Inside Adapton

The Demanded Computation Graph (DCG)

https://docs.rs/adapton/0.3.0/adapton/macros/index.html#demand-driven-change-propagation

```
#[test]
fn avoid_divide_by_zero () {
    use adapton::macros::*;
    use adapton::engine::*;
    manage::init_dcg();

    // Construct two mutable inputs, `num` and `den`, a
    // computation `div` that divides the numerator in `num` by
    // the denominator in `den`, and a thunk `check` that first
    // checks whether the denominator is zero (returning None if
    // so) and if non-zero, returns the value of the division.

    let num  = cell!(42);
    let den  = cell!(2);

    // In Rust, cloning is explicit:
    let den2 = den.clone(); // here, we clone the _global reference_ to the cell.
    let den3 = den.clone(); // here, we clone the _global reference_ to the cell, again.

    let div   = thunk![ get!(num) / get!(den) ];
    let check = thunk![ if get!(den2) == 0 { None } else { Some(get!(div)) } ];

    assert_eq!(get!(check), Some(21));
    set(&den3, 0); assert_eq!(get!(check), None);
    set(&den3, 2); assert_eq!(get!(check), Some(21));
}
```

num

42

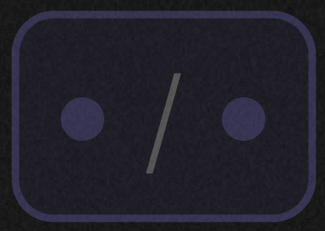
den

2

Allocate input cells

```
let num = cell(42)
let den = cell(2)
let div = thunk [
  get(num) / get(den)
 ]
let check = thunk [
  if get(den) == 0
  then None
  else Some(get(div))
 ]

get(check)
set(den, 0); get(check)
set(den, 2); get(check)
```



check

```
if • == 0
then  None
else Some(•)
```

num

42

den

2

Allocates thunks …

• / • **div**

check

if • == 0
then None
else Some(•)

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let den = cell(2)
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num

42

den

2

• / •

div

check

if • == 0
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```

Demand output, mutate inputs

num

42

den

2

• / •

div

check

if • == 0
then None
else Some(•)

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let num = cell(42)
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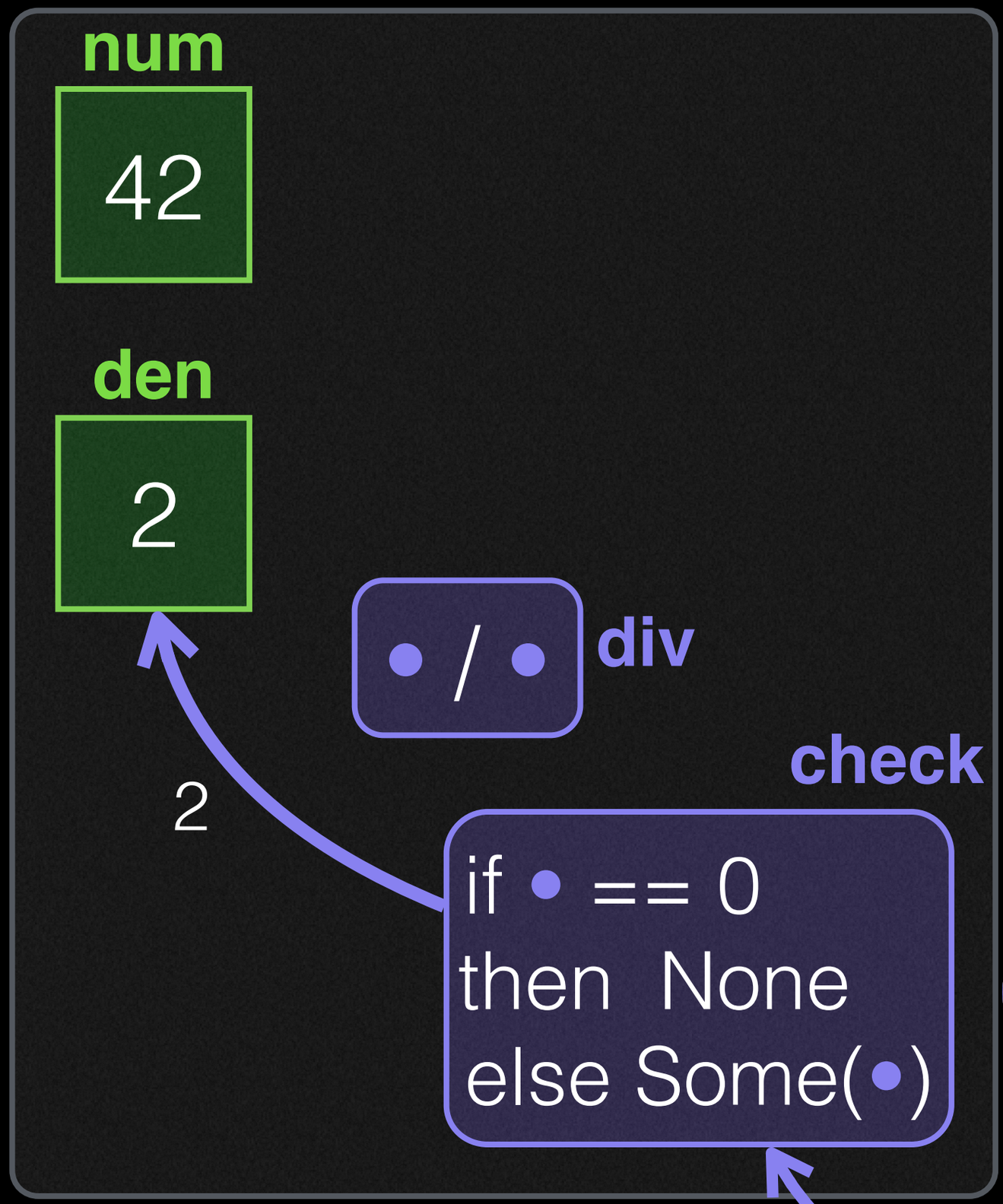
root

From-scratch evaluation

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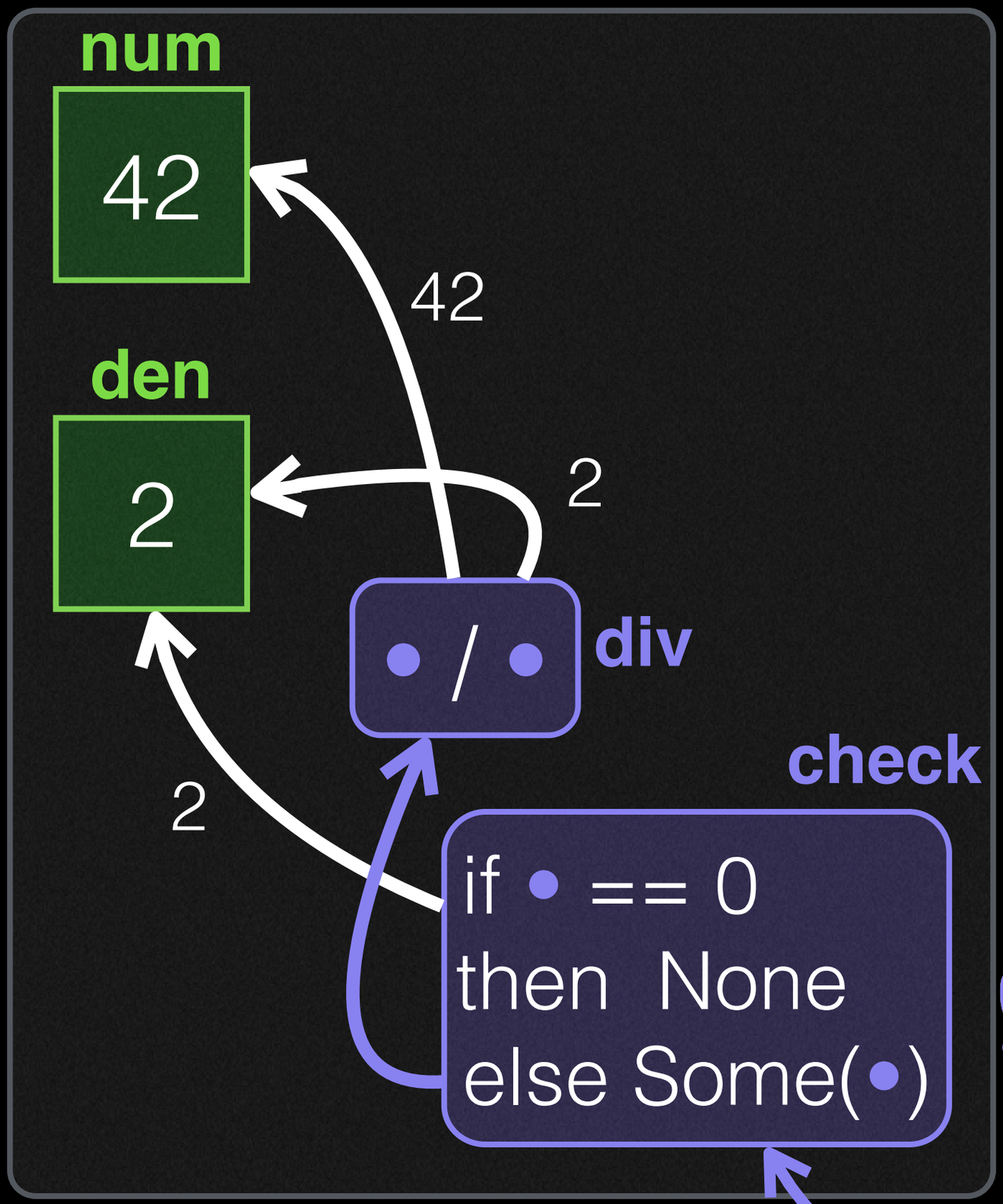


