61A Lecture 26

Wednesday, November 6

Announcements

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  - You don't need a perfect score on the final to do so.

Interpreting Scheme

The Structure of an Interpreter

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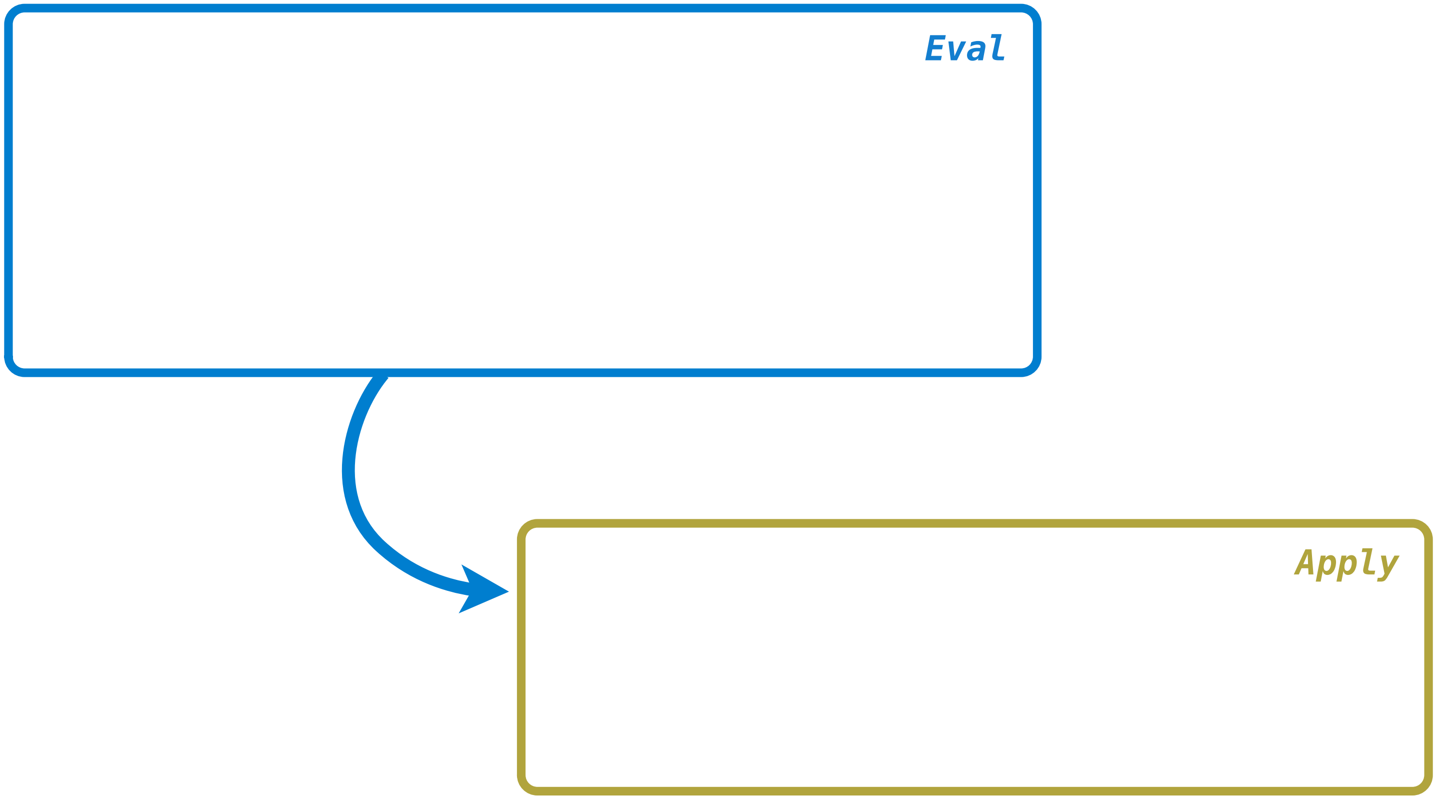

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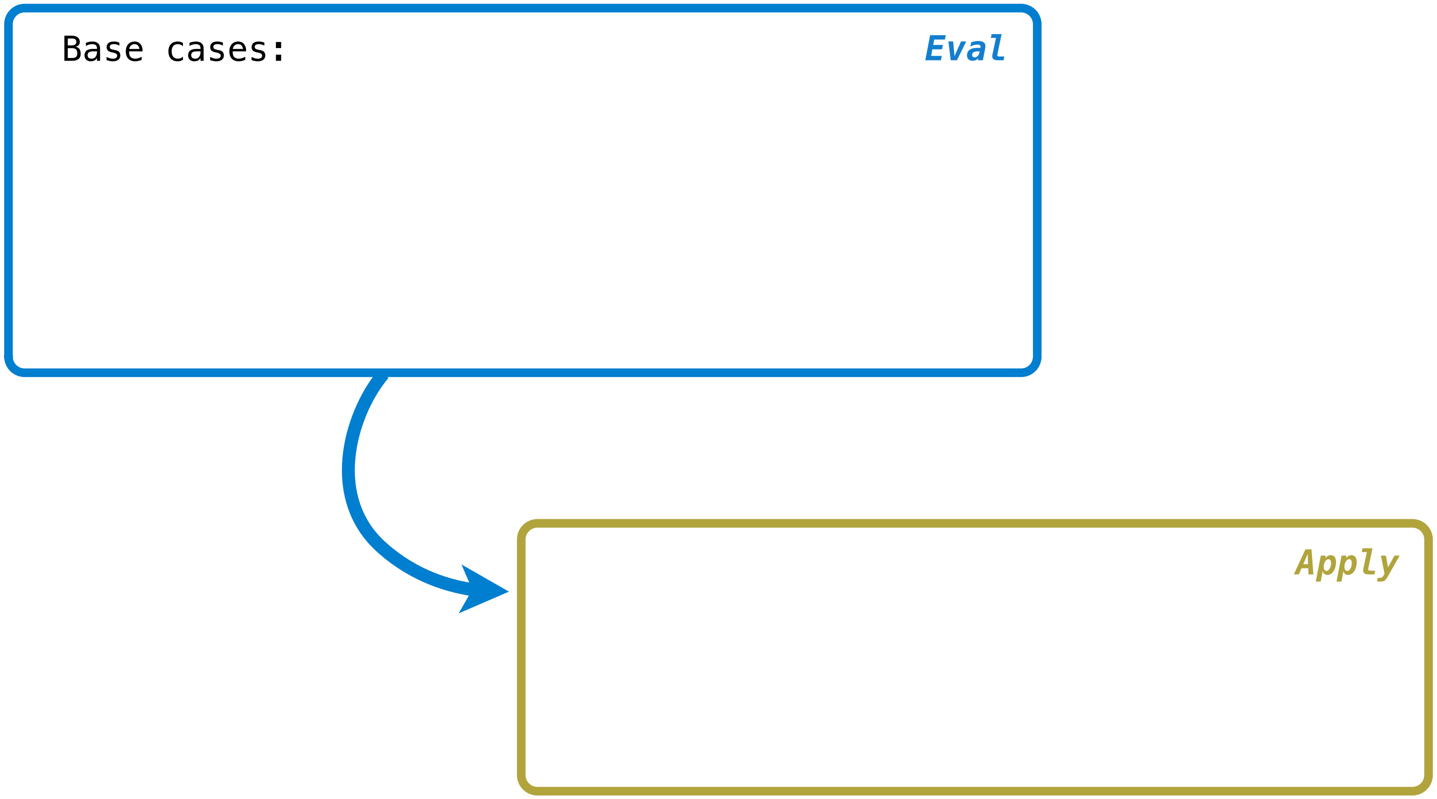

Base cases:

