PYTHON REFLECTION

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Check out *PythonReflection* from SVN

SELF-ISH IDEAS IN PYTHON

- Prototypes:
  - Use the copy module
  - “Fudge” method update
- Named slots instead of variables:
  - __getattribute__(), __setattr__()

http://irrepupavel.com/documents/python/instancemethod/

THE EXPRESSION PROBLEM

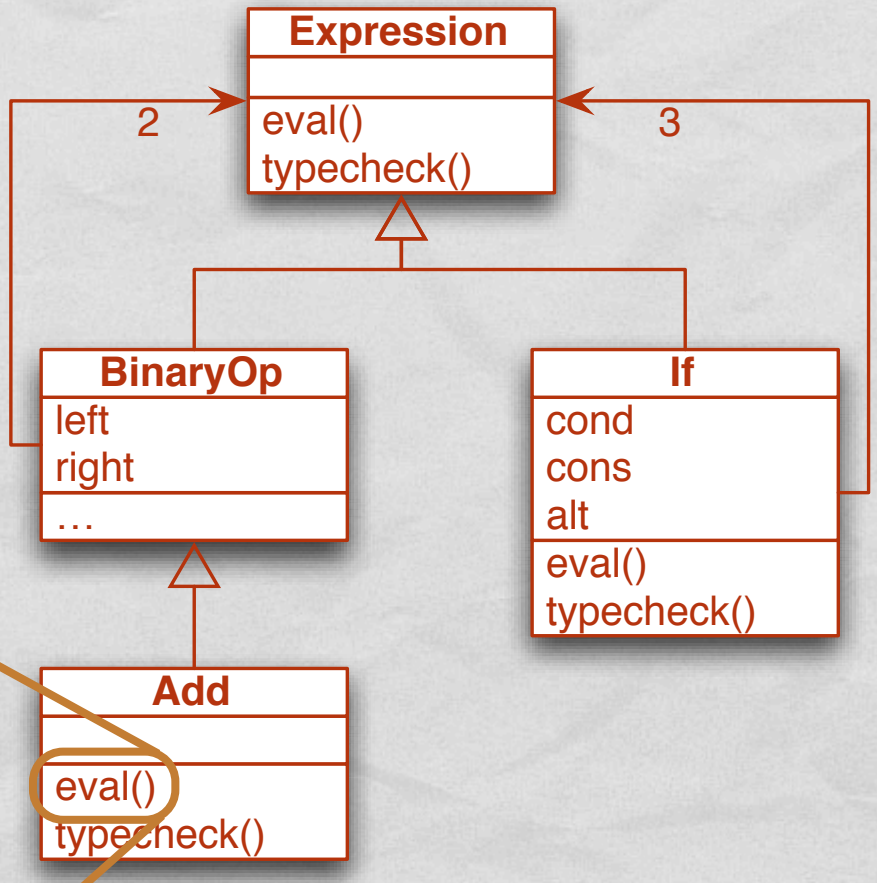
CONSIDER

- A set of recursive datatypes, e.g.:
  - Widgets in a UI framework
  - Expressions in an interpreter
- Functions over the datatypes, e.g.:
  - layout(), render()
  - eval(), typecheck()

Expression Problem: How do we extend both the set of datatypes and the set of functions?

STANDARD OO SOLUTION

- A hierarchy of classes
- Recursive methods




```
def eval(self):
    lv = self.left.eval()
    rv = self.right.eval()
    return lv + rv
```

