

Smalltalk & JavaScript Kernels Alignment for Transpilation



Noury Bouraqadi & Dave Mason



IMT Nord Europe
École Mines-Télécom
IMT-Université de Lille

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Motivation: Leverage the JS Ecosystem

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JS Libraries

JS Runtime

Approach: Develop in STK, Run on JS

Stk

Transpiler

Generated JS

JS Libraries

JS Runtime



Goal: Developer Thinks in STK Only!

Stk

Transpiler

Generated JS

JS Libraries

JS Runtime



Problem: Kernel Misalignments

- Different Core Libraries
 - Class Hierarchies
 - Methods
- Different Kernel Metaclasses
 - Class – Instance incompatibility

Examples of Core Library Differences

STK

- Date, Time, TimeZone...
- SmallInteger, Float64, Fraction...
- Array, OrderedCollection
 - First index 1
- String vs Character
- ...

JS

- Date
- Number
- .
- Array
 - First index 0
- String
- ...<<<<<<<

PharoJS Solution

- Map multiple **STK** classes to **JS**
 - **Array** + **OrderedCollection** => **Array**
 - **Float** + **SmallInteger** + ... => **Number**
 - ...
- Extend **JS** classes with **STK** methods

Including inherited methods!

- E.g. Inject into **Array** in **JS**
 - **Collection** >> **#asSet #asOrdered #inject:into: #detect:ifNone: ...**
 - **SequenceableCollection** >> **#withIndexDo: #allButFirst ...**

JavaScript Background from Prototypes to Classes

JavaScript Prototypes

- Object Properties can be methods or values

```
let x = {  
    plusOne: function(arg) { return arg + 1; }  
}
```

- Prototype-based Inheritance

```
let y = {};  
  
y.__proto__ = x;  
  
y.plusOne(2026); // → 2027
```

JavaScript Classes are Built on Prototypes

```
class Demo {  
    b(arg) { return arg + 1 }  
}
```

```
y = new Demo();
```

```
y.__proto__ === Demo.prototype; // → true
```

```
Object.hasOwn(Demo.prototype, "b"); // → true
```

JavaScript Classes are Prototypes

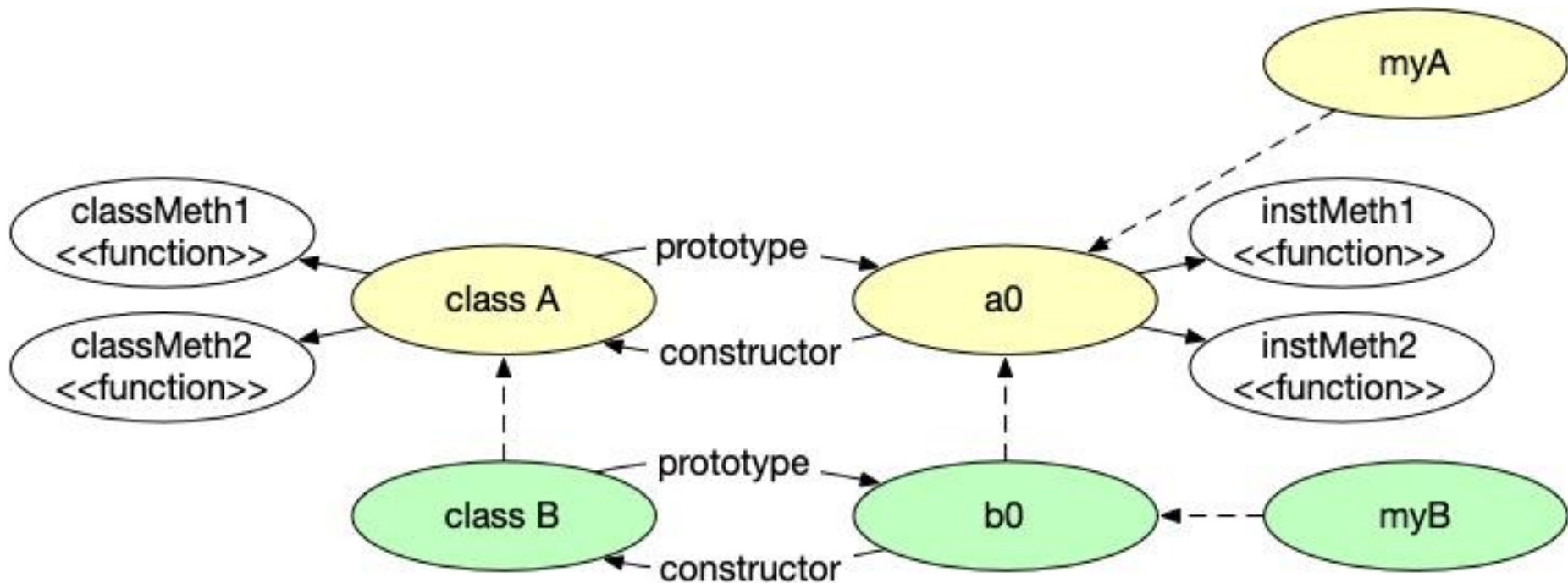
```
class A {  
    static sayHi(name) { return "Hello " +  
name); }  
}
```

```
class B extends A {}
```

```
B.sayHi("IWST"); // → "Hello IWST"
```

```
B.__proto__ === A; // → true
```