Eval

Apply

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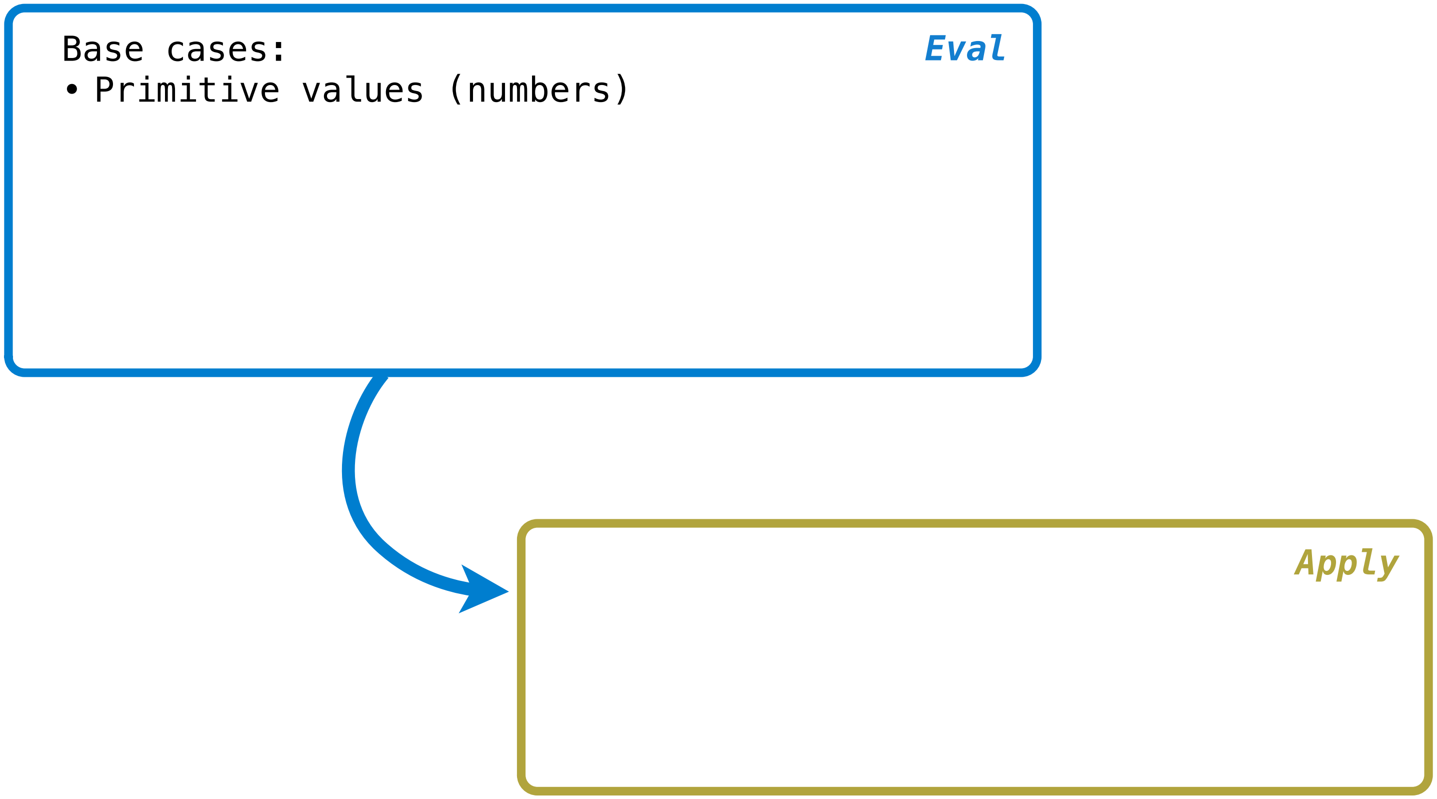

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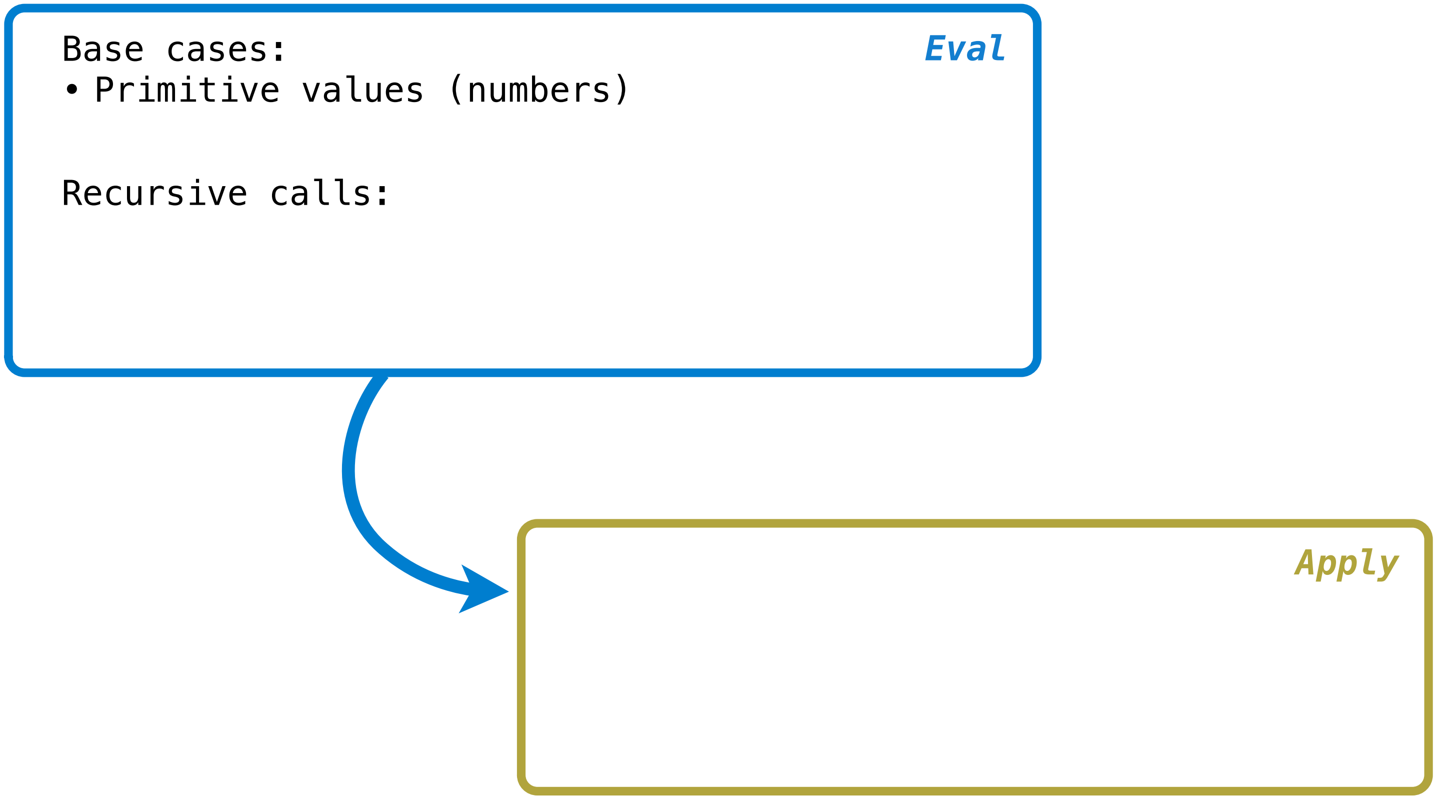

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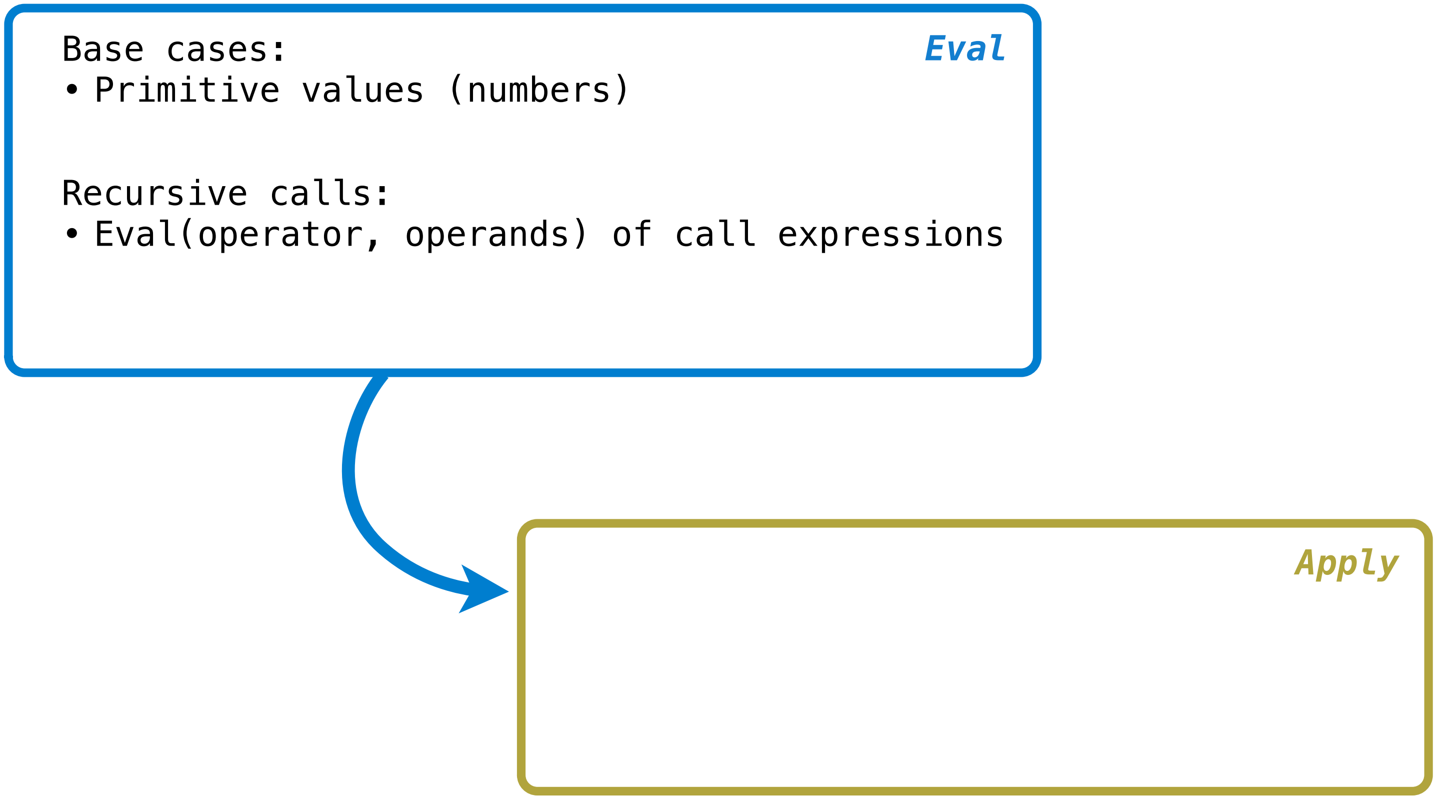

