61A Lecture 30

Monday, November 18

Announcements

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- Homework 9 due Tuesday 11/19 @ 11:59pm

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- Project 4 due Thursday 11/21 @ 11:59pm

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- Project 4 due Thursday 11/21 @ 11:59pm
- Extra reader office hours in 405 Soda this week
  - Monday: 5pm–6:30pm
  - Tuesday: 6pm–7:30pm
  - Wednesday: 5:30pm–7pm
  - Thursday: 5:30pm–7pm

Information Hiding

Attributes for Internal Use

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>>> [next(fibs) for _ in range(10)]
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Starting a name with *two underscores* enforces restricted access from outside the class.

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def fib_generator():
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    yield 0
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There is no way to access values bound to "previous" and "current" externally

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Streams

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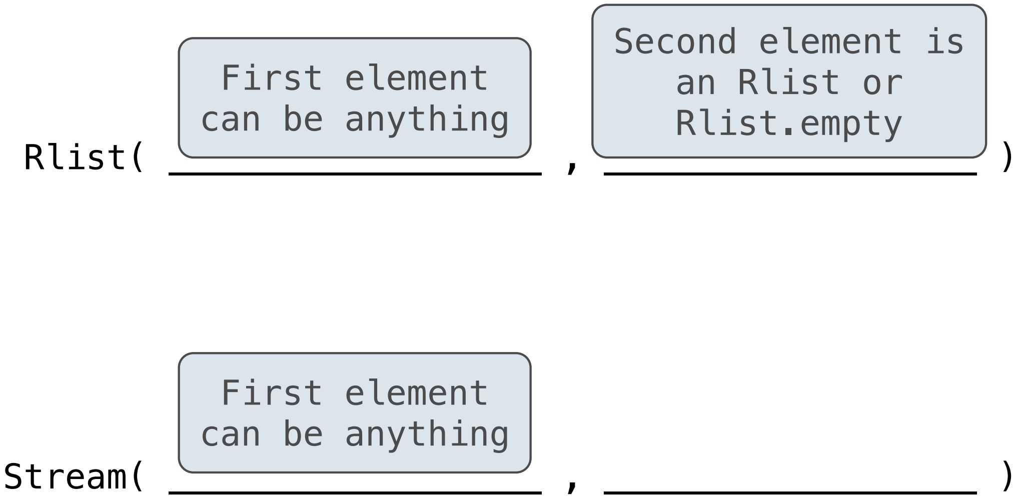

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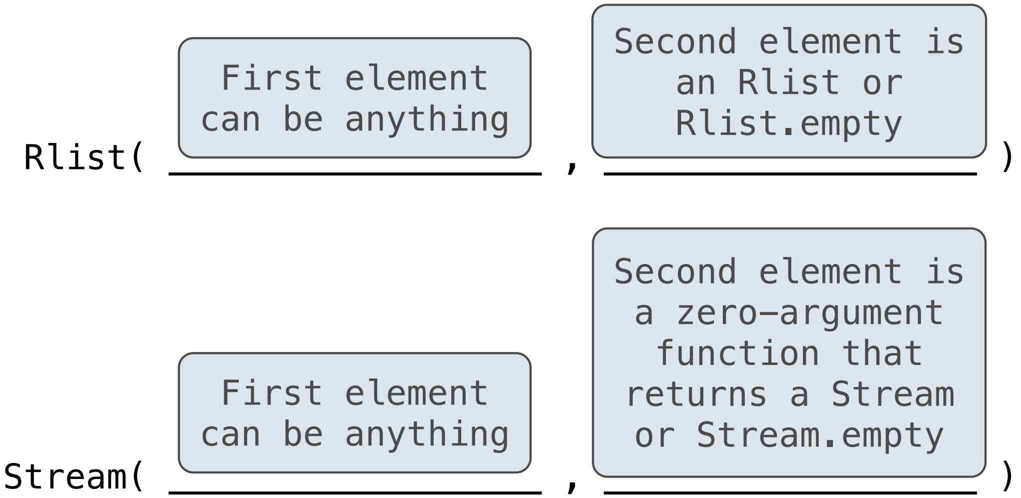