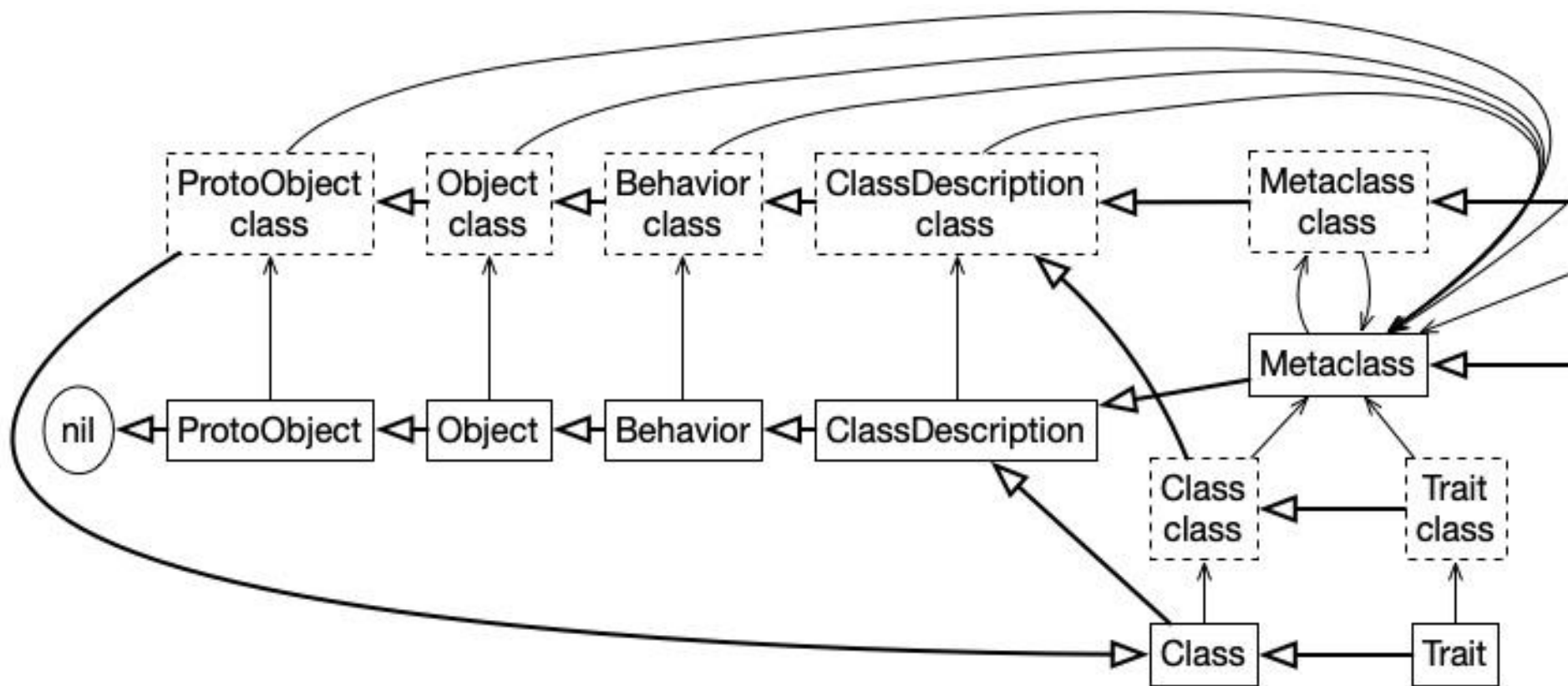
JavaScript Classes, Instances & Prototypes