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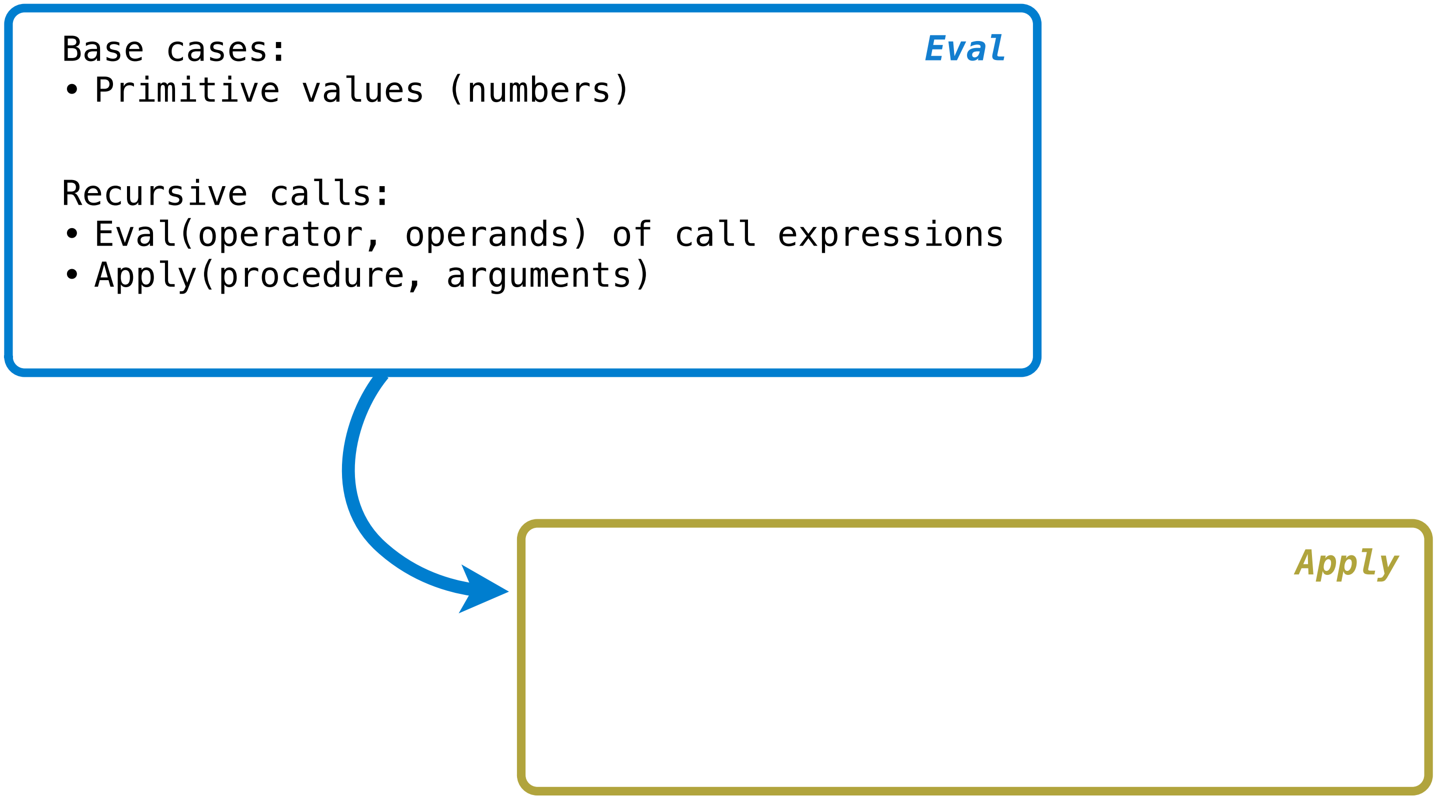

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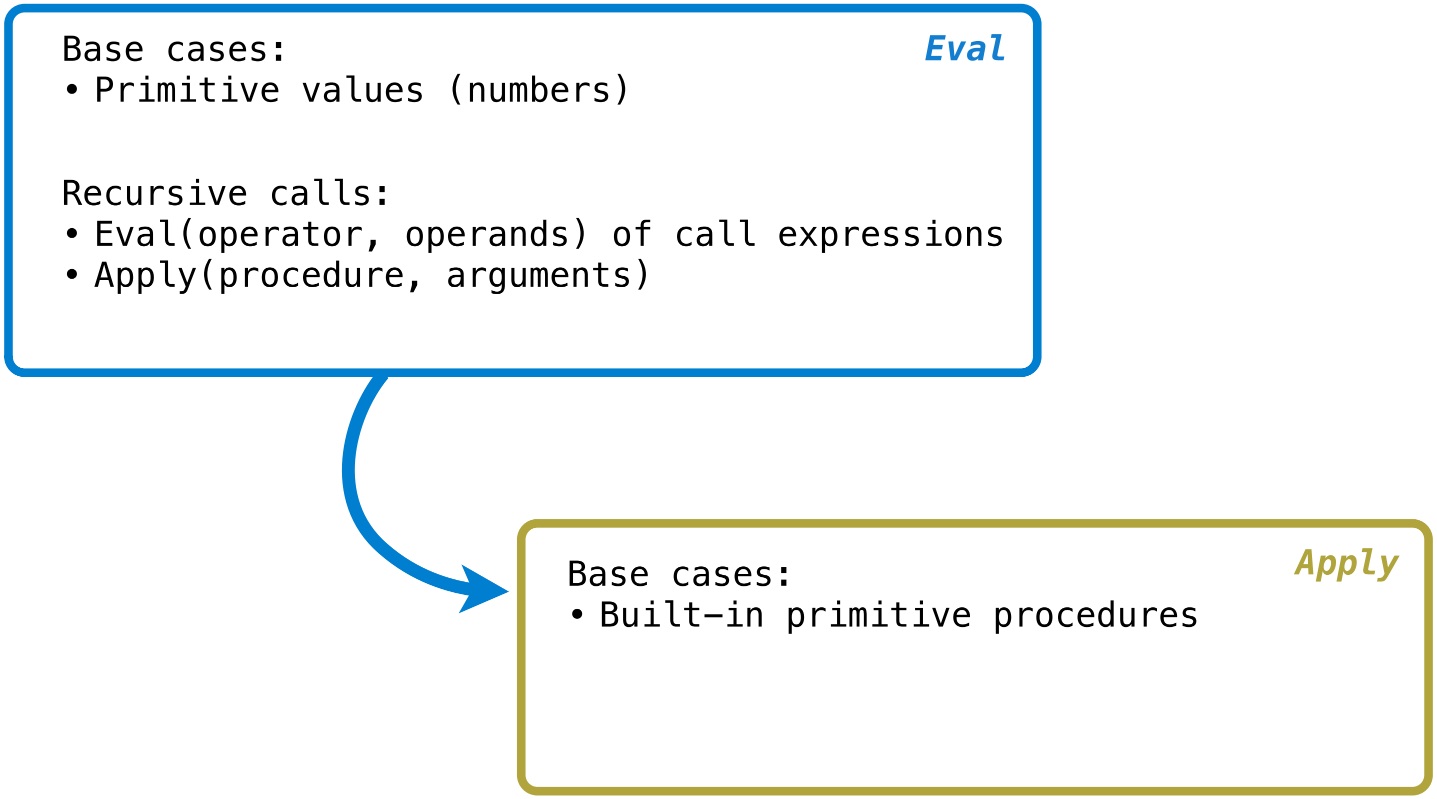

