Propagators: An Introduction

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What?

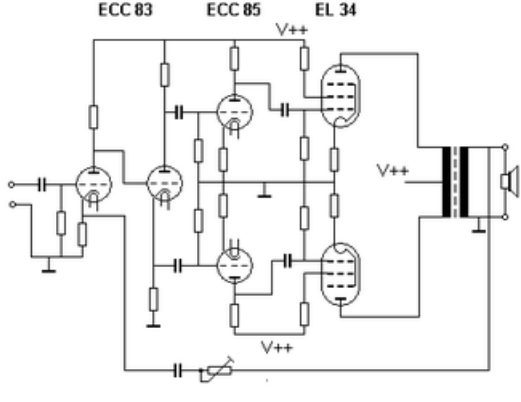
Why?

Roots as early as the 1970's at MIT

- Guy L. Steele Jr.
- Gerald J. Sussman
- Richard Stallman

More recently:

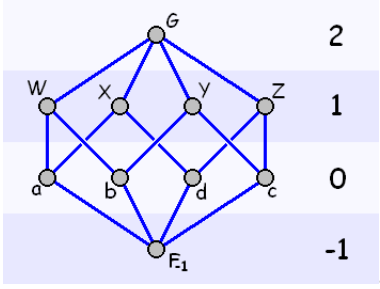
- Alexey Radul



```
(define (map f xs)
  (cond ((null? xs) '())
        (else (cons (f (car xs))
                    (map f (cdr xs)))))))
```

And then

- Edward Kmett



$$x \leq y \implies f(x) \leq f(y)$$

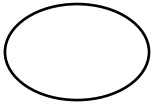
Propagators

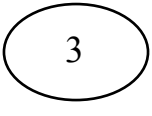
The *propagator model* is a model of computation

We model computations as *propagator networks*

A propagator network comprises

- cells
- propagators
- connections between cells and propagators

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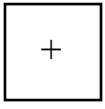

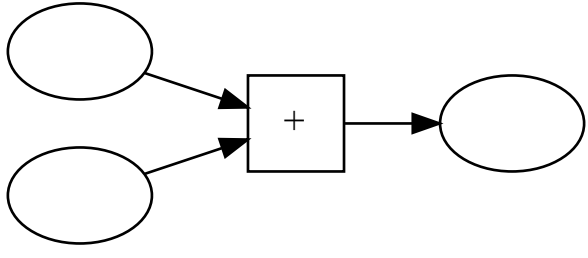

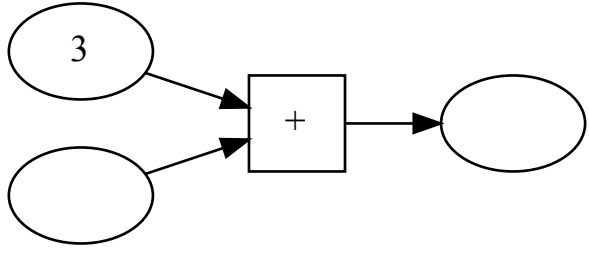
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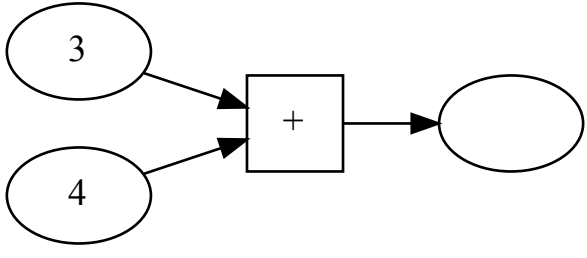
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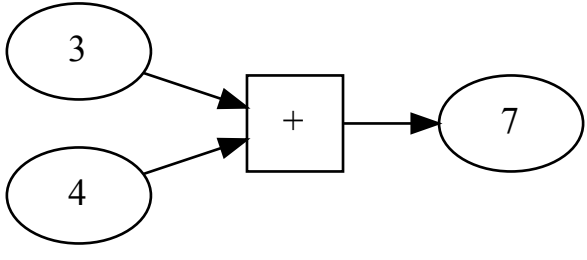
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$$z \leftarrow x + y$$