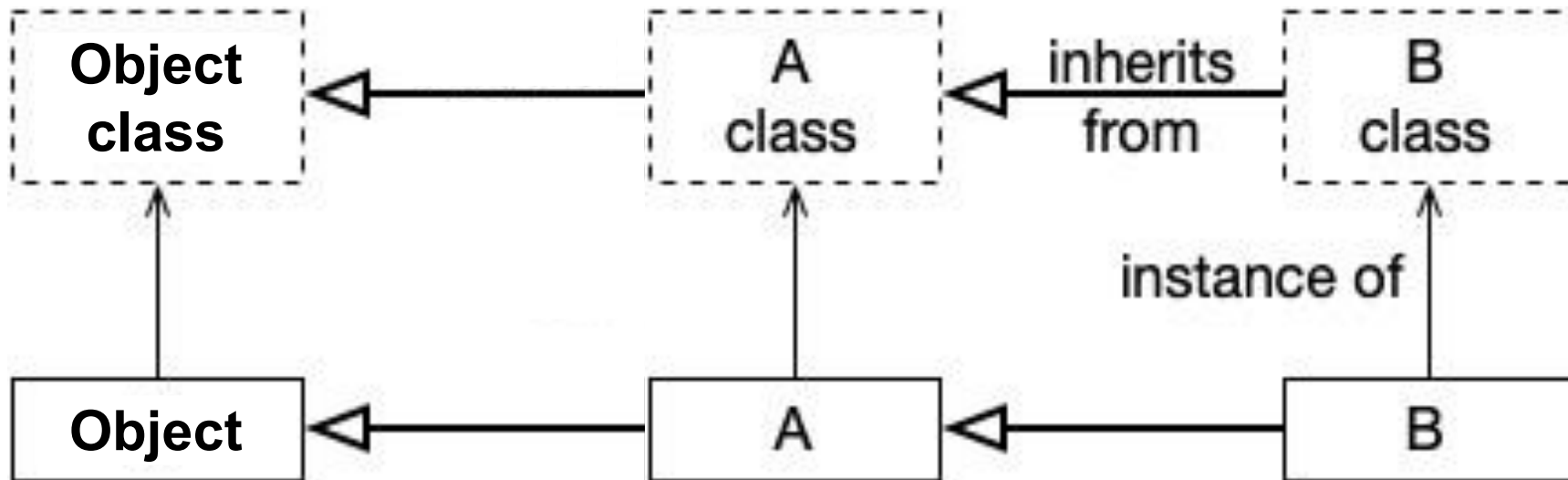
Kernels Comparison

Pharo Smalltalk Kernel Metaclasses

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Smalltalk Parallel Inheritance



Parallel Inheritance => Class-Instance Compatibility

A class >> #specialNew

^self new

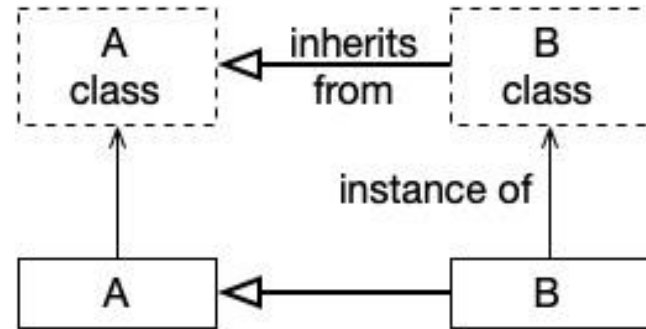
doSomething;

