That is appropriate for COS 333…
  - Through example programs

Agenda

- **Statements**
- Modules
- Objects

Statements

- See **euclidclient1.js**

```
$ node euclidclient1.js
Enter the first integer:
8
Enter the second integer:
12
gcd: 4
lcm: 24
$
```

Statements

Compound statement

```
{
    statement1;
    statement2;
    …
}
```

Statements

Variable definition statements

```
// ES6
let name = expr;
const name = expr;

// Pre-ES6
var name = expr; // name is "hoisted"
```

Aside: Hoisting

```
'use strict';
…
function f() {
    … // Not OK to use n here.
    let n = 5;
    … // OK to use n here.
}
```

```
'use strict';
…
function f() {
    … // OK to use n here.
    … // But its value is undefined.
    var n = 5;
    … // OK to use n here.
}
```

Statements

Function call statement

```
f(expr, expr, ...);
```

`return` statement

```
return;
return expr;
```

Statements

`if` statement

```
if (expr)
   statement;
else
   statement;
```

`false, 0, "", '', null, undefined, NaN` mean logical FALSE

Any other value indicates logical TRUE

Statements

`while` statement

```
while (expr)
    statement;
```

`false, 0, "", '', null, undefined, NaN` mean logical FALSE

Any other value indicates logical TRUE

Statements

`do`…`while` statement

```
do
   statement;
while (expr);
```

`false, 0, "", '', null, undefined, NaN` mean logical FALSE

Any other value indicates logical TRUE

Statements

`for` statements (by example)

```
for (let i = 0; i < 10; i++)
   statement;
for (let i = 0; i < someArray.length; i++)
   …someArray[i]…
for (let element of someArray)
   …element…
for (let property in someObject)
   …property…
```

Statements

`break` statement

```
break;
```

`continue` statement

```
continue;
```

Statements

`try` statement

```
try
    statement;
catch (exception)
    statement;
```

`throw` statement

```
throw object;
```

Agenda

- Statements
- **Modules**
- Objects

Modules

- Kinds of JavaScript modules
  - **ES6** modules
    - Used in (recent) browsers
    - Shown later
  - **Node.js** modules
    - Used by Node.js
    - Shown now…

Modules

- See **euclid2.js** and **euclidclient2.js**

```
$ node euclidclient2.js
Enter the first integer:
8
Enter the second integer:
12
gcd: 4
lcm: 24
$
```

Agenda

- Statements
- Modules
- **Objects**

Objects

- Object definition

```
let someobj = {
    property1: value1,
    property2: value2,
    …
}
```

Objects

- See **fraction1.js**, **fraction1client.js**

```
$ node fraction1client.js
Numerator 1: 1
Denominator 1: 2
Numerator 2: 3
Denominator 2: 4
f1: 1/2
f2: 3/4
f1 is not identical to f2
f1 is less than f2
-f1: -1/2
f1 + f2: 5/4
f1 - f2: -1/4
f1 * f2: 3/8
f1 / f2: 2/3
$
```

Objects

- **Problem**
  - Instead of calling functions:
    - `f3 = fraction.add(f1, f2);`
  - We want to send messages:
    - `f3 = f1.add(f2);`
- **Solution**
  - The value of an object property can be a function definition…

Objects

- See **fraction2.js**, **fraction2client.js**

```
$ node fraction2client.js
Numerator 1: 1
Denominator 1: 2
Numerator 2: 3
Denominator 2: 4
f1: 1/2
f2: 3/4
f1 is not identical to f2
f1 is less than f2
-f1: -1/2
f1 + f2: 5/4
f1 - f2: -1/4
f1 * f2: 3/8
f1 / f2: 2/3
$
```

Objects

- **Problem**:
  - Space inefficiency…

Objects

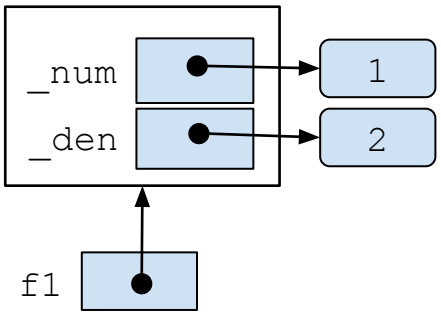
In Python

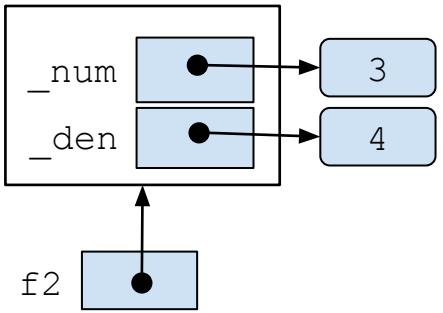
```
f1 = Fraction(1, 2)
f2 = Fraction(3, 4)
```

```
add(self, other):
    …
```

```
sub(self, other):
    …
```