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Base cases:

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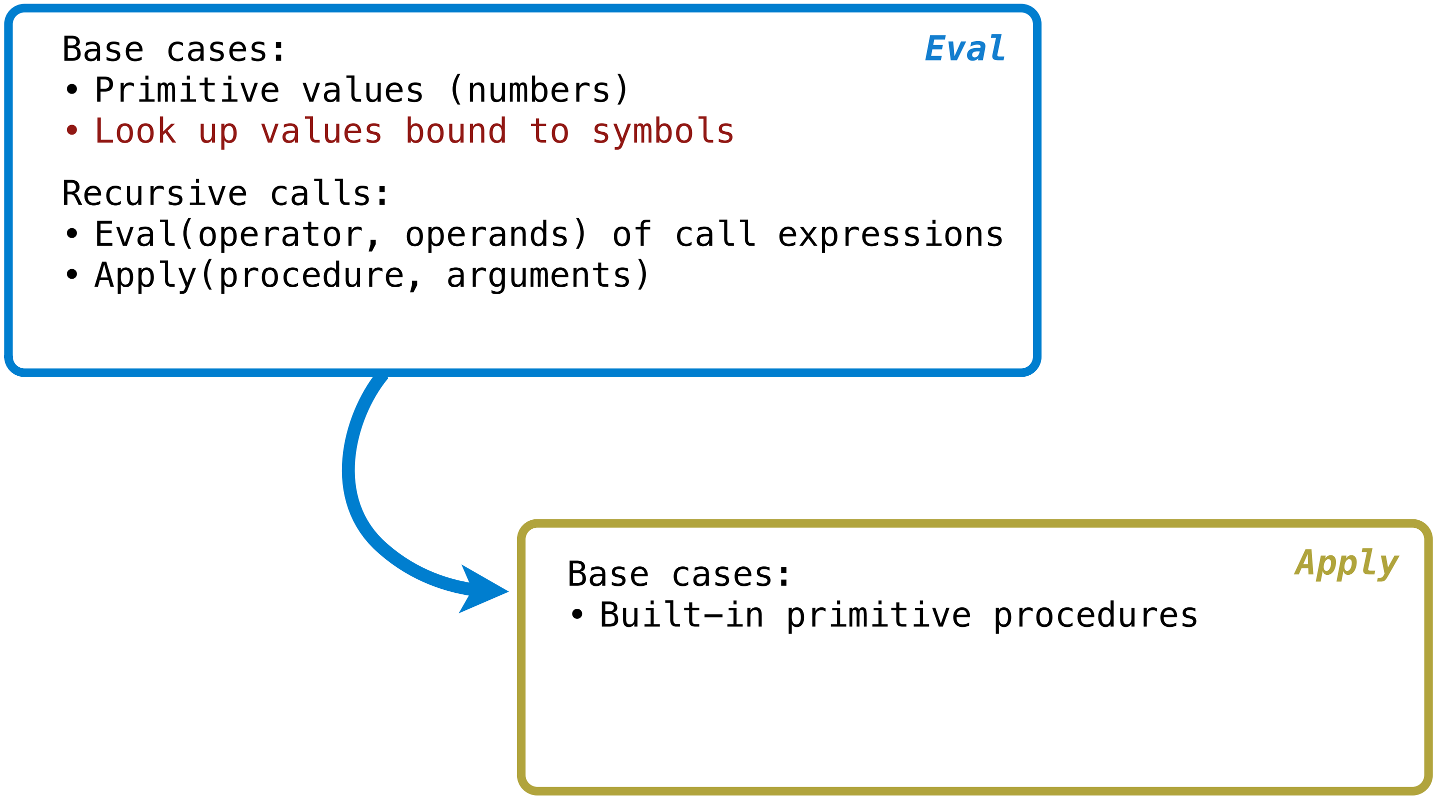

Eval

Base cases:

- Primitive values (numbers)
- Look up values bound to symbols

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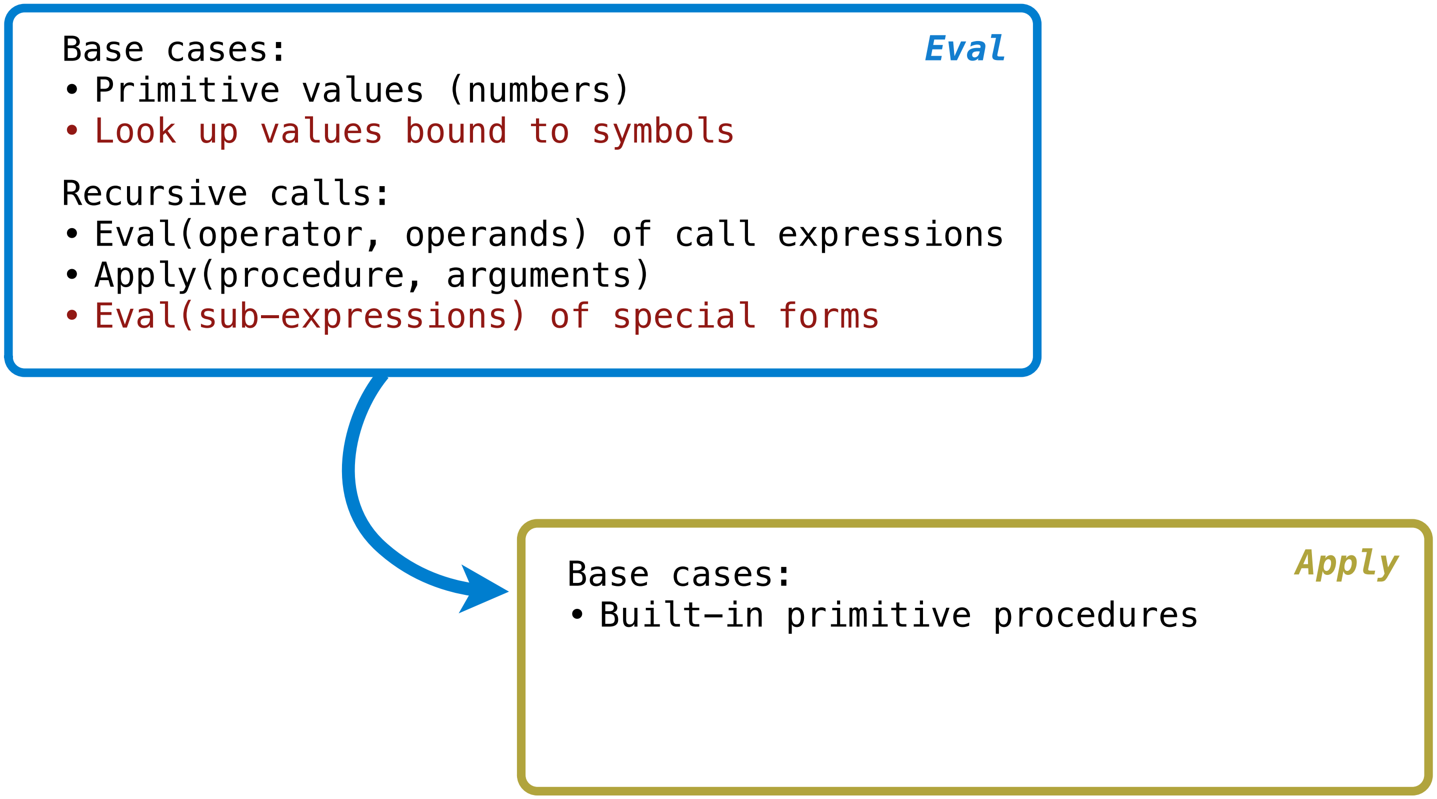