yourself

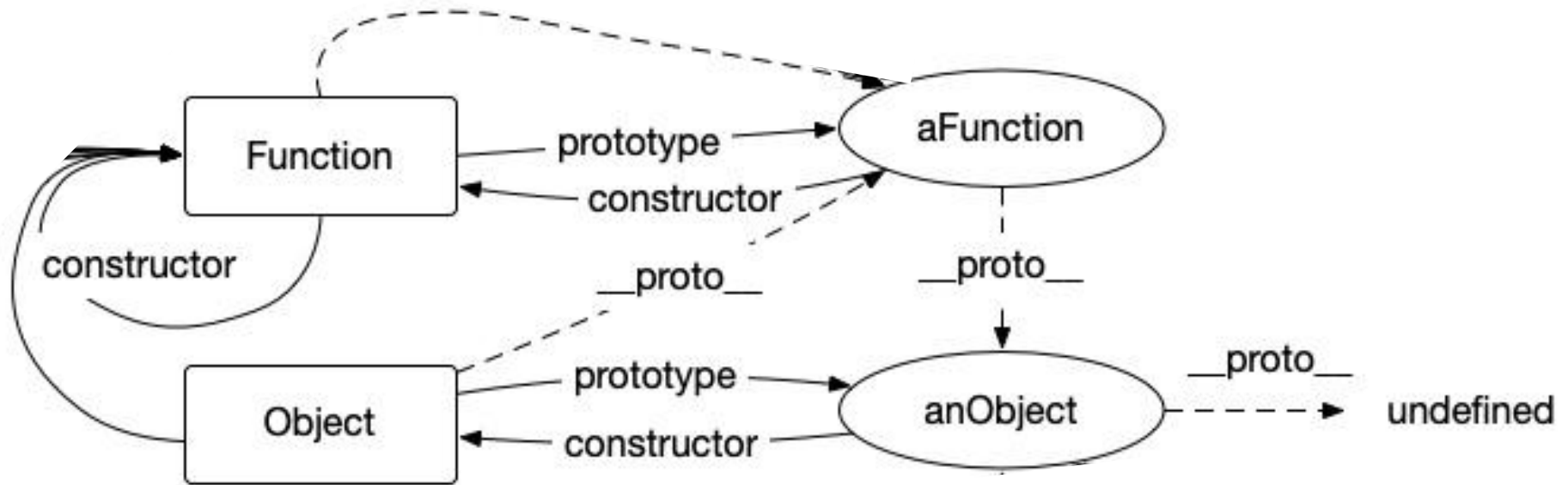
A >> #doSomething

"..."

B specialNew "→ Success: new special instance of B"