$$z = x + y$$

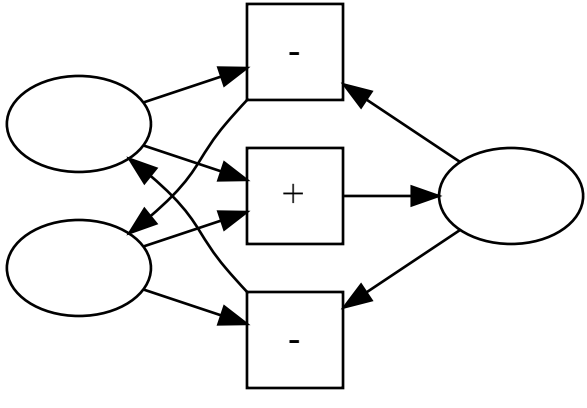
$$7 = x + 4$$

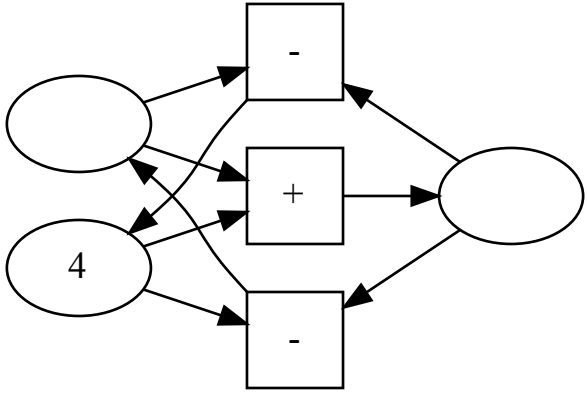
$$z = x + y$$

$$z \leftarrow x + y$$

$$x \leftarrow z - y$$

$$y \leftarrow z - x$$

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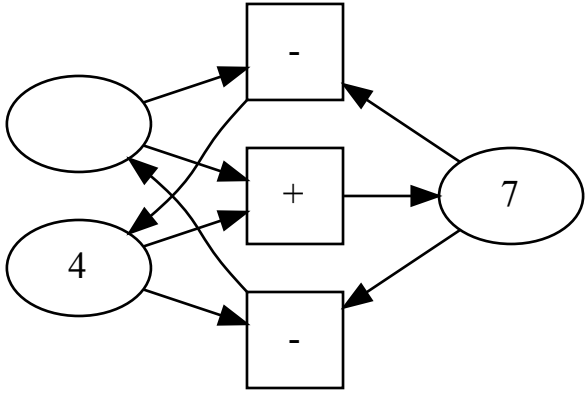
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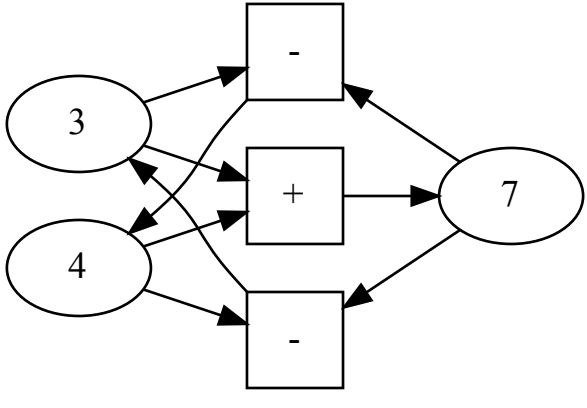
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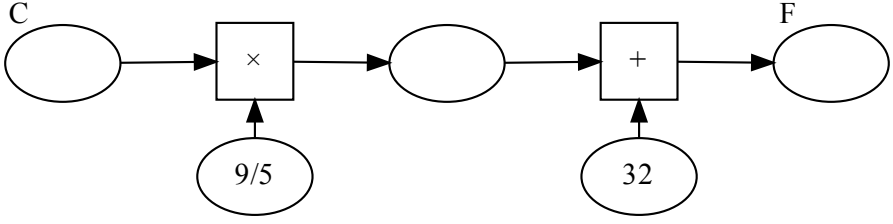
Propagators let us express multidirectional relationships

$$F = C \times \frac{9}{5} + 32$$



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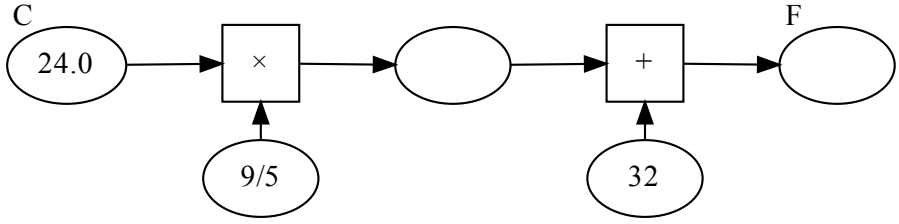