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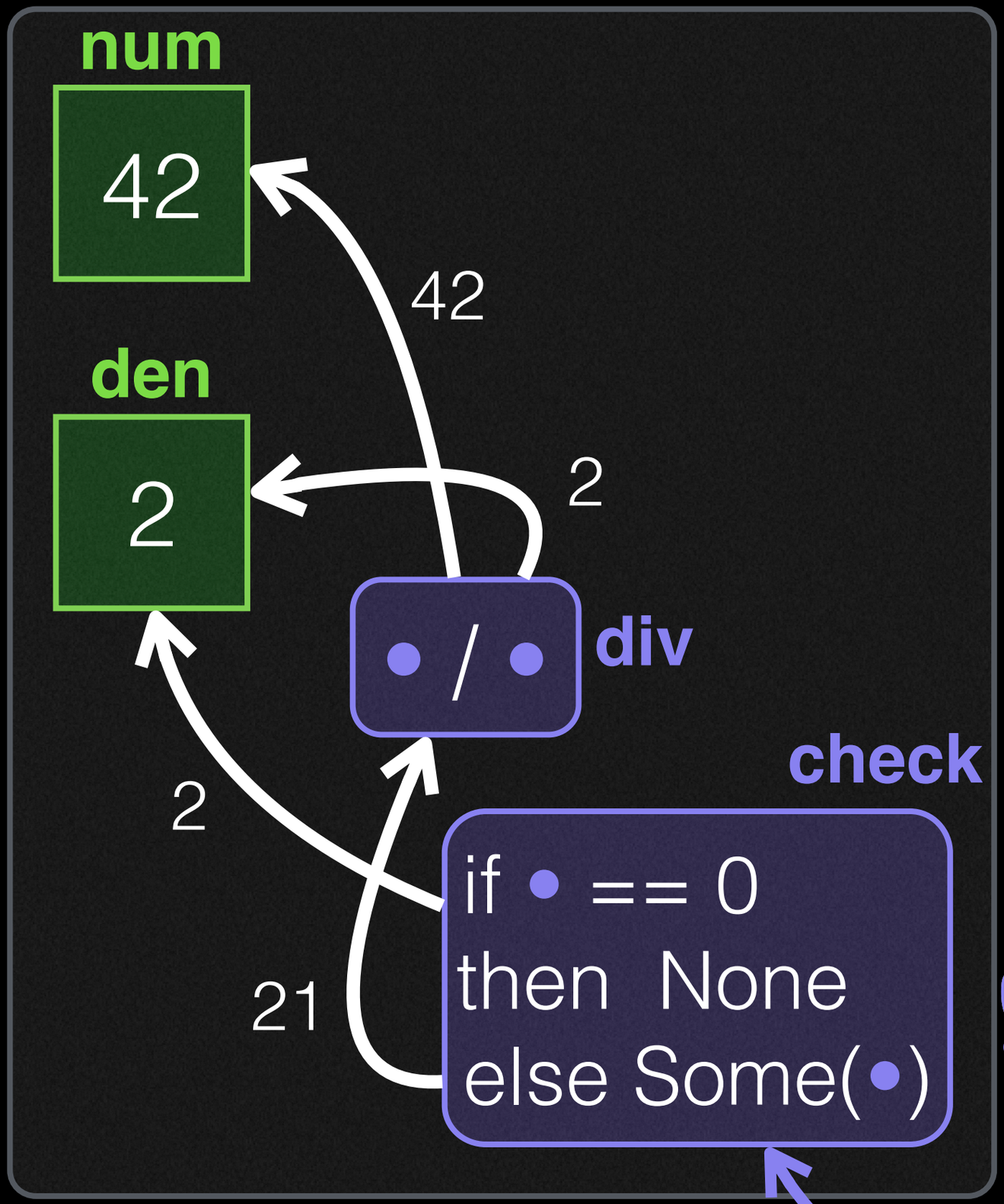


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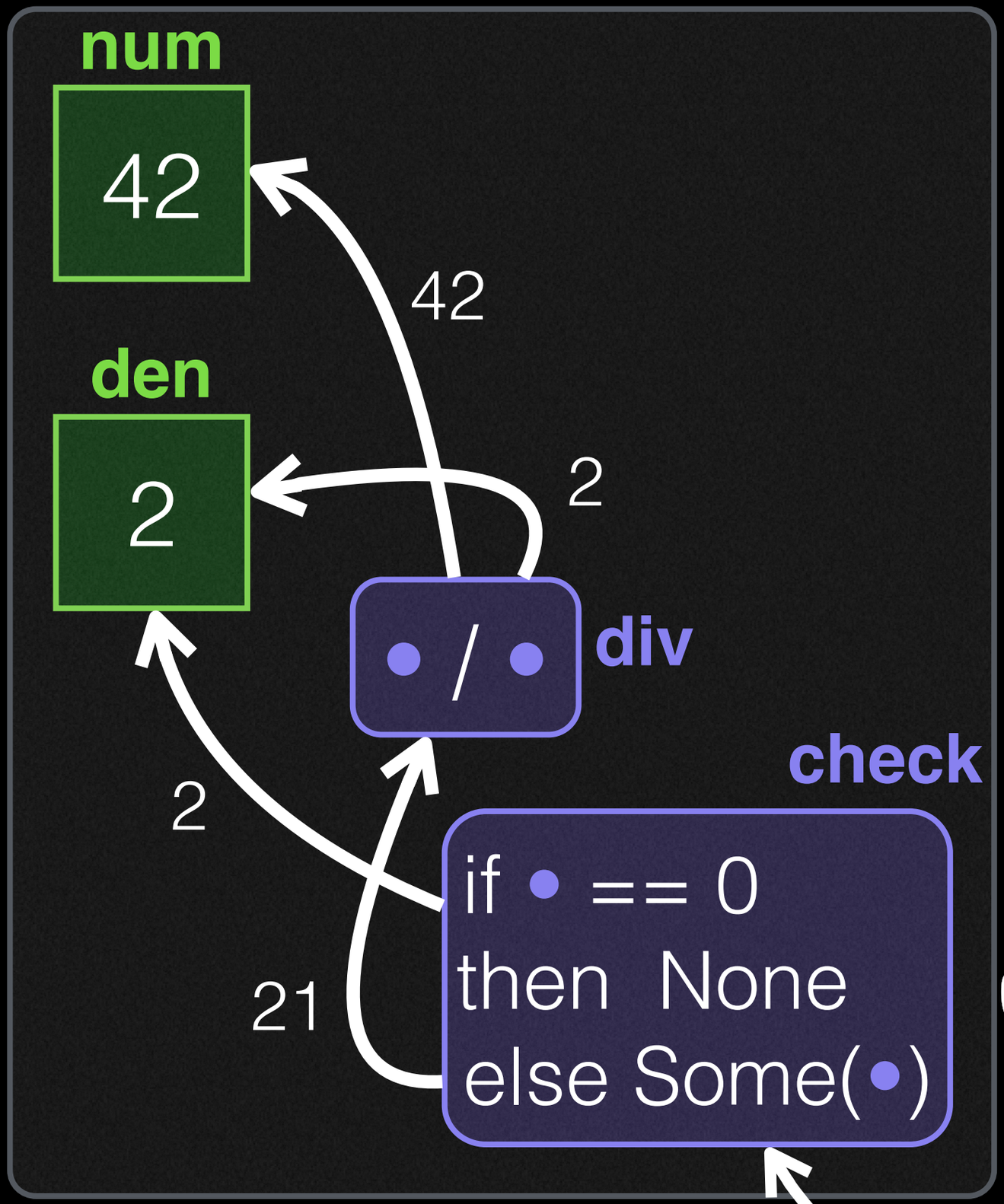


