Containers

Announcements

Iteration and Recursion

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(Demo)

Box-and-Pointer Notation

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Lists can contain lists as elements (in addition to anything else)

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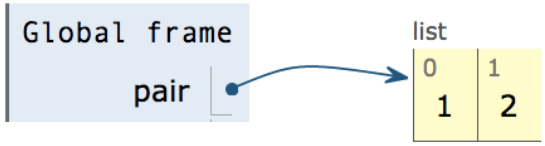


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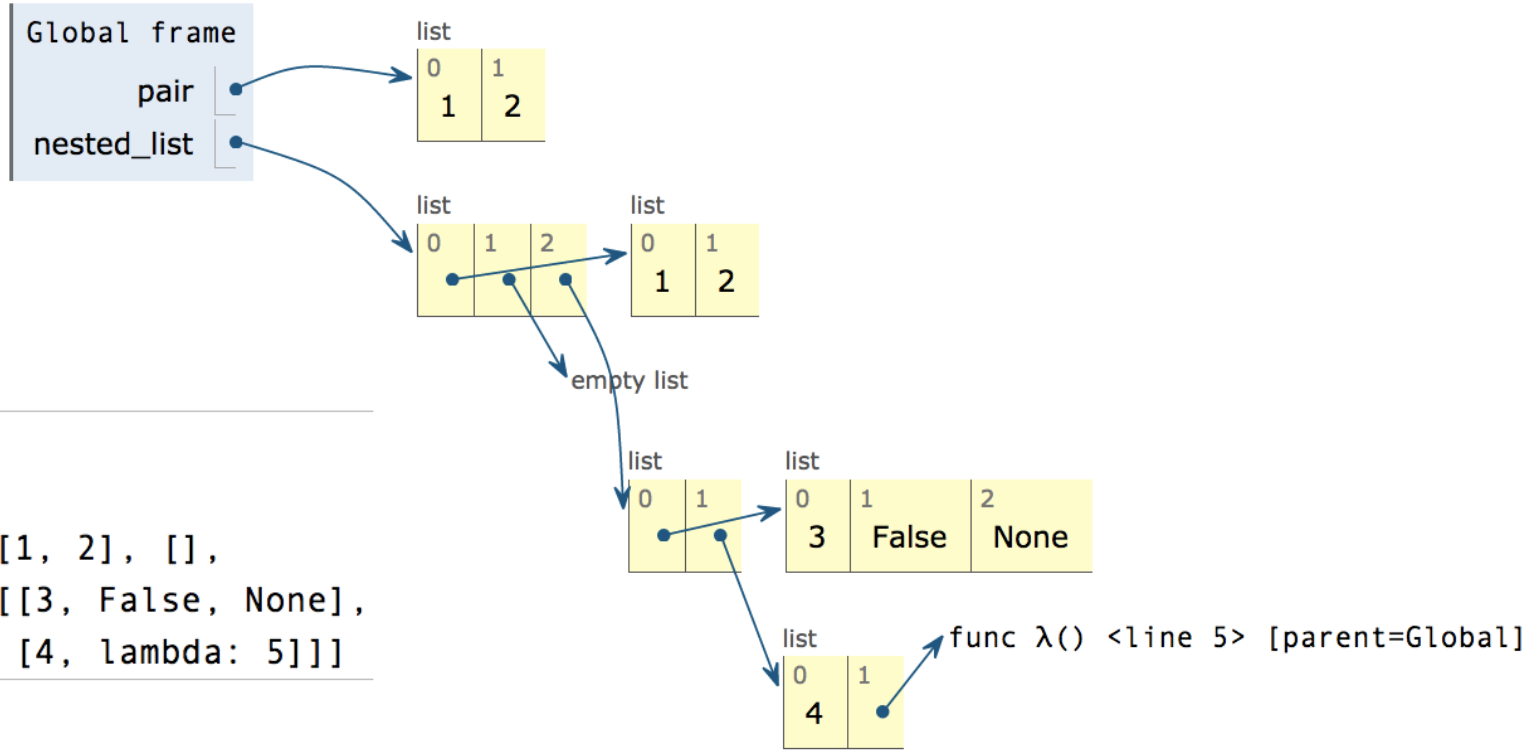