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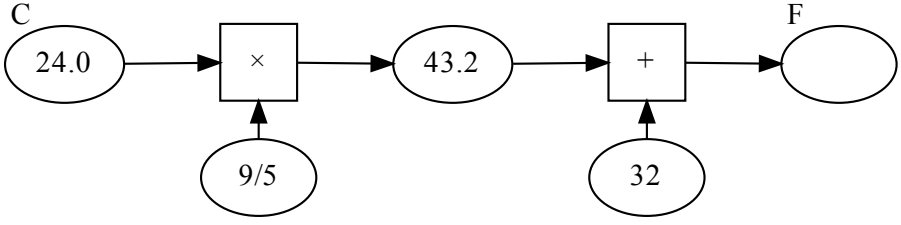

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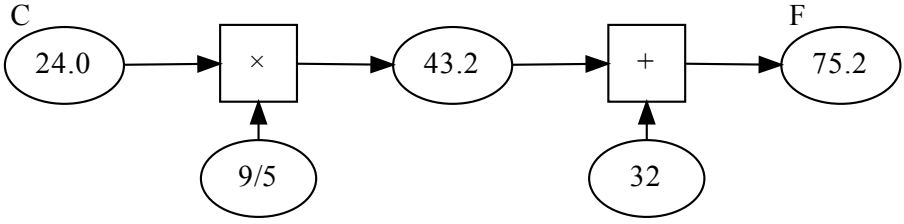
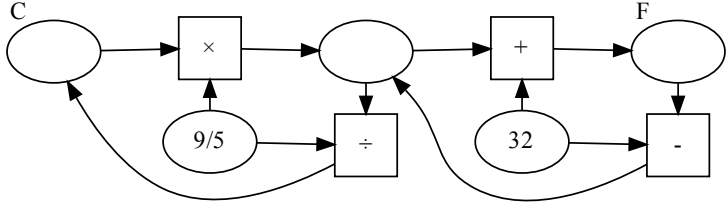


$$F = C \times \frac{9}{5} + 32$$

$$C = (F - 32) \times \frac{5}{9}$$



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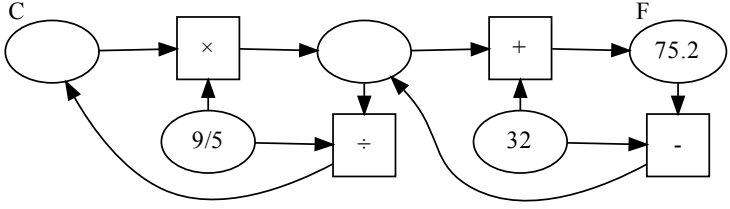

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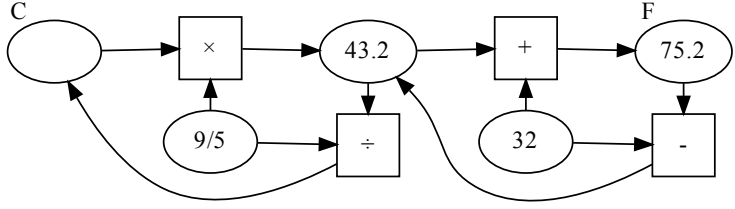

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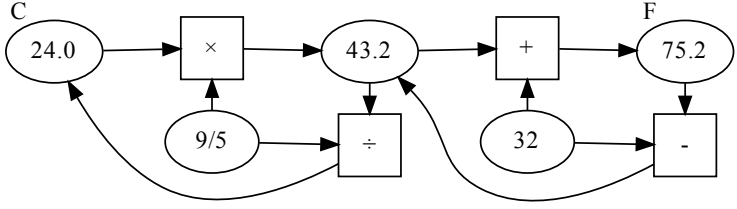