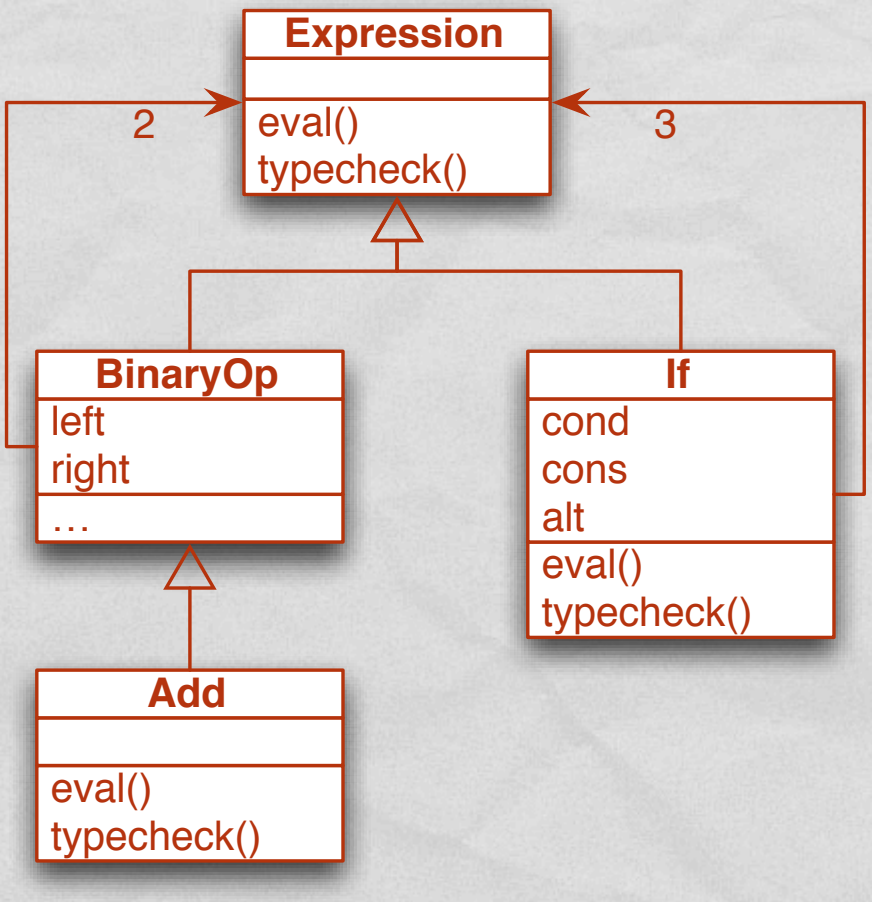
STANDARD FUNCTIONAL SOLUTION

- Records
- Recursive functions with cases

```
(define eval
  (lambda (exp)
    (cond
      ((add-exp? exp)
        (+ (eval (add-exp->left exp))
           (eval (add-exp->right exp))))
      (...))))

(define typecheck ...)
```

HOW WOULD WE ADD A "MINUS" EXPRESSION?

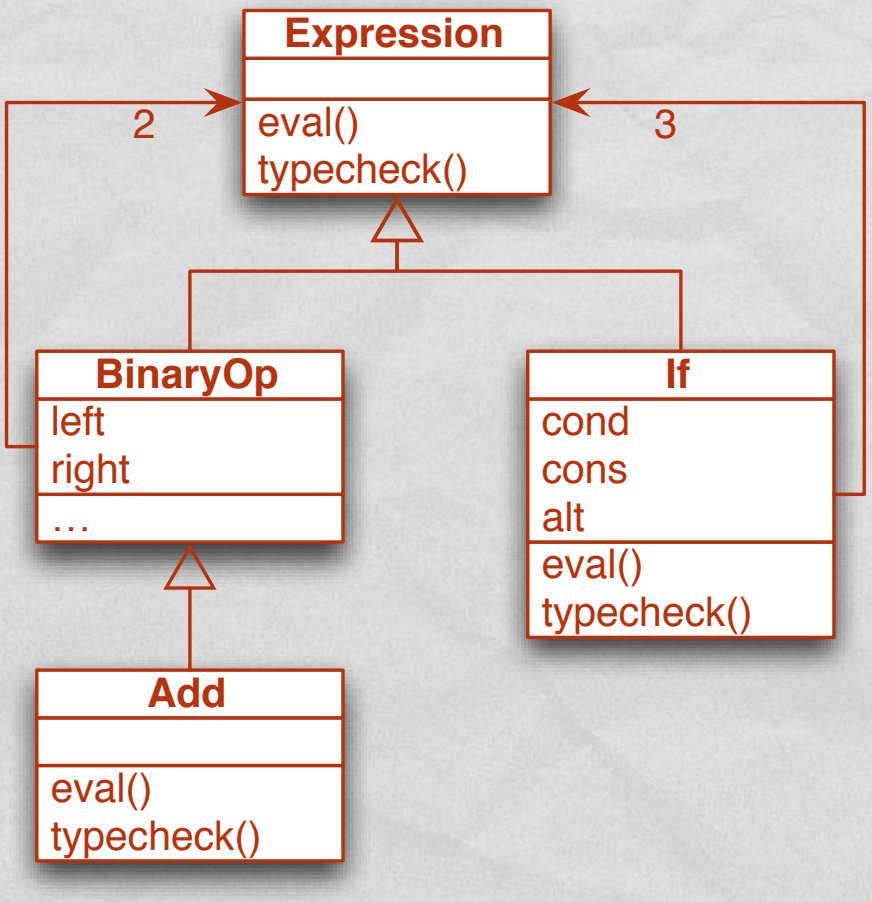



```
(define eval
  (lambda (exp)
    (cond
      ((add-exp? exp)
        (+ (eval (add-exp->left exp))
           (eval (add-exp->right exp))))
      (…))))

(define typecheck …)
```

Q1–3

HOW WOULD WE ADD A "PRETTYPRINT" OPERATION?




```
(define eval
  (lambda (exp)
    (cond
      ((add-exp? exp)
        (+ (eval (add-exp->left exp))
           (eval (add-exp->right exp))))
      (…))))

(define typecheck …)
```

Q4–6

OO WORK-AROUND: THE VISITOR PATTERN

- Use function objects to represent operations
- Add “accept” methods to all datatypes
- Use double-dispatch to match operations and datatypes