Call-target-specific Method Arguments
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Overview

Introduction

- Goal: make method calls faster.
- How to: prepare arguments for method calls at call site.
- Running example: keyword arguments in JRuby –¿ twice as fast

Overview

Introduction

Concept

Example: Ruby Keyword Arguments

Implementation Details

Benchmarks

Argument Mismatch

method signature $\neq$ call arguments

```
def method(a: 0, b: 0, c: 0)

end

method(a: 1, b: 2, c: 3)

method(b: 1, a: 2)
method(c: 4)
method()
```
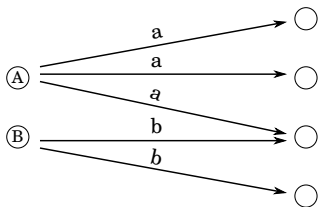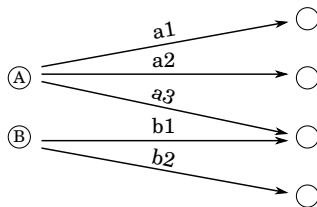
When to Convert Arguments?

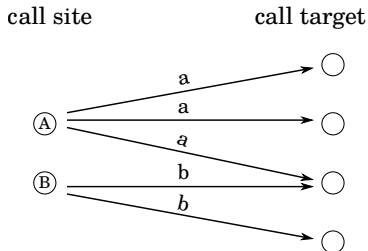**convert after invoke:**

call site   call target

convert before invoke:

call site   call target

When to Convert Arguments?

convert after invoke:

call site — call target

convert before invoke:

call site — call target

1. Convert args to generic repres.
2. Lookup receiver
3. Invoke target method
4. Convert args to specific repres.
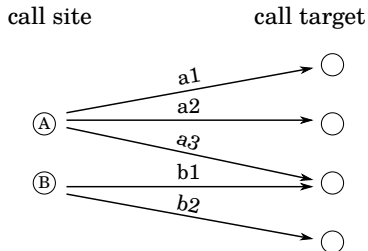
1. Lookup receiver
2. Convert args to specific repres.
3. Invoke target method

Overview

Convert After Invocation: Call-site-specific Arguments

Generate generic
representation:
`{a: 1, b: 2}`

↓

Lookup method:
`A.method`

↓

Invoke method:
`A.method`

↓

Convert to spec.
representation:
```
a := 1
b := 2
c := 20
```

```ruby
def A.method(b: 10, c: 20, a: 30)
end

obj.method(a: 1, b: 2)
```

Convert Before Invocation: Call-target-specific Arguments

```
┌─────────────────────┐
│   Lookup method     │
└─────────────────────┘
          │
          │  A.method
          ▼
┌─────────────────────┐
│ Convert to spec.    │
│ representation:     │
│     b := 2          │
│     c := (/)        │
│     a := 1          │
└─────────────────────┘
          │
          ▼
┌─────────────────────┐
│  Invoke method:     │
│     A.method        │
└─────────────────────┘
```
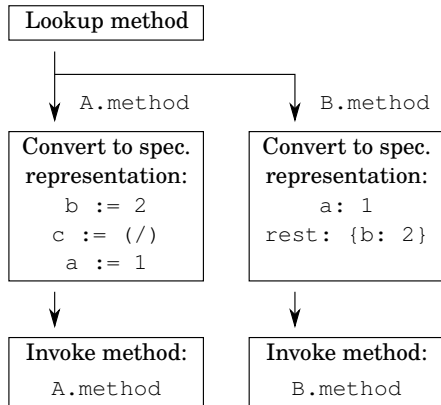
```ruby
def A.method(b: 10, c: 20, a:
    30)
end

obj.method(a: 1, b: 2)
```

Convert Before Invocation: Call-target-specific Arguments

```
┌─────────────────┐
│  Lookup method  │
└─────────────────┘
    │           │
  A.method    B.method
    ▼           ▼
┌─────────────┐ ┌─────────────┐
│Convert to   │ │Convert to   │
│spec.        │ │spec.        │
│representation:│ │representation:│
│   b := 2    │ │   a: 1      │
│   c := (/)  │ │ rest: {b: 2}│
│   a := 1    │ │             │
└─────────────┘ └─────────────┘
    │               │
    ▼               ▼
┌─────────────┐ ┌─────────────┐
│Invoke method:│ │Invoke method:│
│  A.method   │ │  B.method   │
└─────────────┘ └─────────────┘
```
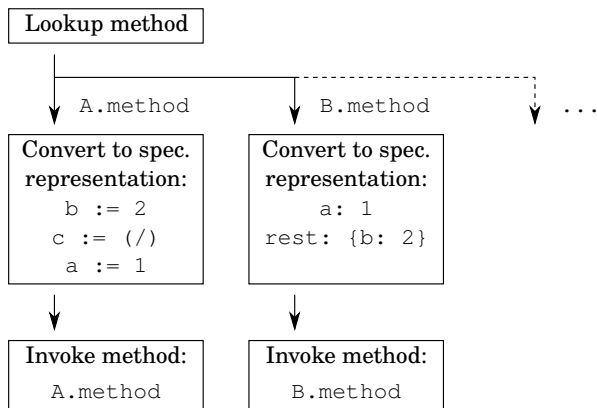
```ruby
def A.method(b: 10,
    c: 20, a: 30)
end

def B.method(a:, **
    rest)
end

obj.method(a: 1, b:
    2)
```

Convert Before Invocation: Call-target-specific Arguments

Call-target-specific Method Arguments

- Code/AST for generating arguments representation depends on call target.
- We cache one AST subtree generating the arguments array per PIC entry.
- Call-target-specific argument handling is part of the PIC.

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Micro-Benchmarks