…





Explicit `self` parameter allows `Fraction` objects to share same function defs

Objects

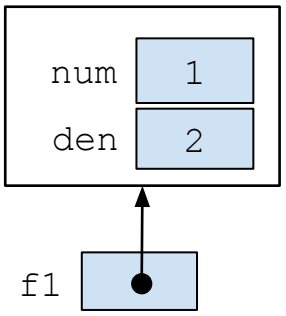
```
Fraction f1 = new Fraction(1, 2);
Fraction f2 = new Fraction(3, 4);
```

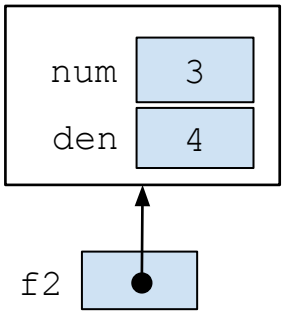
In Java

```
add(this, other)
{…}
```

```
sub(this, other)
{…}
```

…



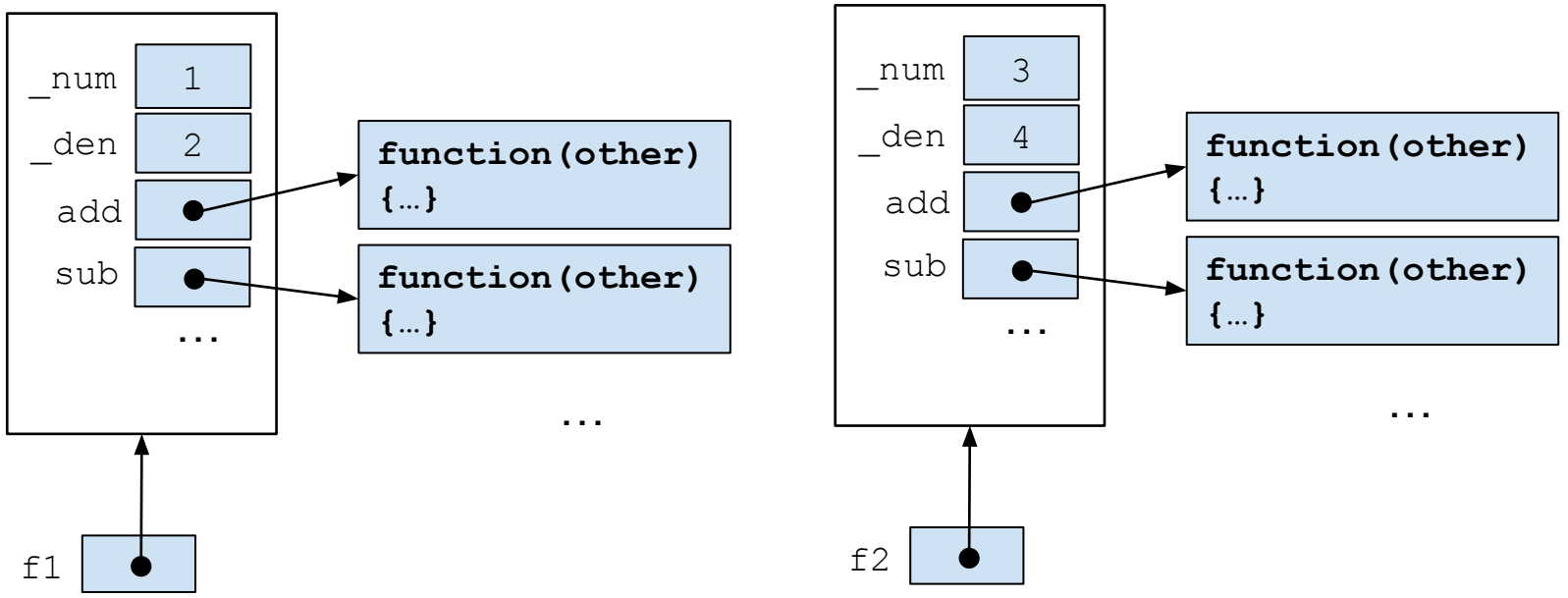


Implicit `this` parameter allows `Fraction` objects to share same method defs

Objects

```
let f1 = createFraction(1, 2);
let f2 = createFraction(3, 4);
```

In JavaScript (so far)



Lecture Summary

- In this lecture we covered:
  - Statements
  - Modules
  - Objects