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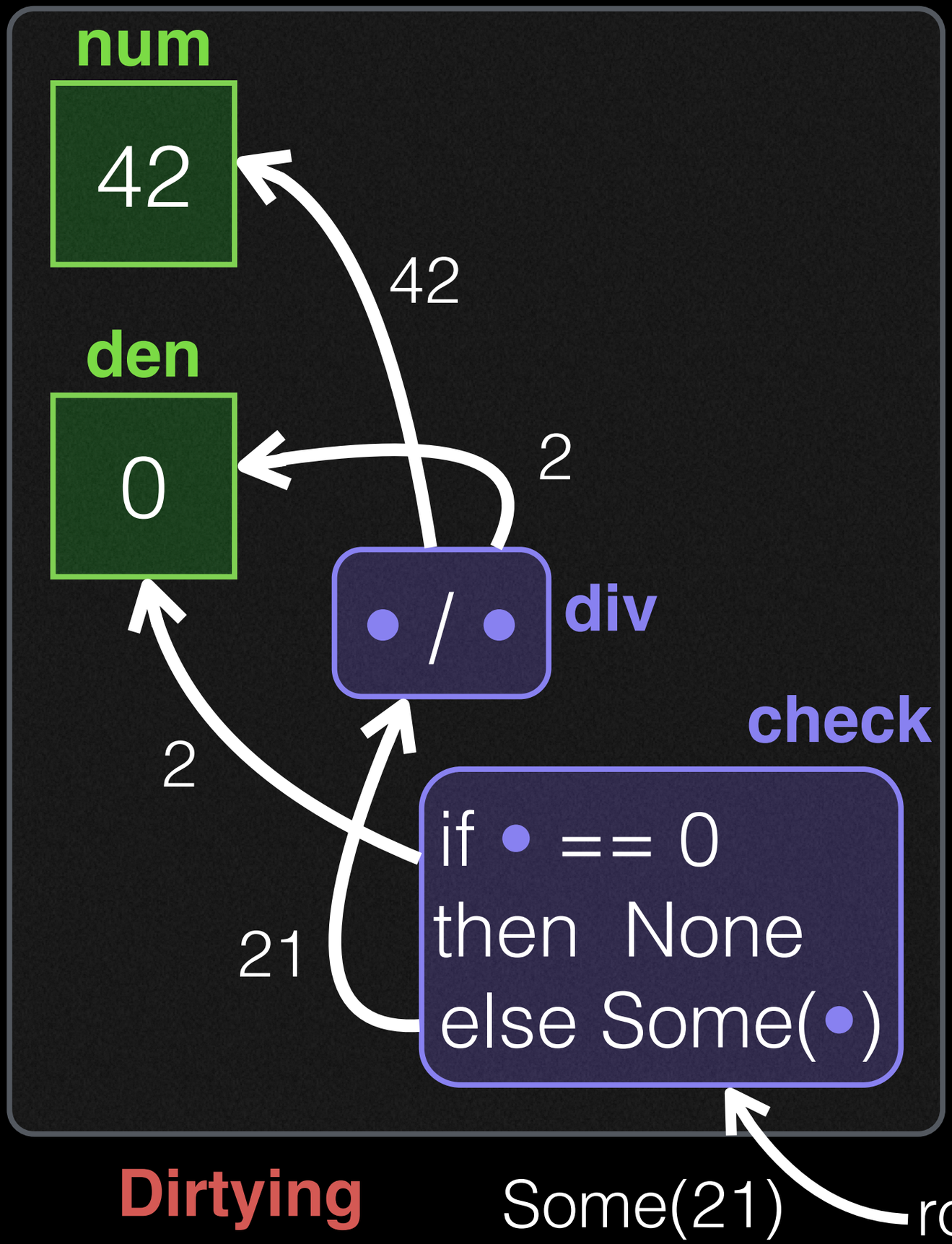


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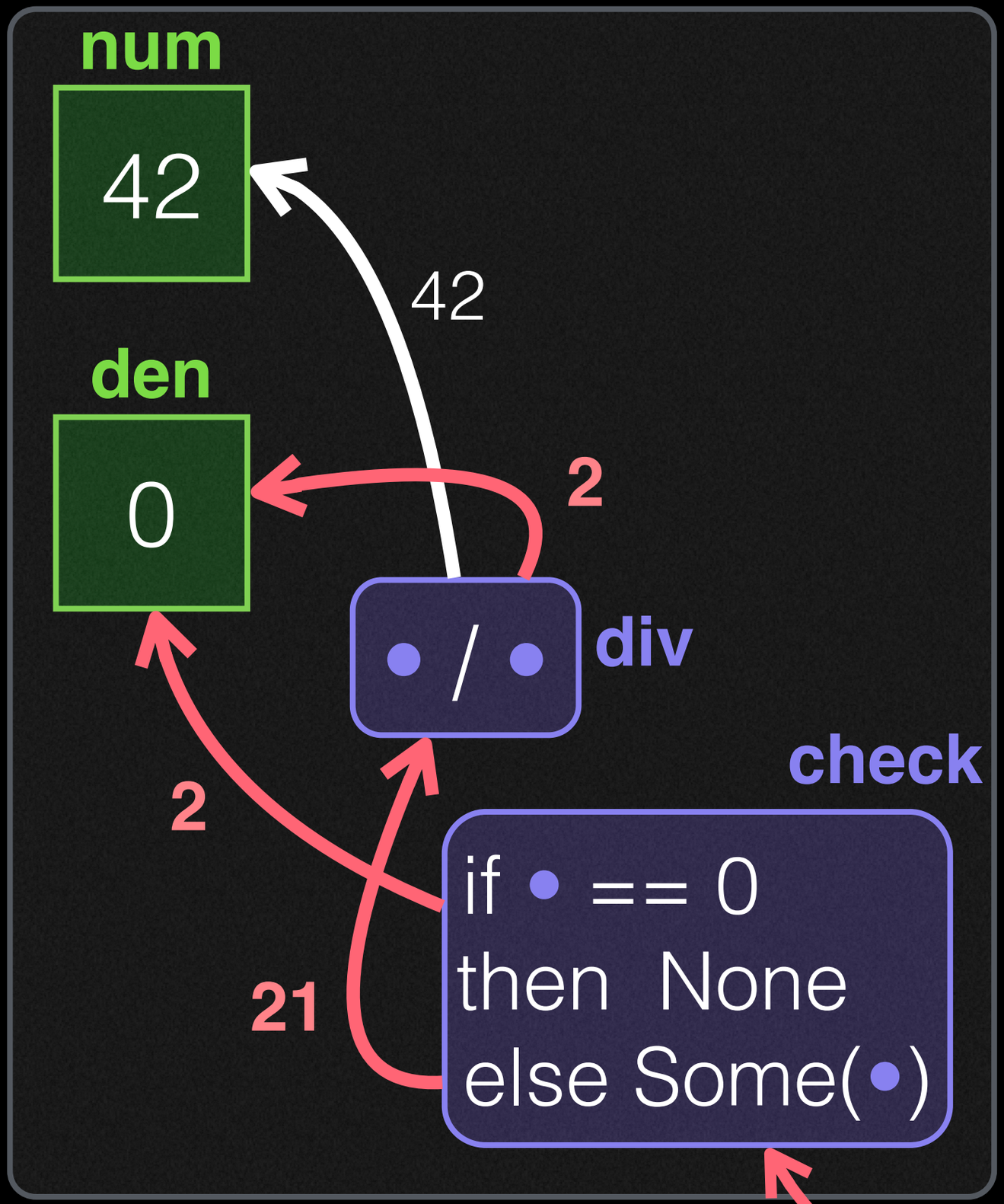


