

61A Lecture 23

Friday, October 24

Announcements

- Midterm 2 is on Monday 10/27 7pm-9pm
- Topics and locations: <http://cs61a.org/exams/midterm2.html>
- Bring 1 hand-written, 2-sided sheet of notes; Two study guides will be provided
- Emphasis: mutable data, object-oriented programming, recursion, and recursive data
- Review session on Saturday 10/25 from 3pm to 6pm in 2050 VLSB
- HKN review session on Sunday, 10/26 12-3pm in 155 Dwinelle
- Includes content through Wednesday 10/22 (today is review & examples)
- Discussion handouts contain practice questions!
- No lecture next Monday, No lab next Tuesday & Wednesday, No office hours next Mon-Wed

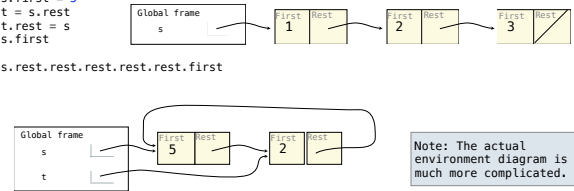
Mutable Linked Lists

Recursive Lists Can Change

Attribute assignment statements can change first and rest attributes of a Link

The rest of a linked list can contain the linked list as a sub-list

```
>>> s = Link(1, Link(2, Link(3)))
>>> s.first = 5
>>> t = s.rest
>>> t.rest = s
>>> s.first
5
>>> s.rest.rest.rest.rest.rest.first
2
```

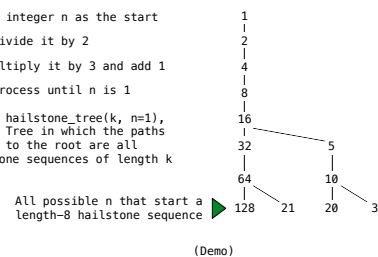


Hailstone Trees

Hailstone Trees

Pick a positive integer n as the start
If n is even, divide it by 2
If n is odd, multiply it by 3 and add 1
Continue this process until n is 1

Question: Write `hailstone_tree(k, n=1)`, which returns a Tree in which the paths from the leaves to the root are all possible hailstone sequences of length k ending in 1.



Question: List the leaves of a Tree instance

Binary Hailstone Trees

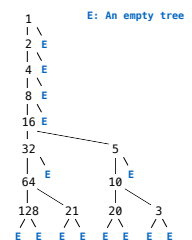
Hailstone Trees using BinaryTree

```
class BinaryTree(Tree):
    empty = Tree(None)
    empty.is_empty = True

    def __init__(self, entry, left=empty, right=empty):
        Tree.__init__(self, entry, (left, right))
        self.is_empty = False

    @property
    def left(self):
        return self.branches[0]

    @property
    def right(self):
        return self.branches[1]
```



Question: List the entries in the longest path in a binary tree for which all elements are less than k

Environment Diagrams

Go Bears!