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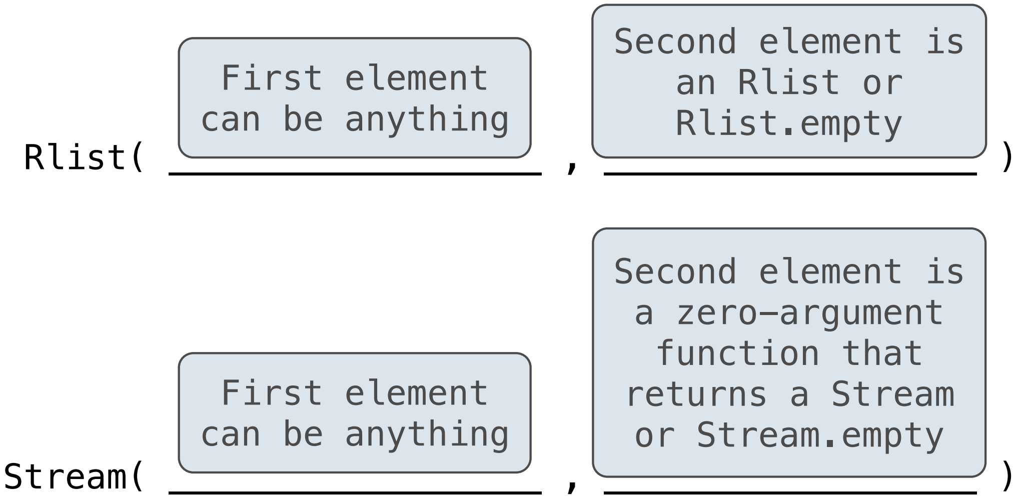

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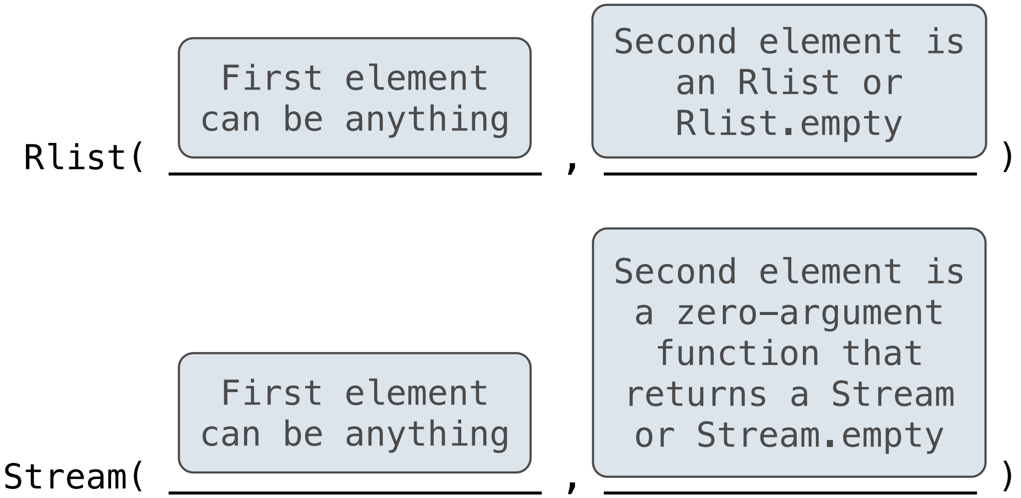

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(Demo)

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```
def integer_stream(first=1):
    """Return a stream of consecutive integers, starting with first.

    >>> s = integer_stream(3)
    >>> s.first
    3
    >>> s.rest.first
    4
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    def compute_rest():
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    class empty:
        def __repr__(self):
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        assert callable(compute_rest), 'compute_rest must be callable.'
        self.first = first
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        self.first = first
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    @property
    def rest(self):
        """Return the rest of the stream, computing it if necessary."""
        if self._compute_rest is not None:
            self._rest = self._compute_rest()
            self._compute_rest = None
        return self._rest
```

Higher-Order Functions on Streams

Mapping a Function over a Stream

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def map_stream(fn, s):
    """Map a function fn over the elements of a stream s."""
    if s is Stream.empty:
        return s
    def compute_rest():
        return map_stream(fn, s.rest)
    return Stream(fn(s.first), compute_rest)
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```
>>> s = integer_stream(3)
>>> s
Stream(3, <...>)
>>> m = map_stream(lambda x: x*x, s)
>>> first_k(m, 5)
[9, 16, 25, 36, 49]
```

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def filter_stream(fn, s):
    """Filter stream s with predicate function fn."""
    if s is Stream.empty:
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    def compute_rest():
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    if fn(s.first):
        return Stream(s.first, compute_rest)
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