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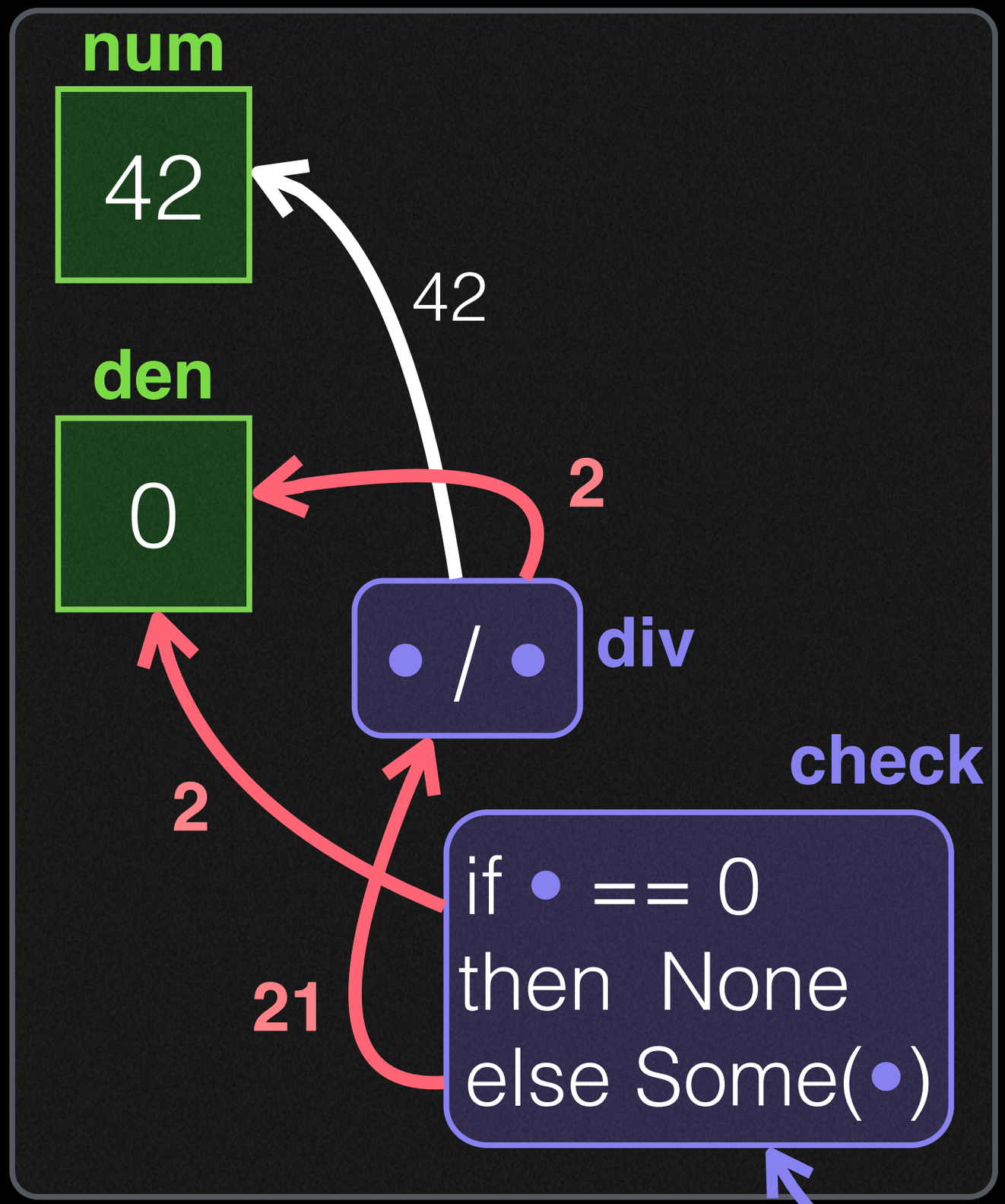


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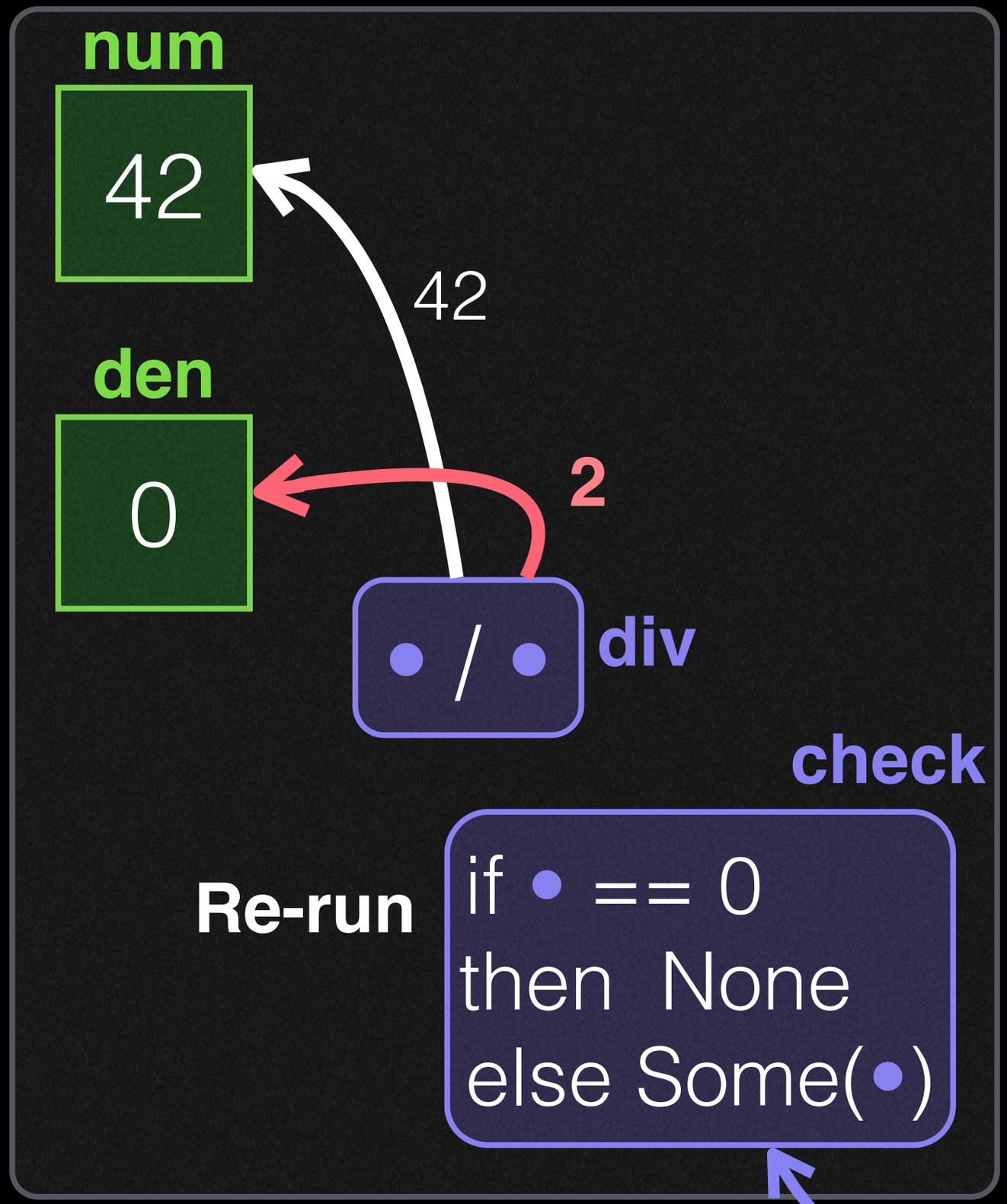
Change propagation (transitive cleaning)

root

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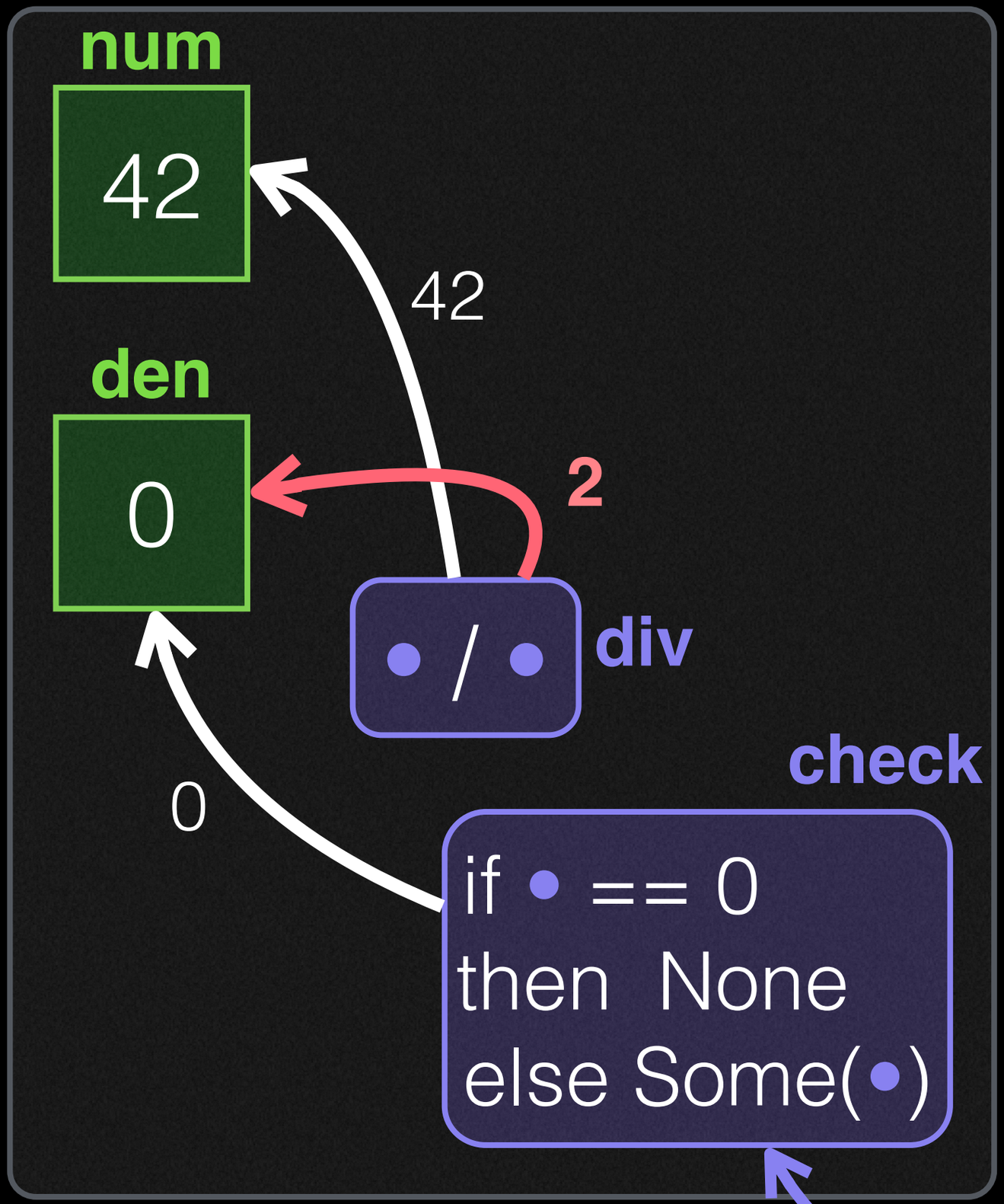