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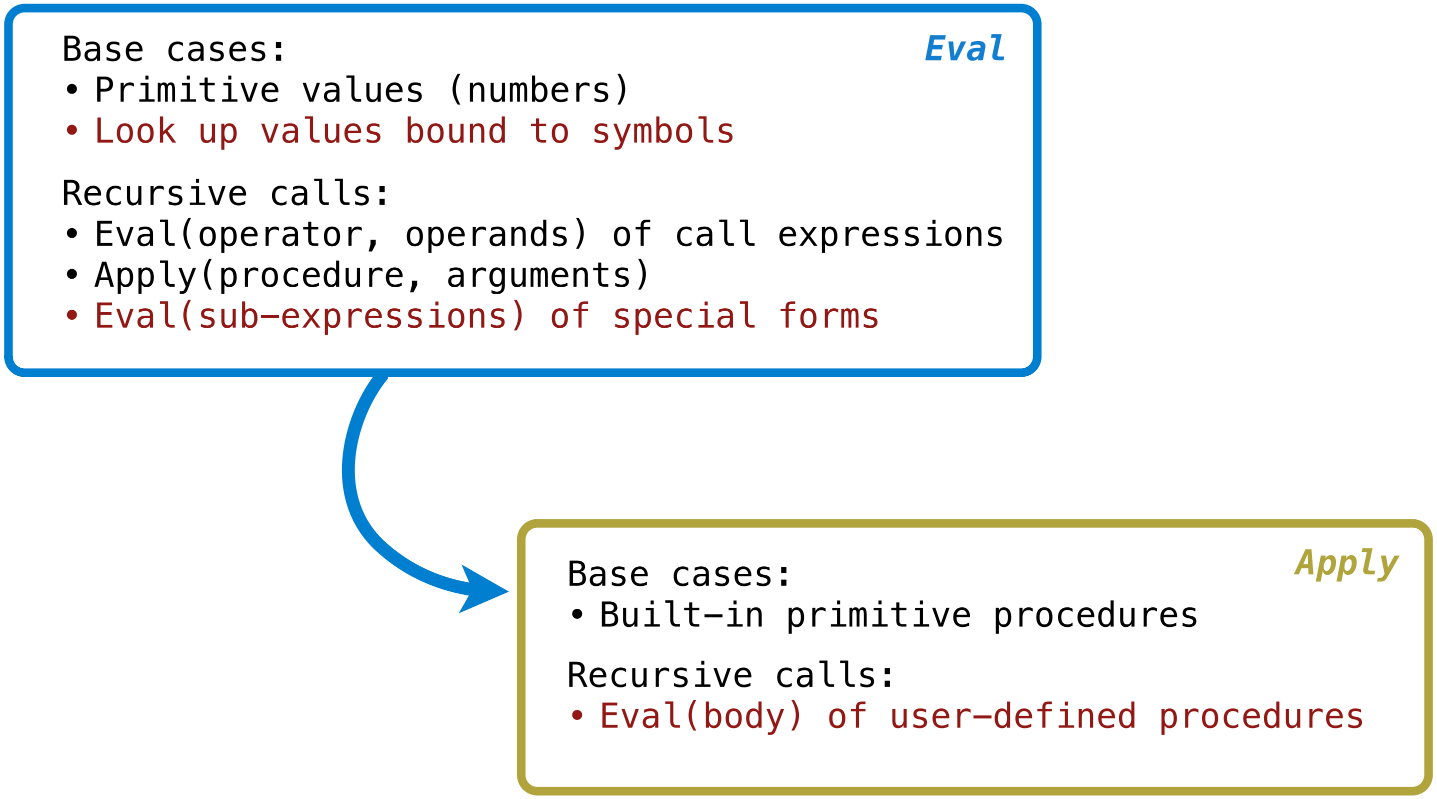

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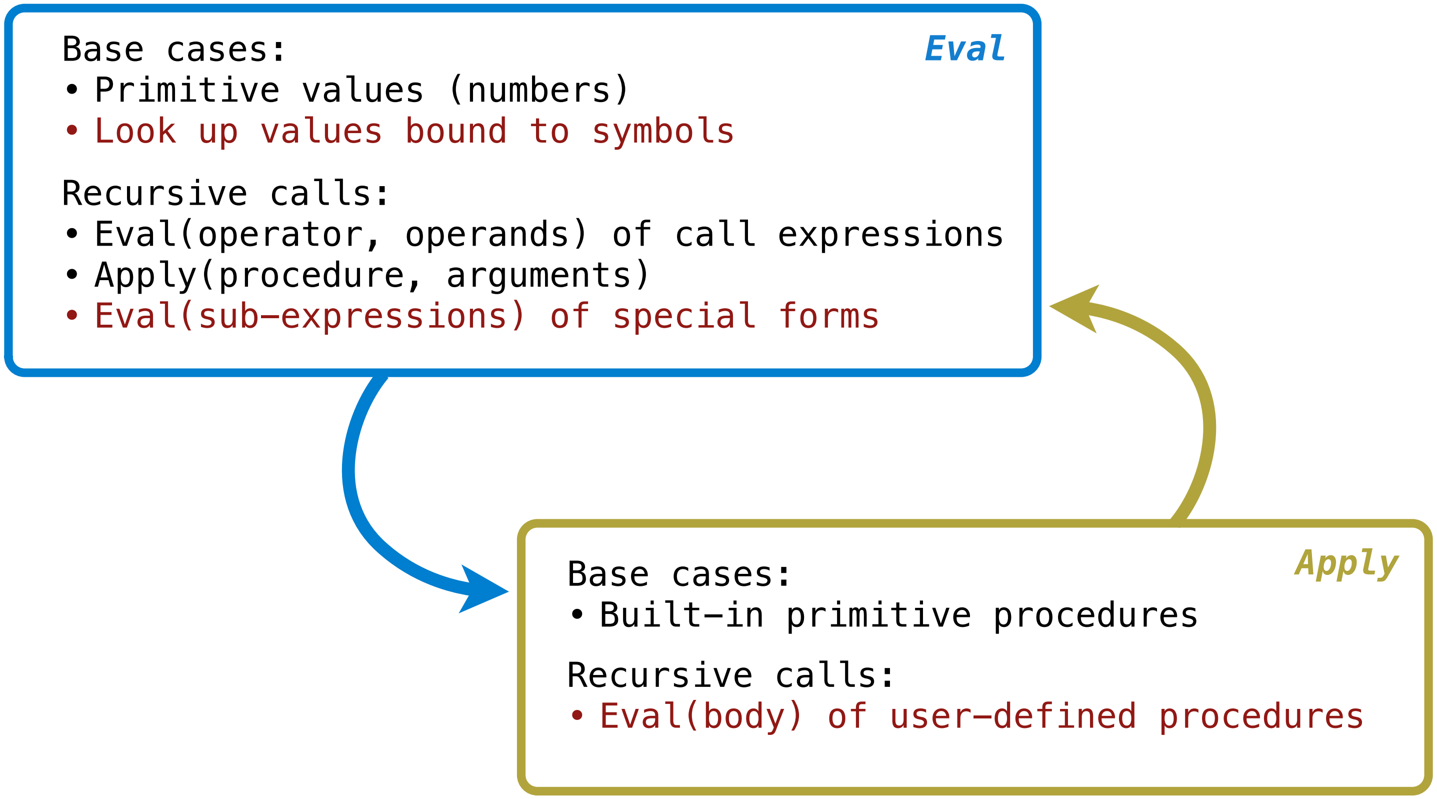