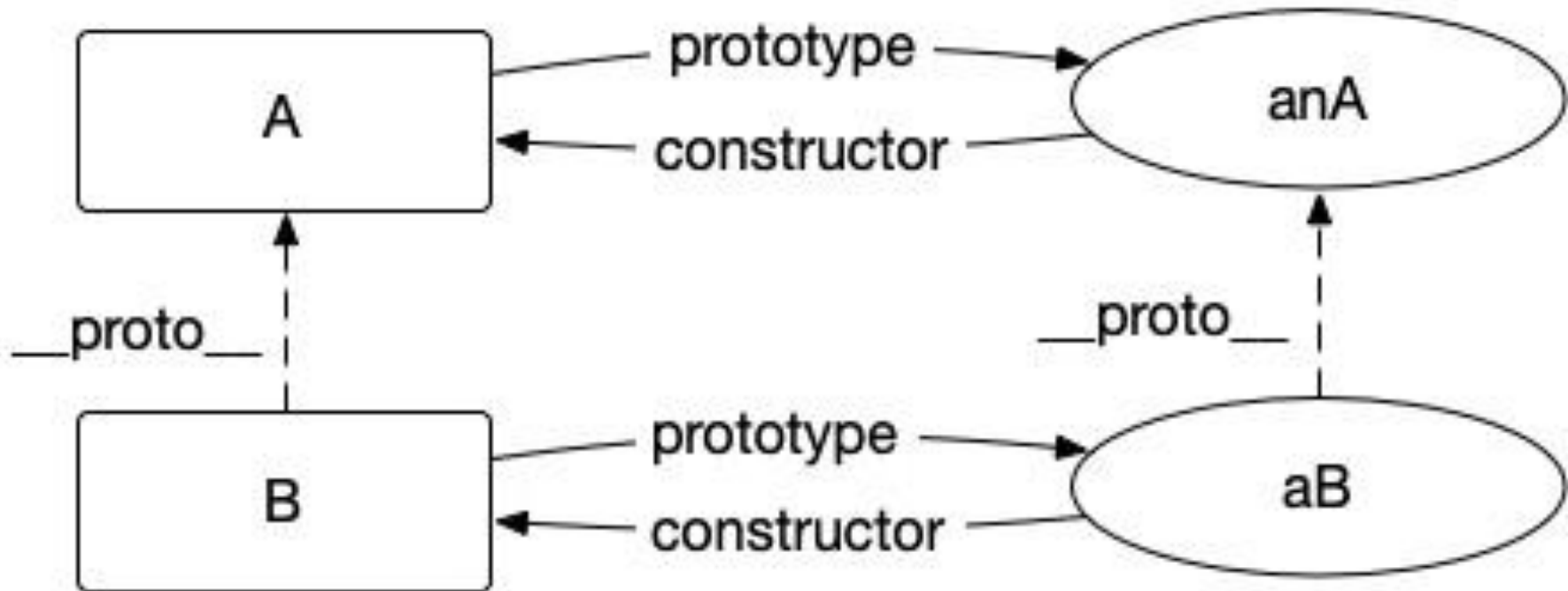
Javascript Kernel Metaclasses



Classes are functions !!!

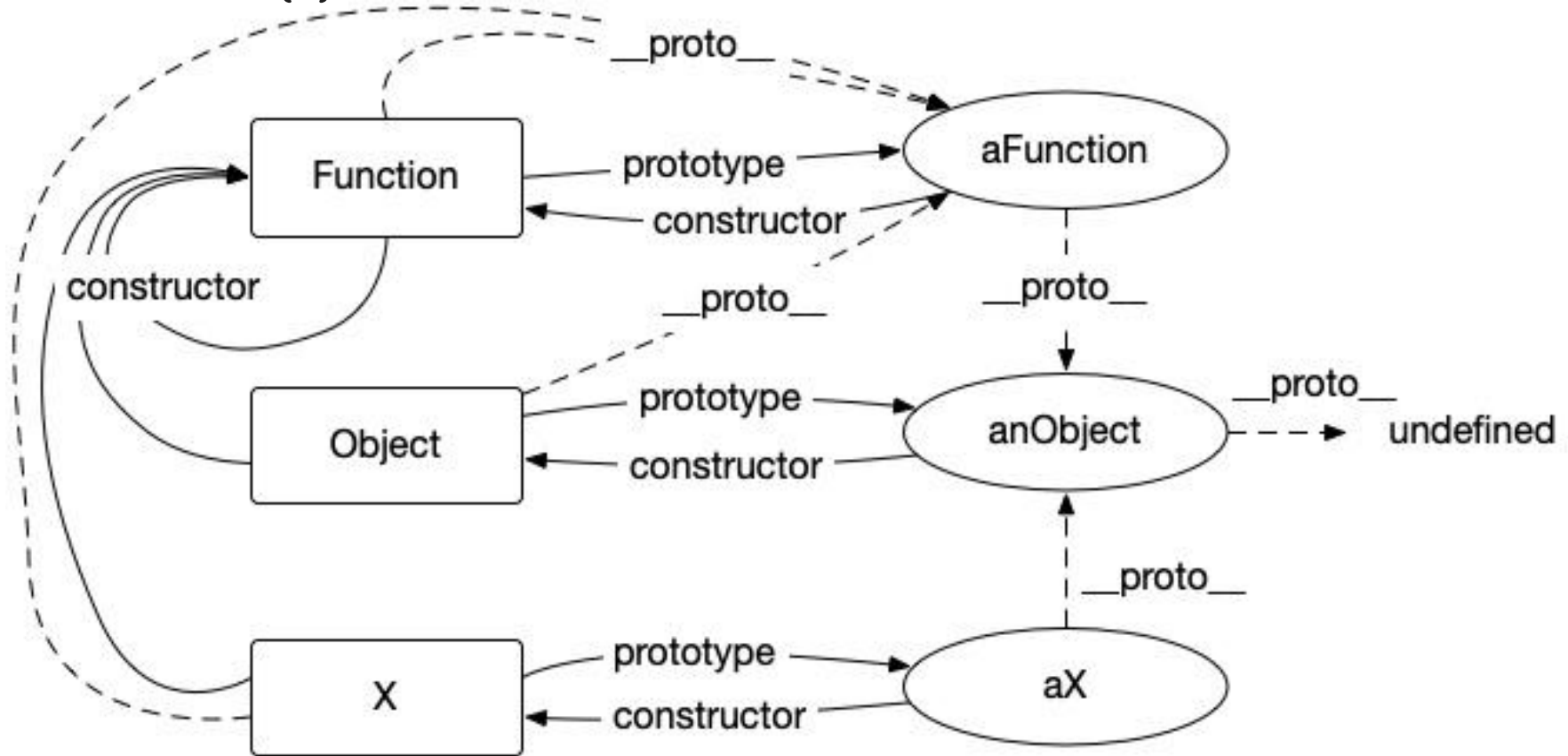
JavaScript Enables Parallel Inheritance

```
class B extends A { }
```