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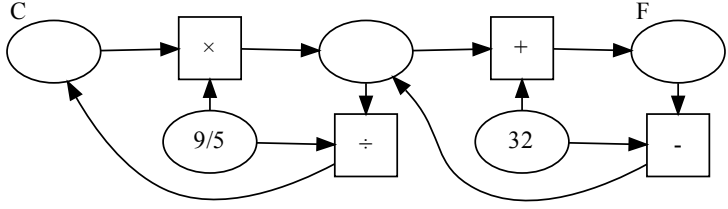

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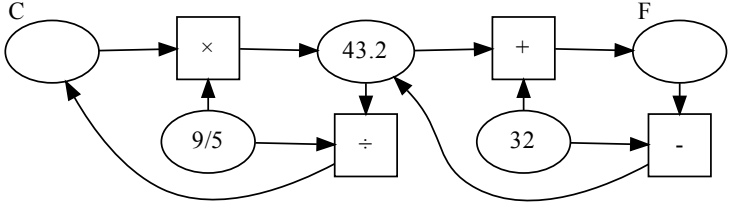

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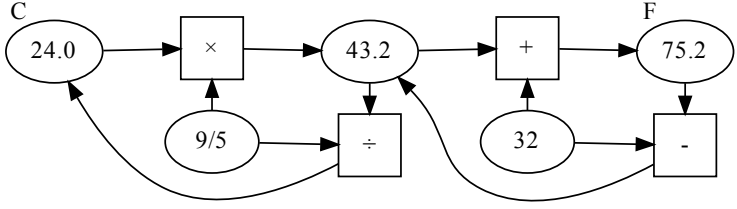