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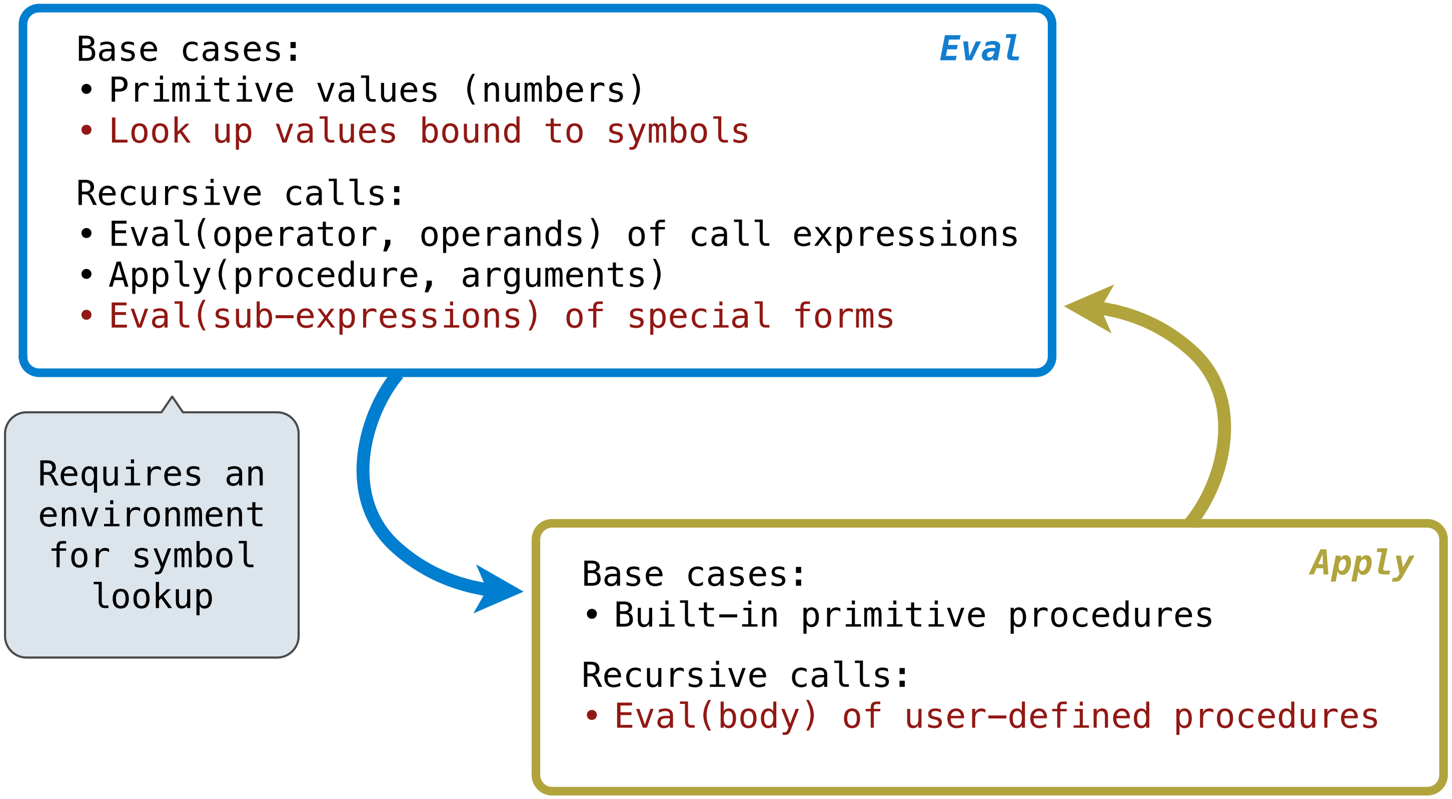

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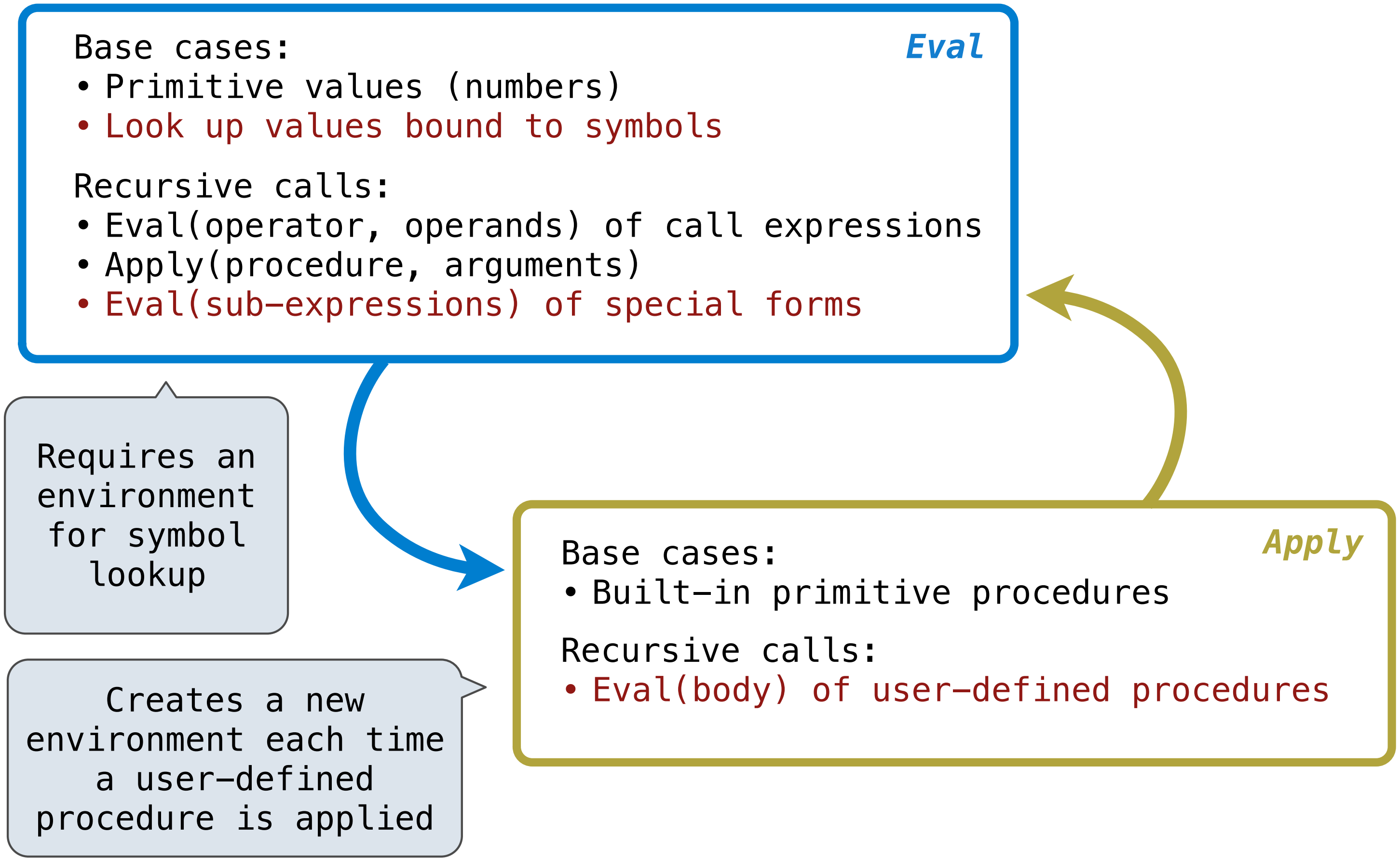

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Special Forms

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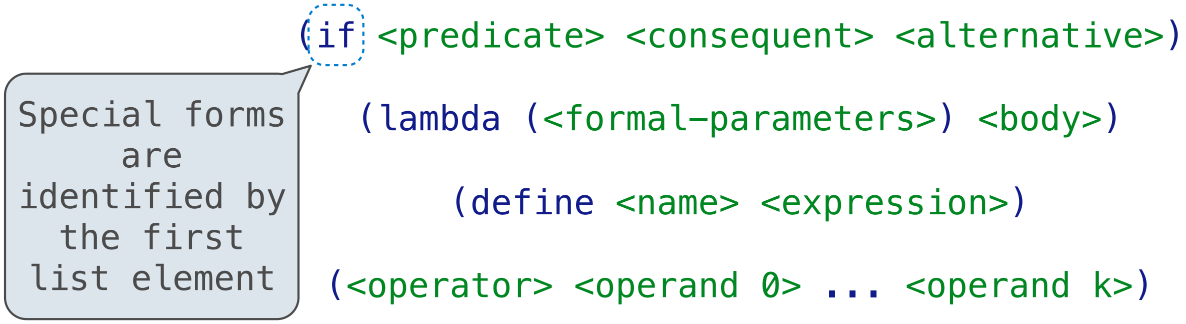