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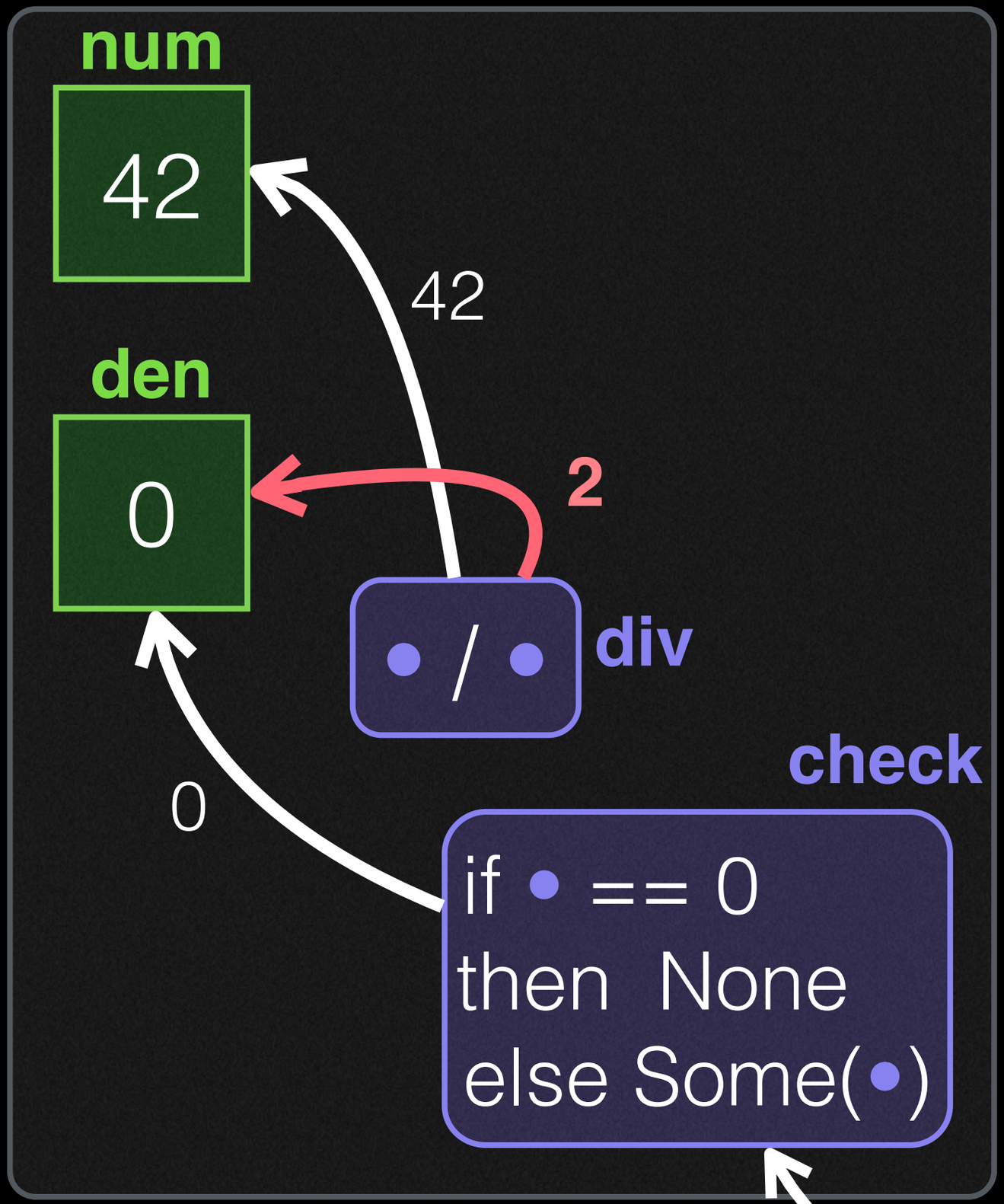


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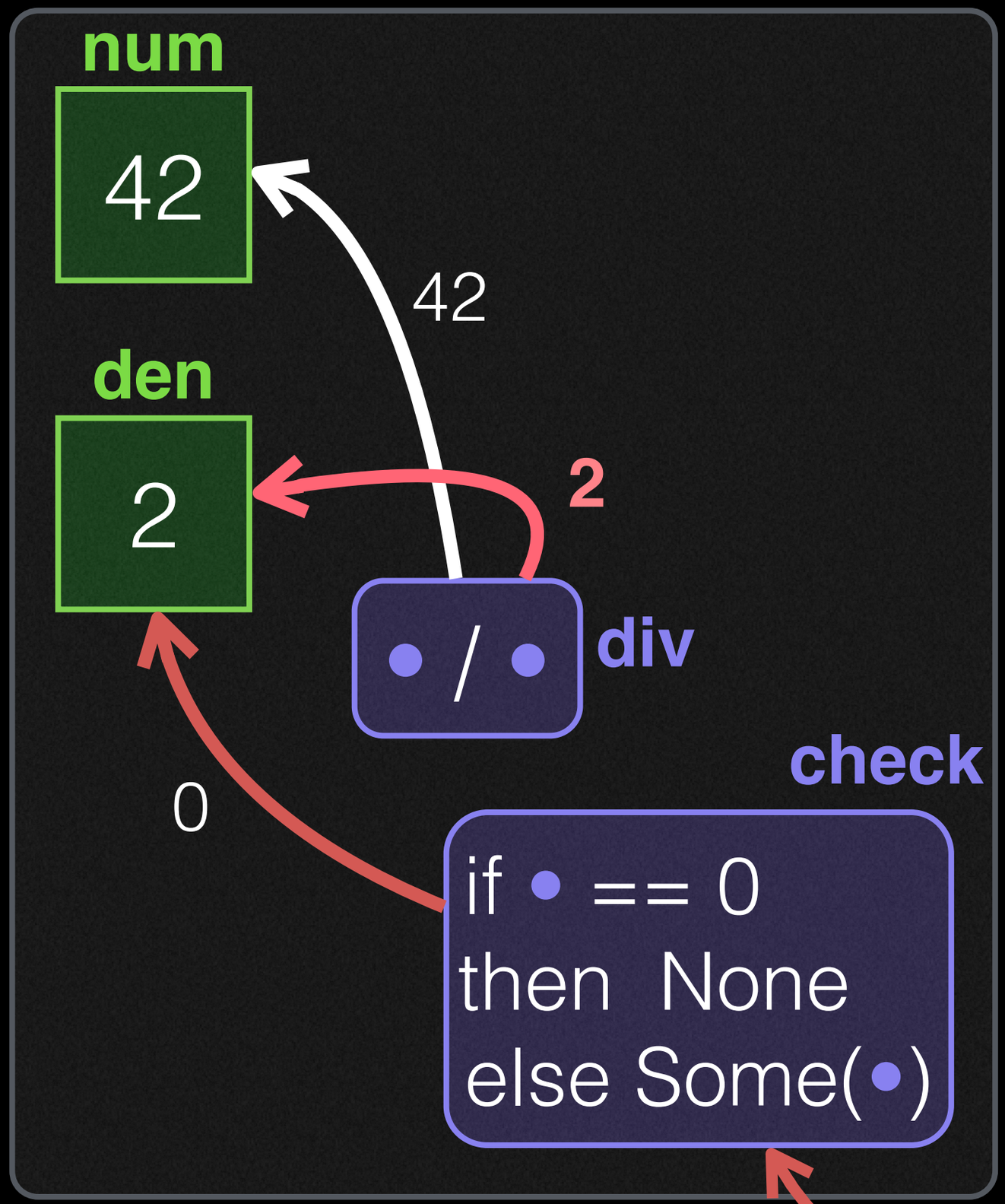