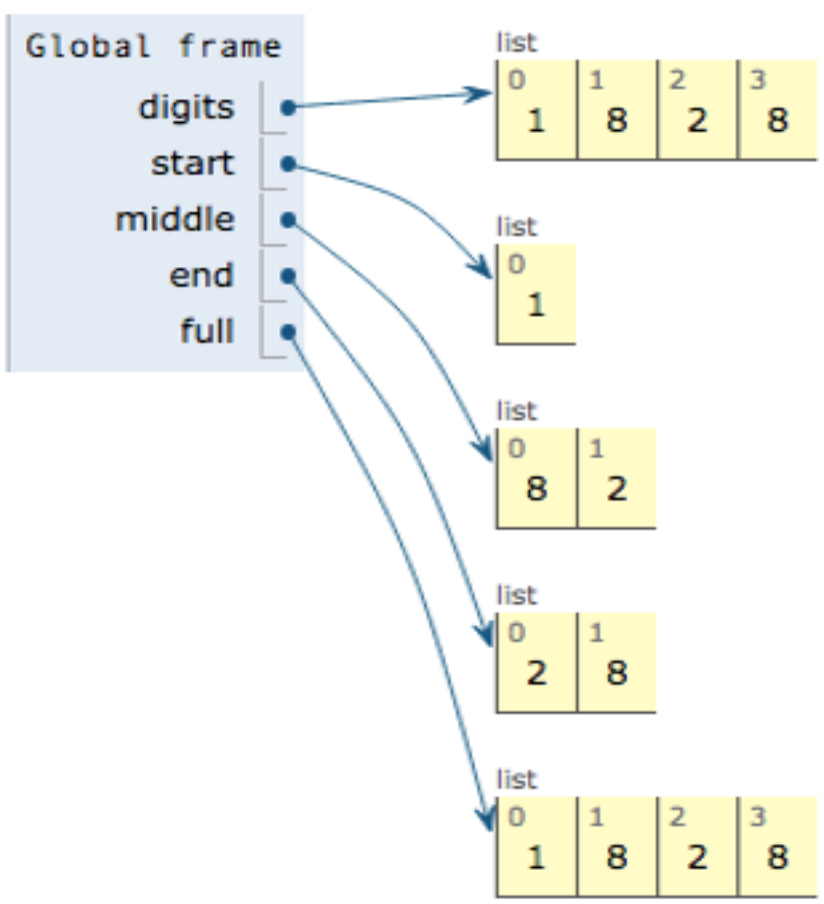

```
1  pair = [1, 2]
2
3  nested_list = [[1, 2], [],
4                 [[3, False, None],
5                  [4, lambda: 5]]]
```


pythontutor.com/composingprograms.html#code=pair%20%3D%20[1,%202]%0A%0Anested_list%20%3D%20[[1,%202],%20[],%0A%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20[[3,%20False,%20None],%0A%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20[4,%20lambda%3A%205]]]&mode=display&origin=composingprograms.js&cumulative=true&py=3&rawInputLstJSON=[]&curInstr=4

Slicing Creates Lists

Slicing Creates New Values

```
1  digits = [1, 8, 2, 8]
2  start = digits[:1]
3  middle = digits[1:3]
4  end = digits[2:]
5  full = digits[:]
```



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Processing Container Values

(Demo)

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- **all**(iterable) -> bool

  Return True if bool(x) is True for all values x in the iterable.
  If the iterable is empty, return True.

sum(([[2, 3], [4]], [])
>> [2, 3, 4]

s = [1, 2, 3, 4]
sum(s, 0)
>> 10

---

max(1, 2, 3, 4)
>> 4

max([1, 2, 3, 4])
>> 4

max[“hi”, “i”, “like”, “class”, “a”, “bit”])
>> ‘like’
max[…, key=len]
#가장 긴 것 return
>> ‘class’

max([[1], [2, 3], [4], [0, 1, 3]])
>> [4]

Discussion Question

Find the power of 2 that is closest to 1,000 using one line:

(You can assume that it's smaller than 2 ** 100.)

```
min( [ _____________________________ ], key= _____________________________ )
```

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```
min( [ 2 ** n for n in range(100) ], key= lambda x: abs(1000 - x) )
```

Strings

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Representing programs:

```
'curry = lambda f: lambda x: lambda y: f(x, y)'
```

s = 'curry = lambda f: lambda x: lambda y: f(x, y)'
s[:8]
>> ‘curry = ’

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(Demo)

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"Line feed" character represents a new line

Dictionaries

```
{'Dem': 0}
```

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The second restriction is part of the dictionary abstraction

numerals.values()
>> dict_values([1, 5, 10])
list(numerals.values())
>> [1, 5, 10]

* value로 부르면 안됨. key로.

numerals.get('V', 0)
>> 5
numerals.get('C', 0)
# 없으면 C를 0로 하고 get
>> 0

{1: 2, 1: 3}
>> {1: 3}
{1: [2, 3]}
>> {1: [2, 3]}

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If you want to associate multiple values with a key, store them all in a sequence value

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```
{x * x: x for x in [1, 2, 3, 4, 5] if x > 2}  evaluates to  {9: 3, 16: 4, 25: 5}
```

Example: Indexing

Implement **index**, which takes a sequence of **keys**, a sequence of **values**, and a two-argument **match** function. It returns a dictionary from **keys** to lists in which the list for a key k contains all **values** v for which **match**(k, v) is a true value.

```
def index(keys, values, match):
    """Return a dictionary from keys k to a list of values v for which
    match(k, v) is a true value.

    >>> index([7, 9, 11], range(30, 50), lambda k, v: v % k == 0)
    {7: [35, 42, 49], 9: [36, 45], 11: [33, 44]}
    """

    return ____________________________________________________________
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