JavaScript Easily Breaks Parallel Inheritance

```
class X{ }
```

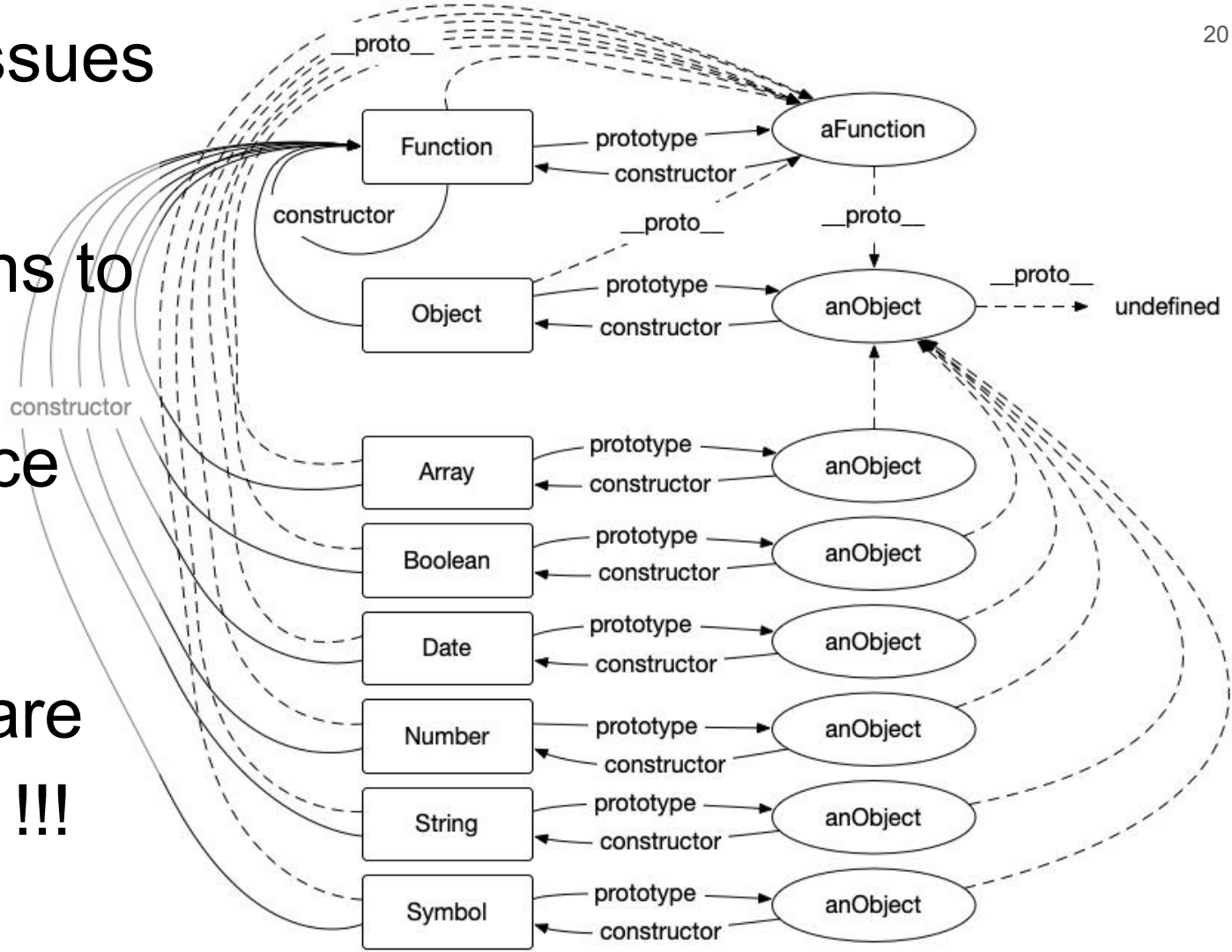


JS Kernel Issues

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- Exceptions to Parallel Inheritance

- Classes are functions !!!