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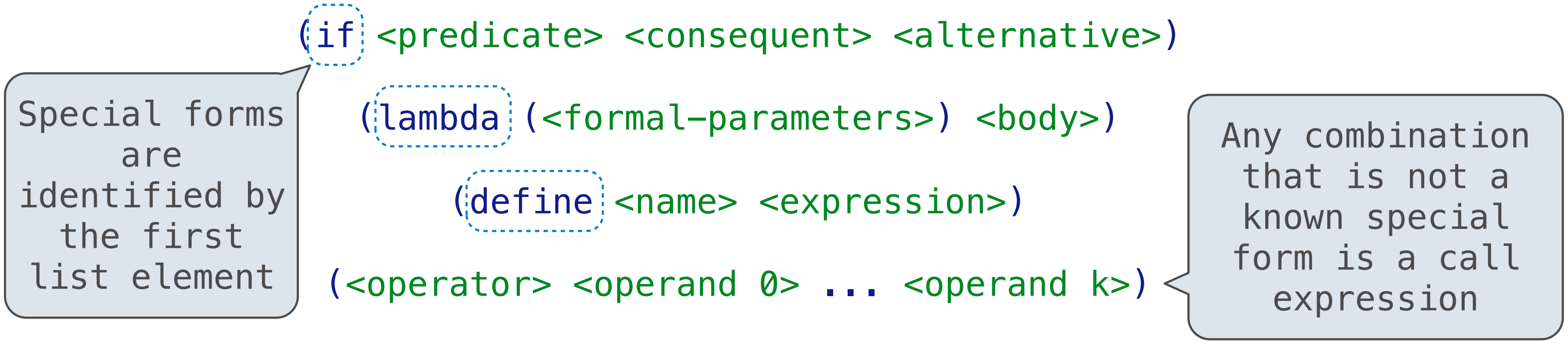

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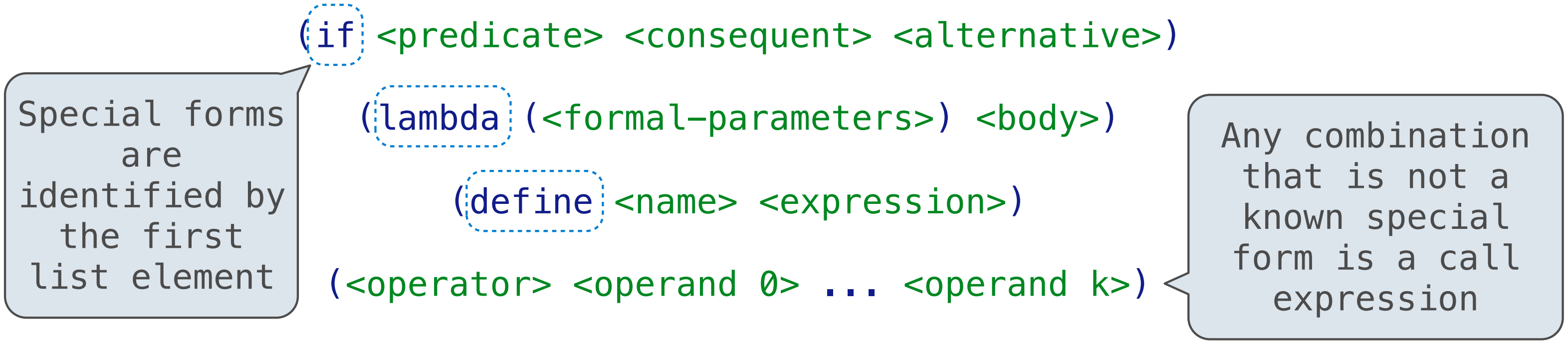

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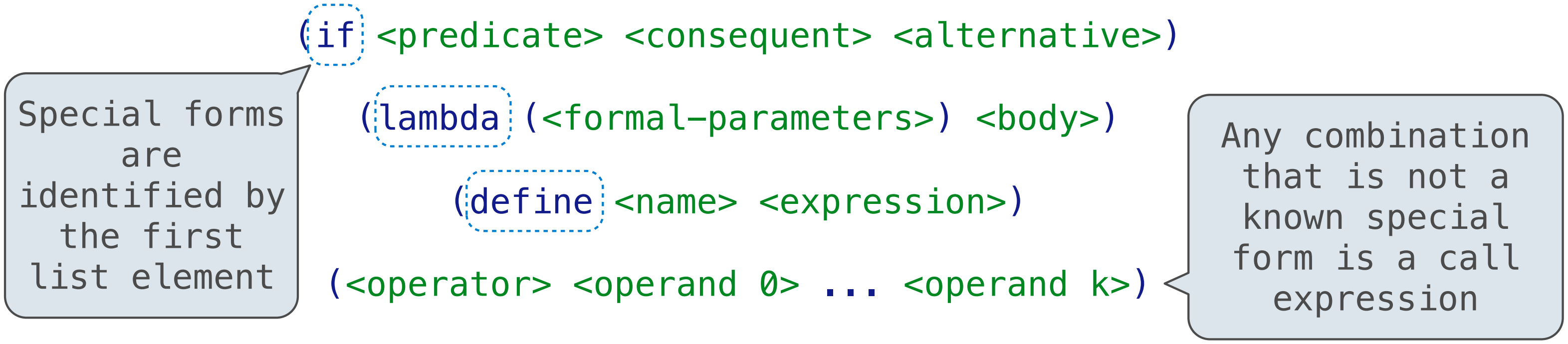

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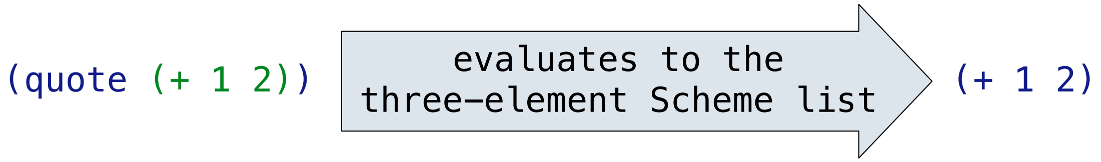

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class LambdaProcedure:
    def __init__(self, formals, body, env):
        self.formals = formals                  A scheme list of symbols
        self.body = body                        A scheme expression
        self.env = env                          A Frame instance
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Frames and Environments

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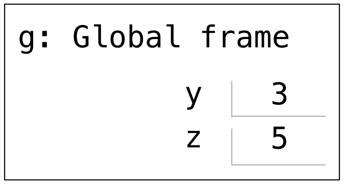
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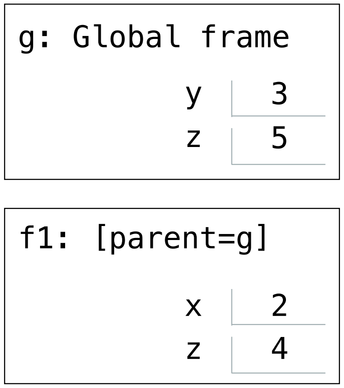

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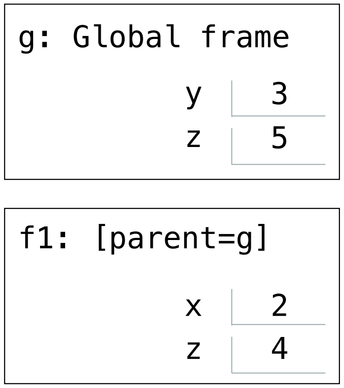

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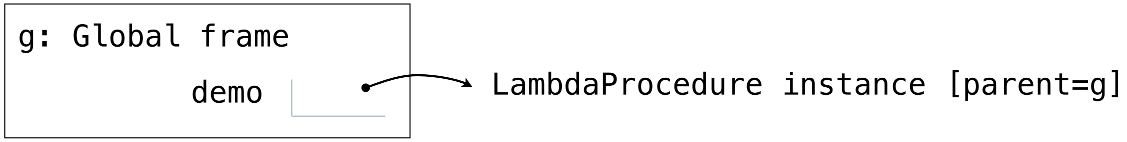

g: Global frame

demo

LambdaProcedure instance [parent=g]

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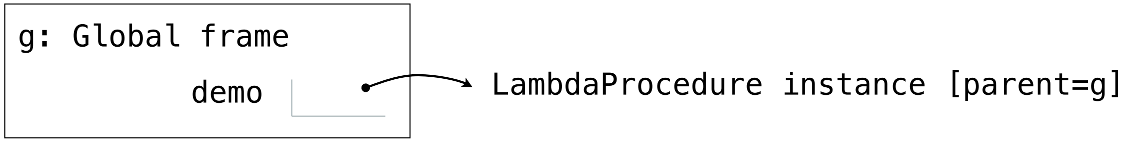

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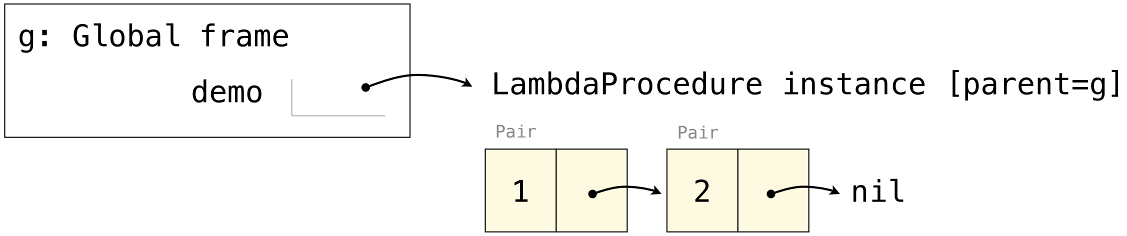