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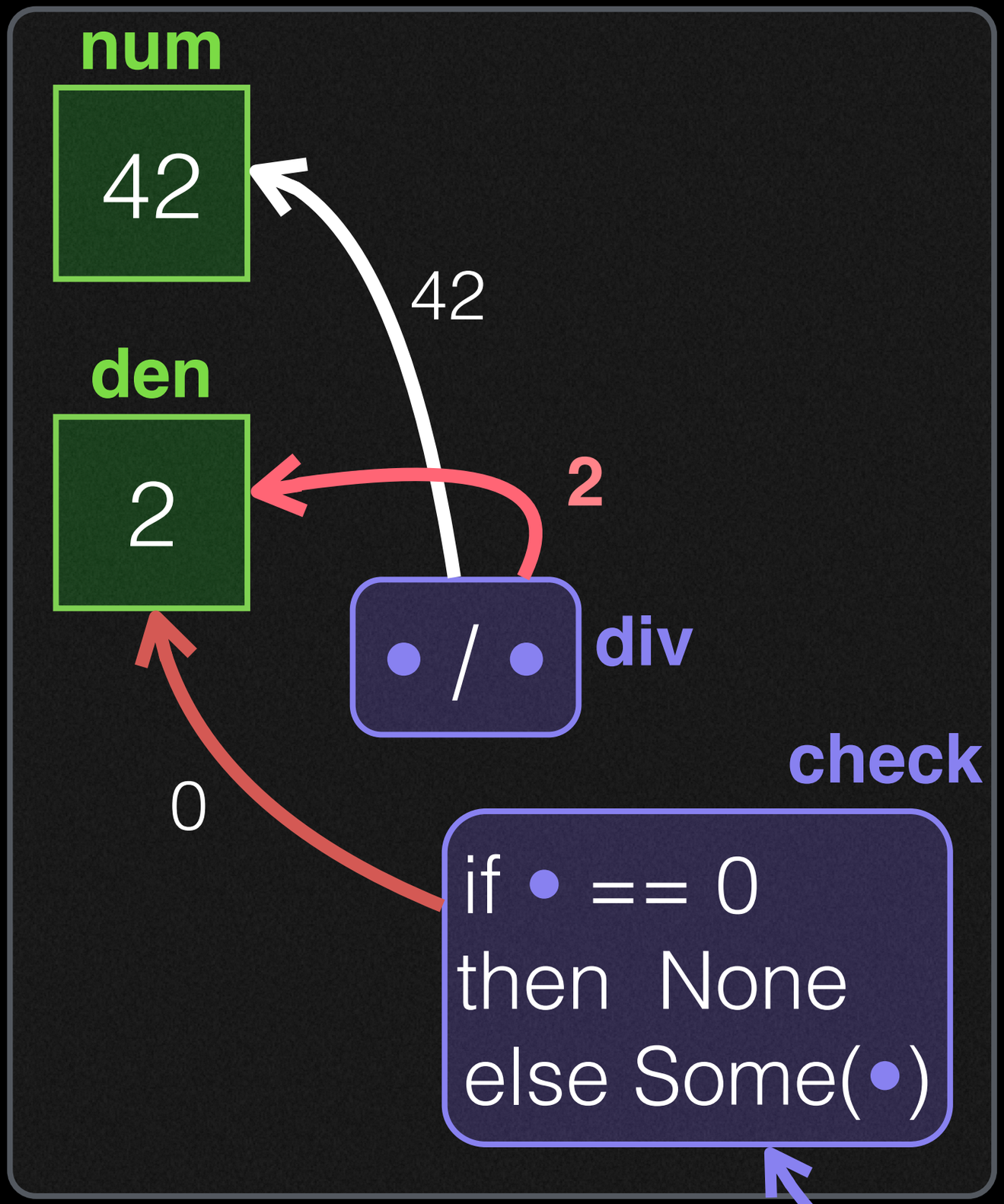


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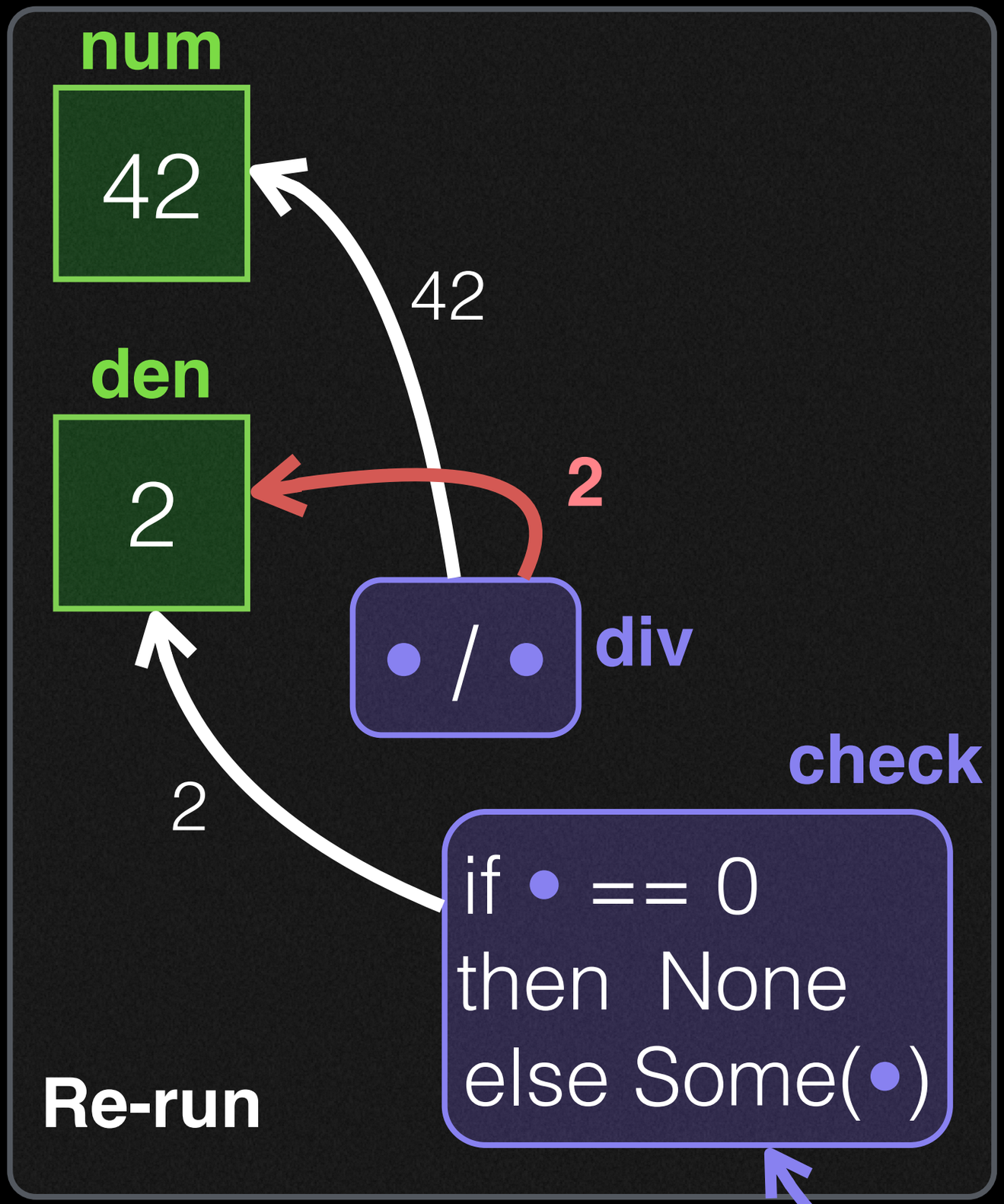