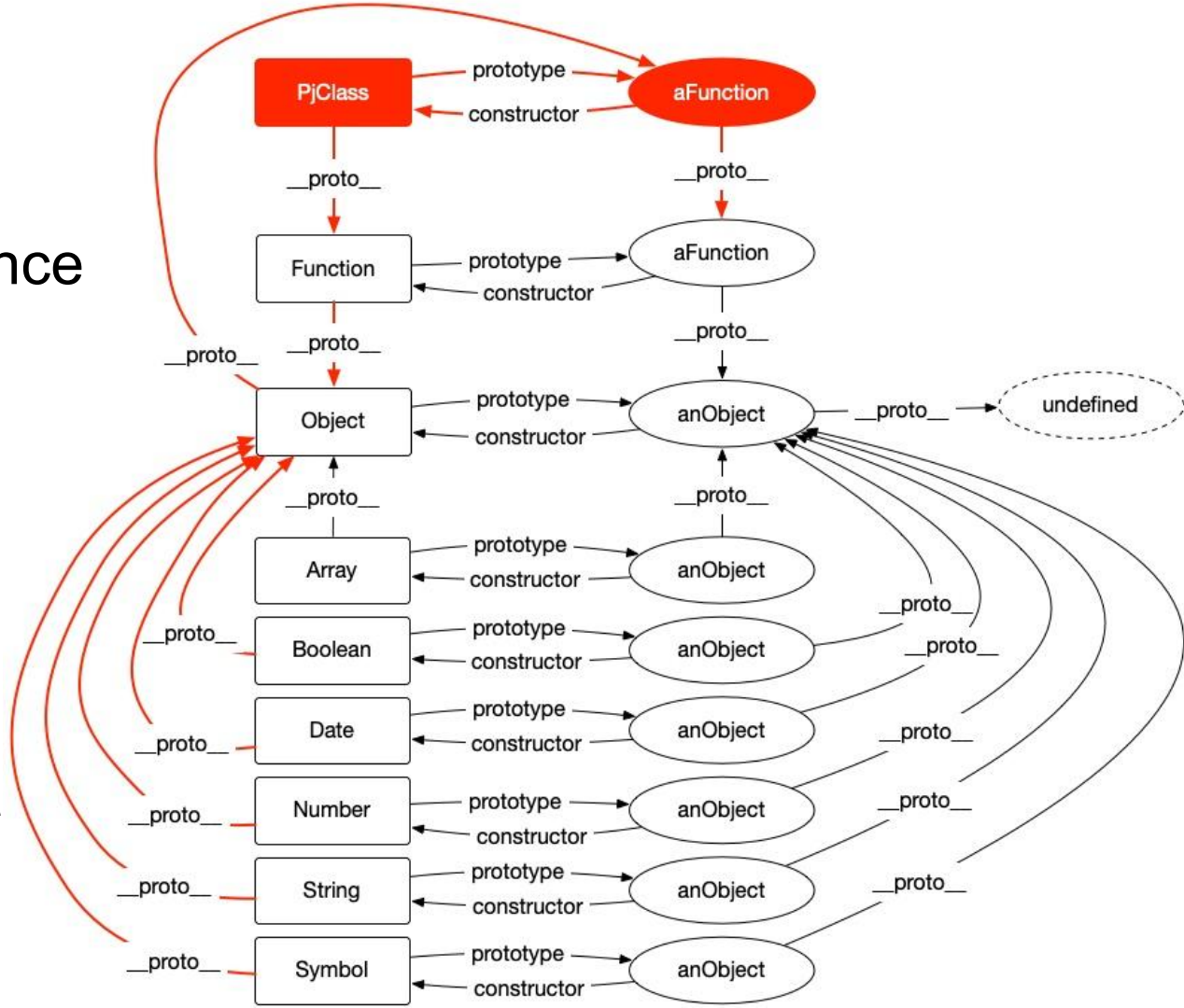


PharoJS Solution

1. Parallel Inheritance

2. Metaclass for classes only

3. Function as root metaclass



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THE Question!



match
who will you be
rooting for?



vs

match

who will you be
rooting for?



[1]