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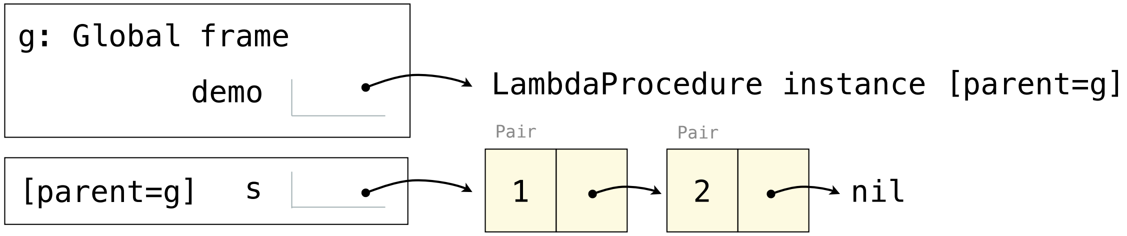

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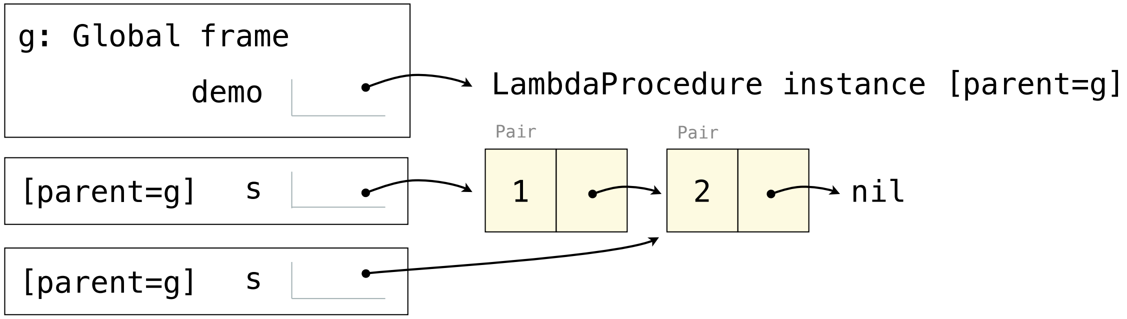

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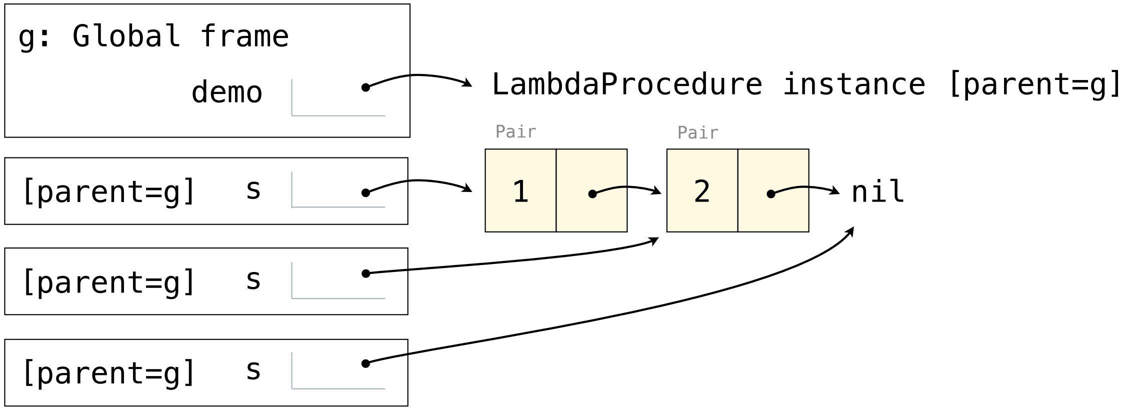

Eval/Apply in Lisp 1.5

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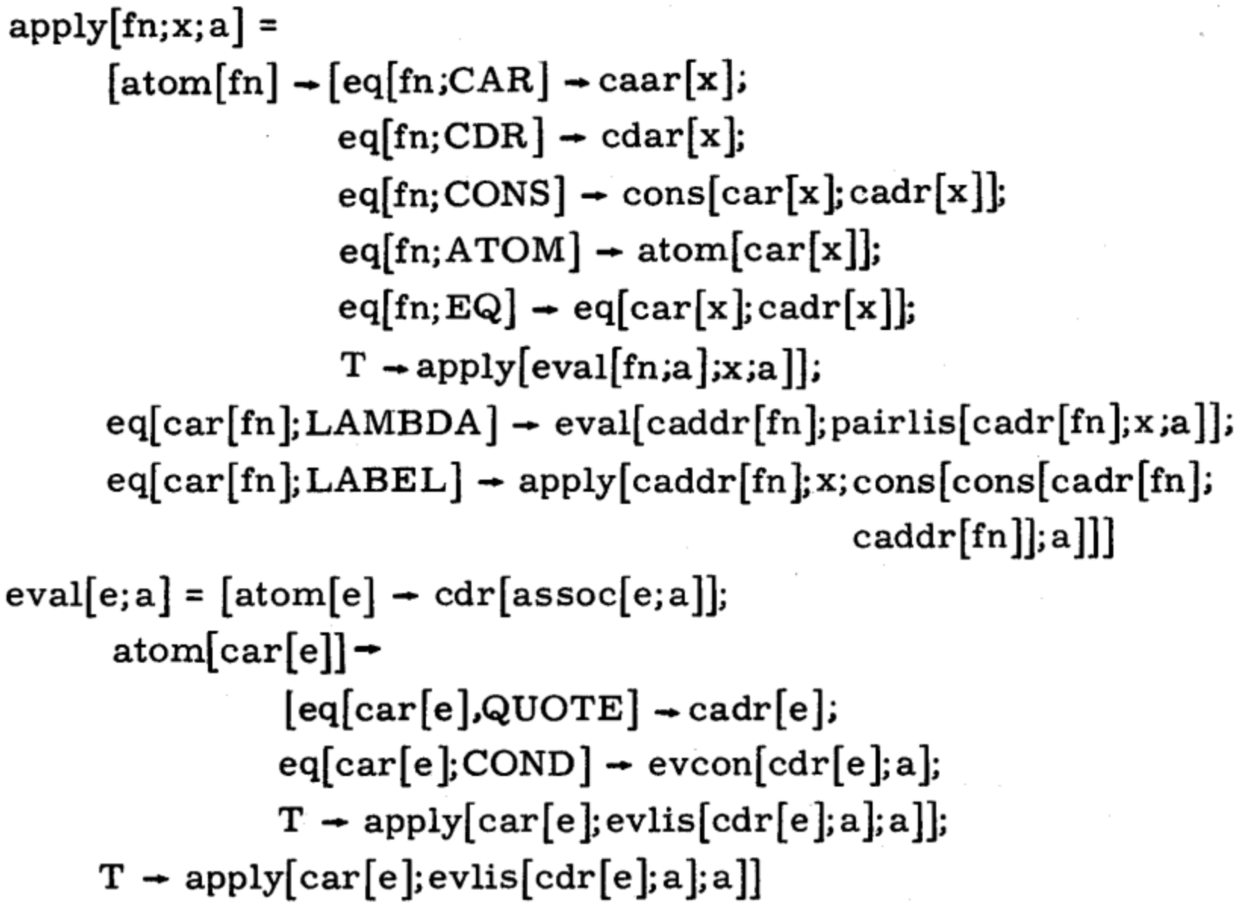

```
apply[fn;x;a] =
        [atom[fn] → [eq[fn;CAR] → caar[x];
                     eq[fn;CDR] → cdar[x];
                     eq[fn;CONS] → cons[car[x];cadr[x]];
                     eq[fn;ATOM] → atom[car[x]];
                     eq[fn;EQ] → eq[car[x];cadr[x]];
                     T → apply[eval[fn;a];x;a]];
        eq[car[fn];LAMBDA] → eval[caddr[fn];pairlis[cadr[fn];x;a]];
        eq[car[fn];LABEL] → apply[caddr[fn];x;cons[cons[cadr[fn];
                                                    caddr[fn]];a]]]
eval[e;a] = [atom[e] → cdr[assoc[e;a]];
        atom[car[e]]→
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Special form to create dynamically scoped procedures

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              mu
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