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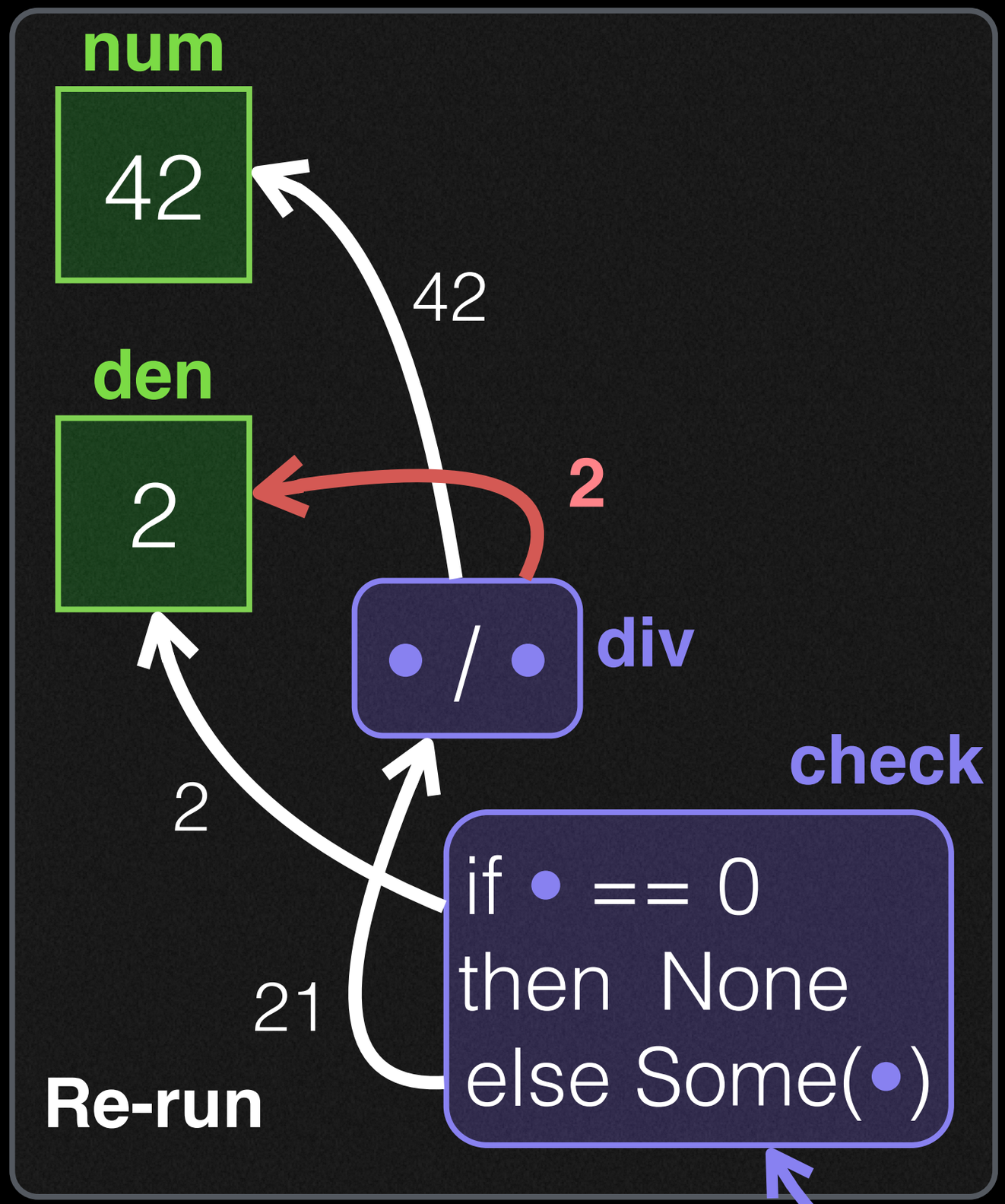


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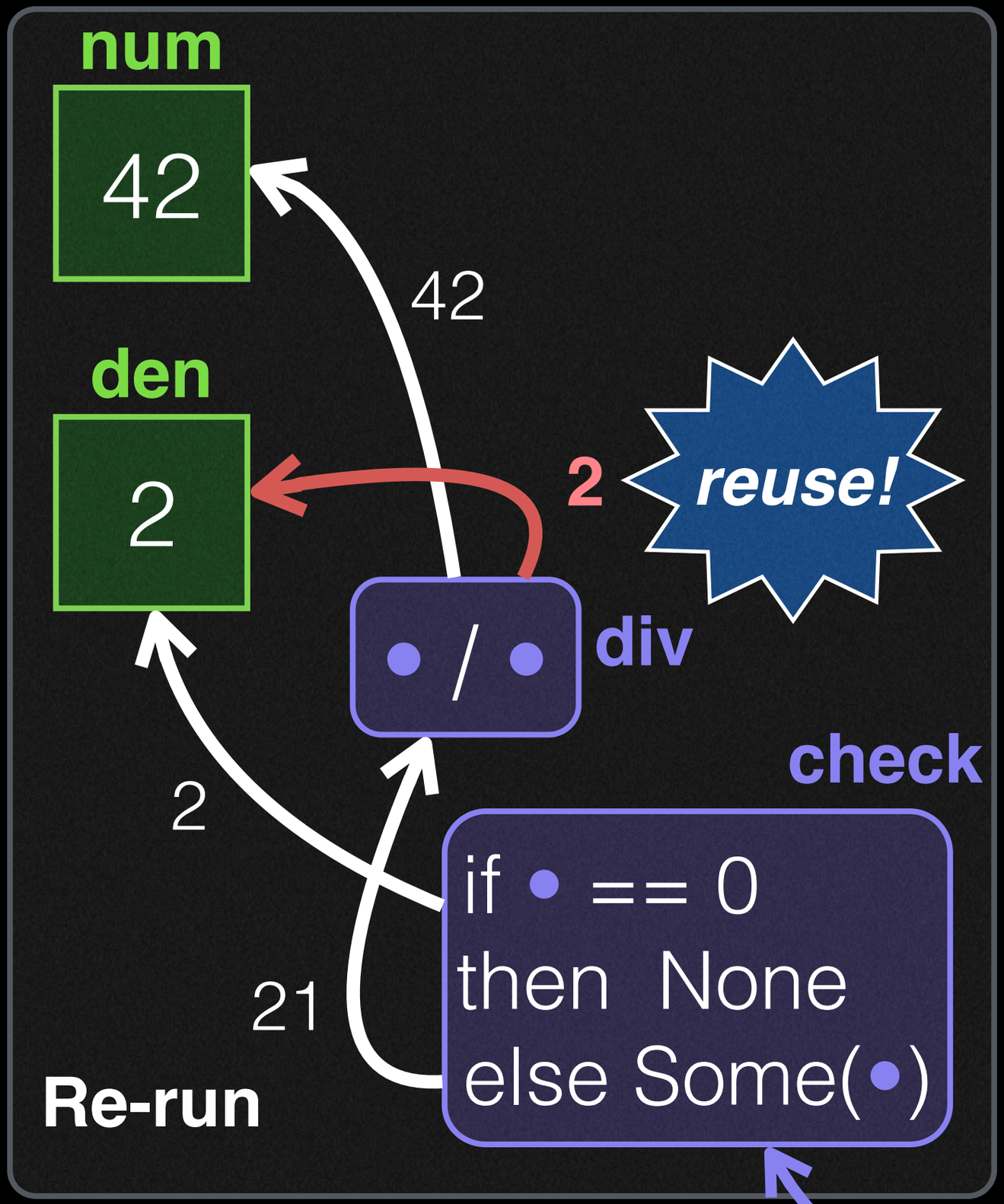


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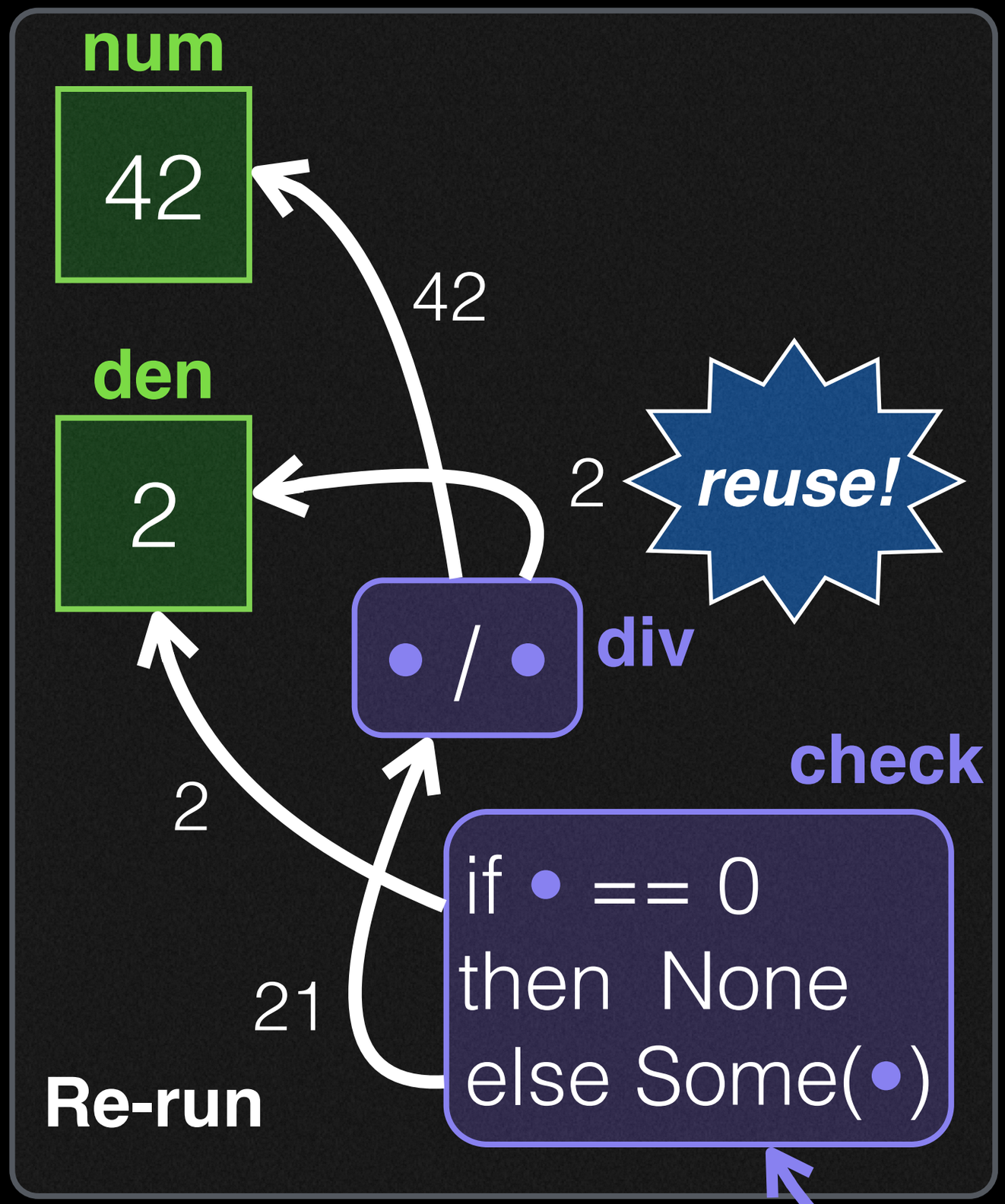