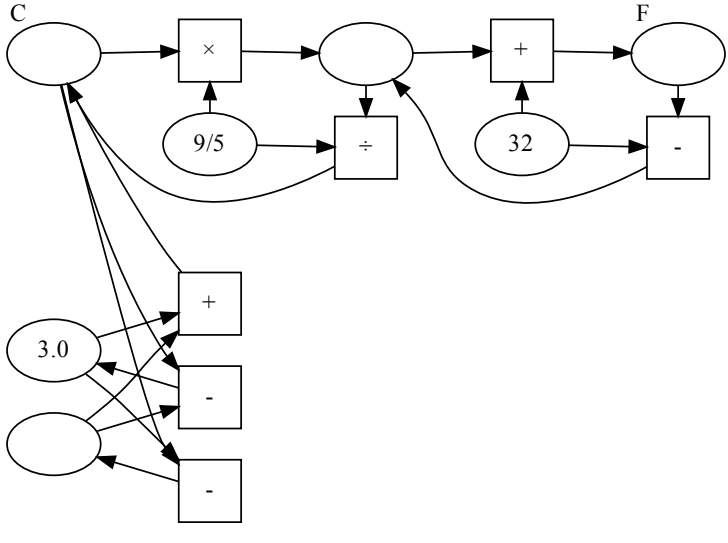
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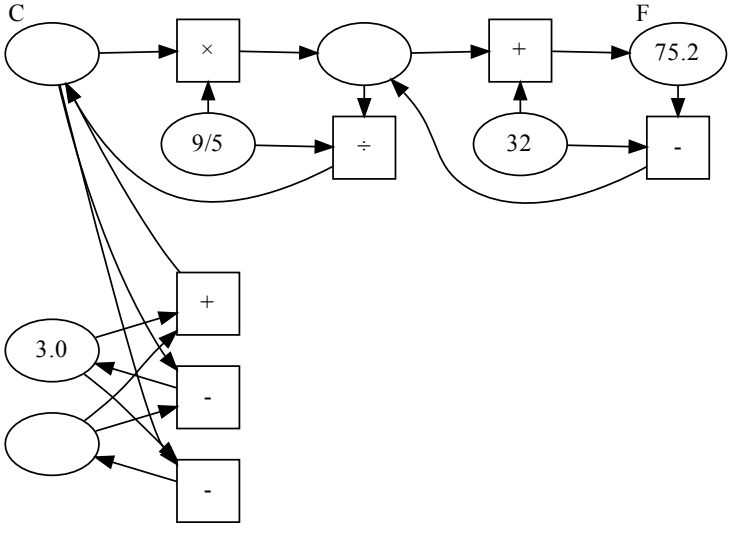
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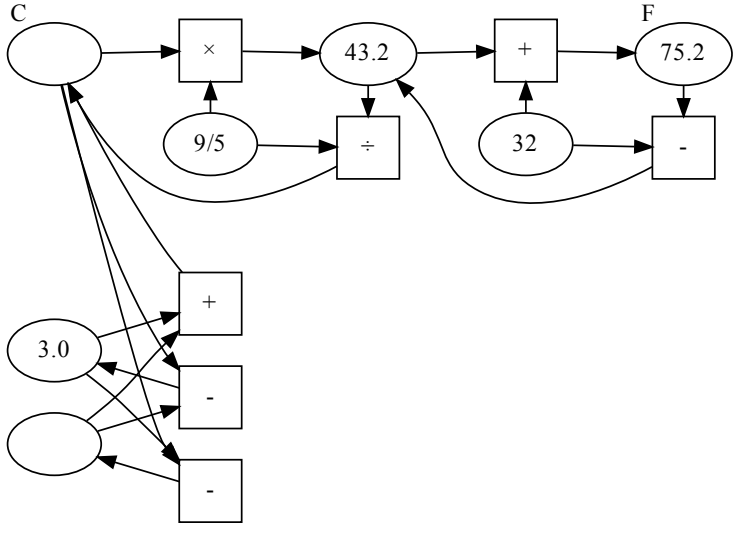
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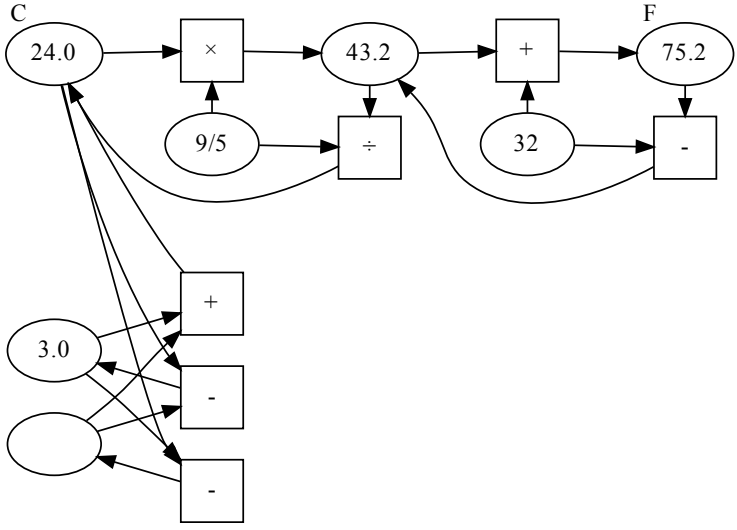
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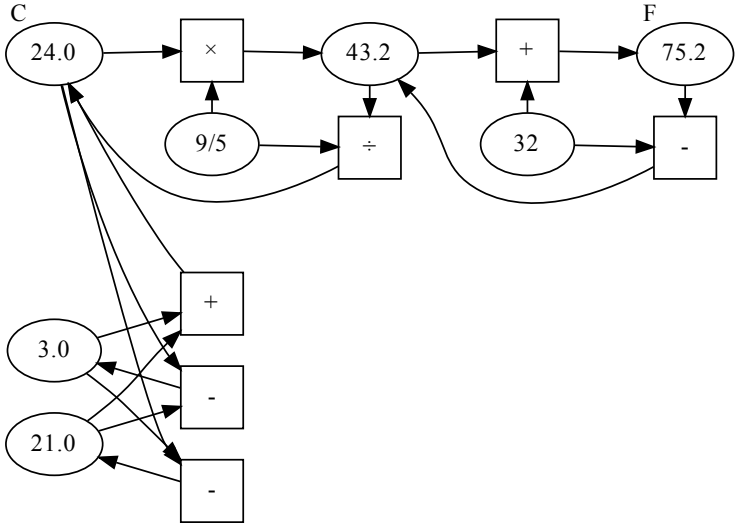
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