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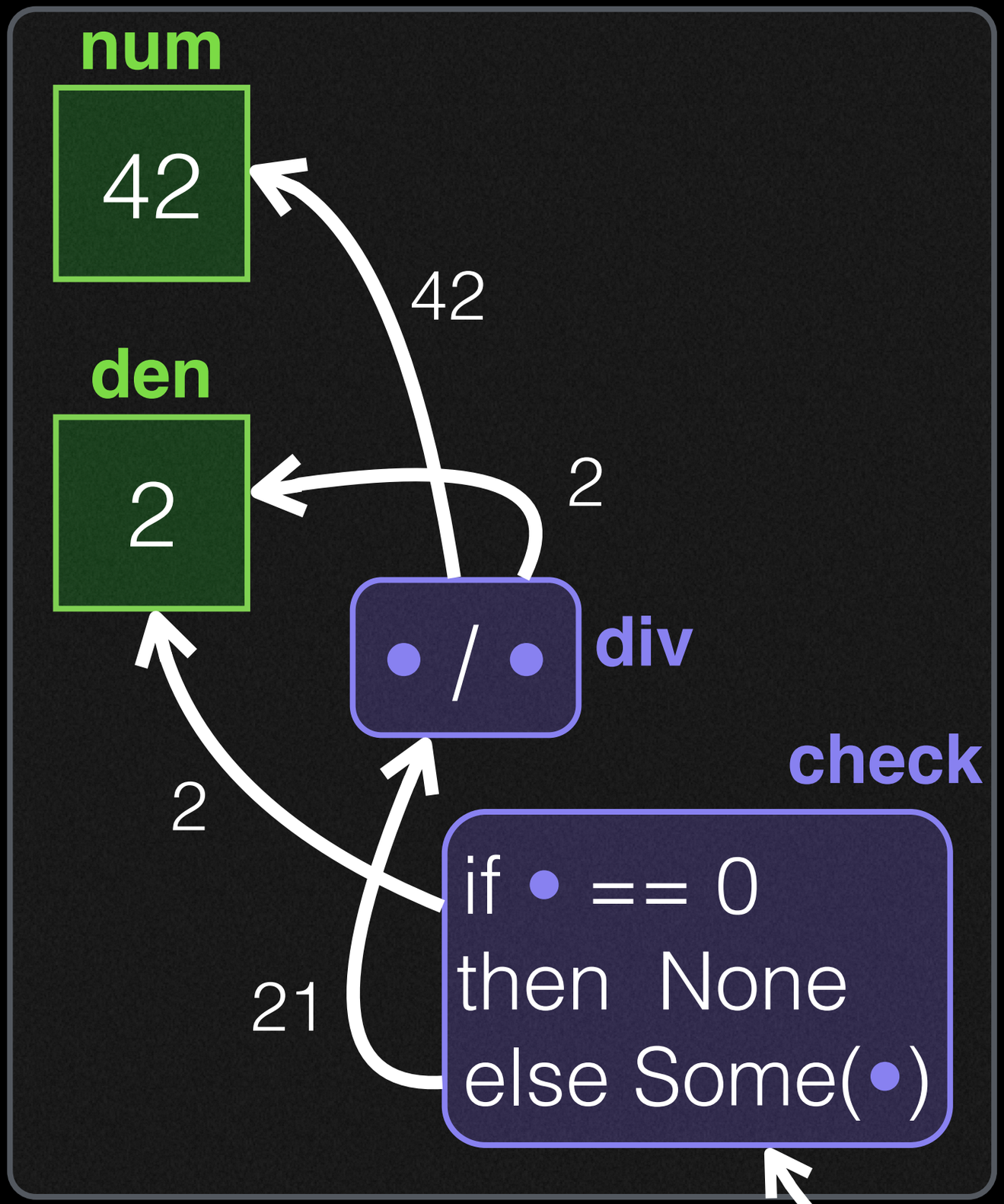


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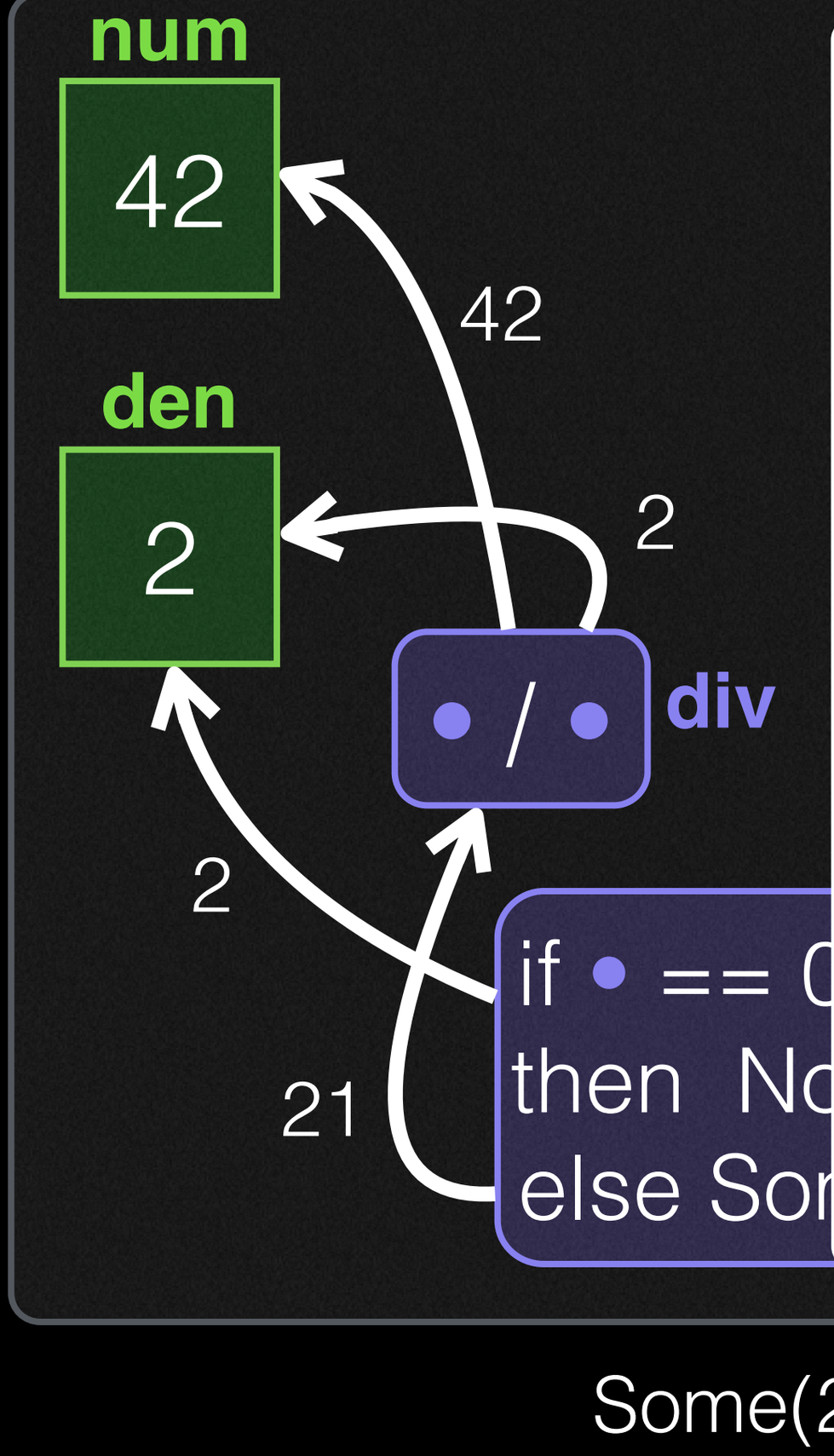

Summary:

- **dirtying is eager**

- **cleaning** is **demand-driven**
  c.f. self-adjusting computation

- **cleaning** is **consistent / sound**
  ("from-scratch consistent", FSC)

c.f. "height-based" change prop
https://gist.github.com/khooyp/98abc0e64dc296deaa48