Containers

Announcements

Iteration and Recursion

Replacing Iteration with Recursion

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- If needed, introduce a new function with an argument for every value that must be tracked.

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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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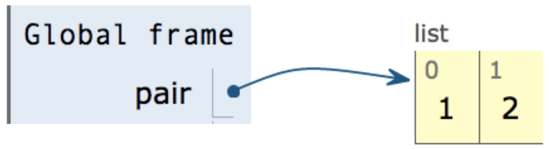

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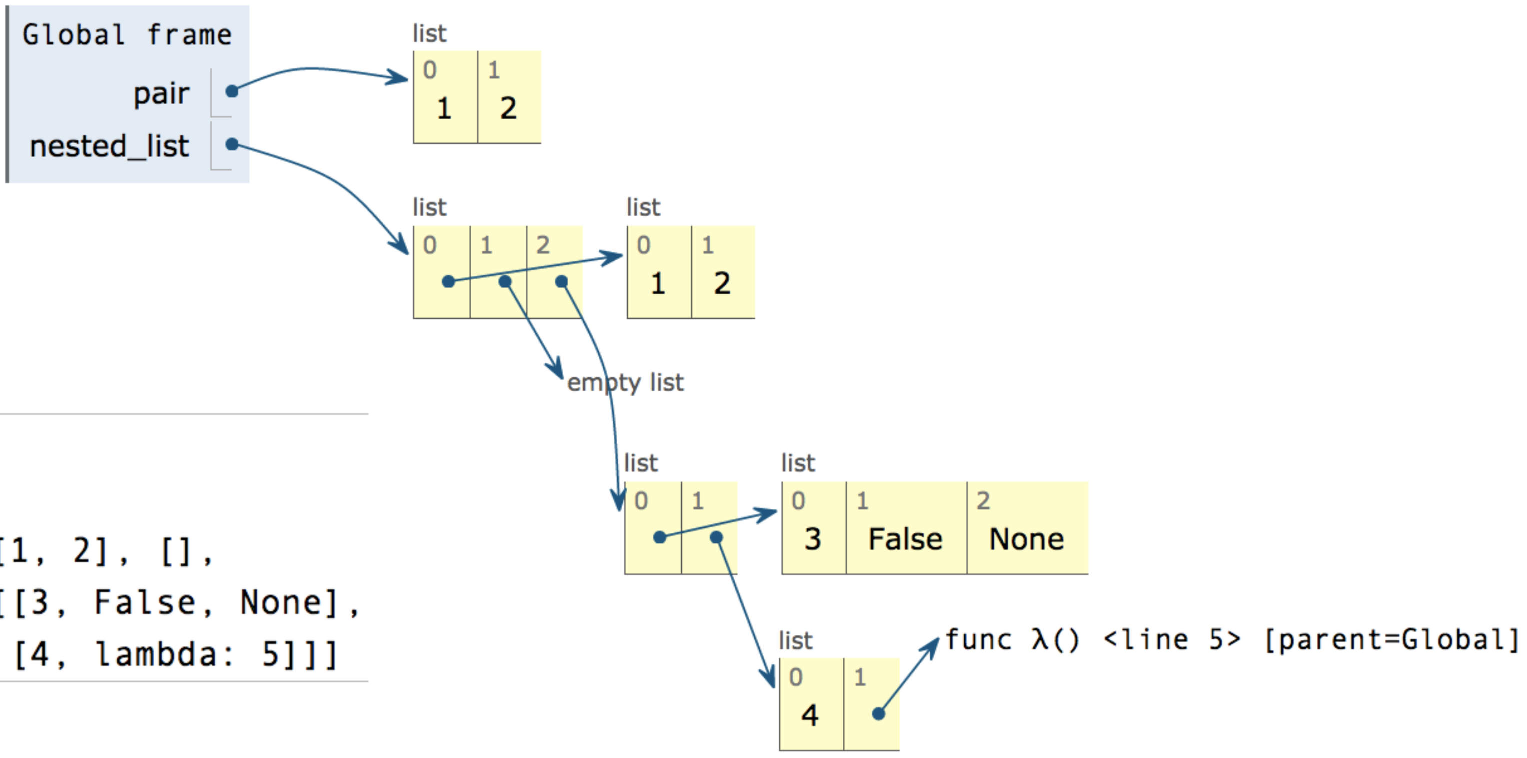
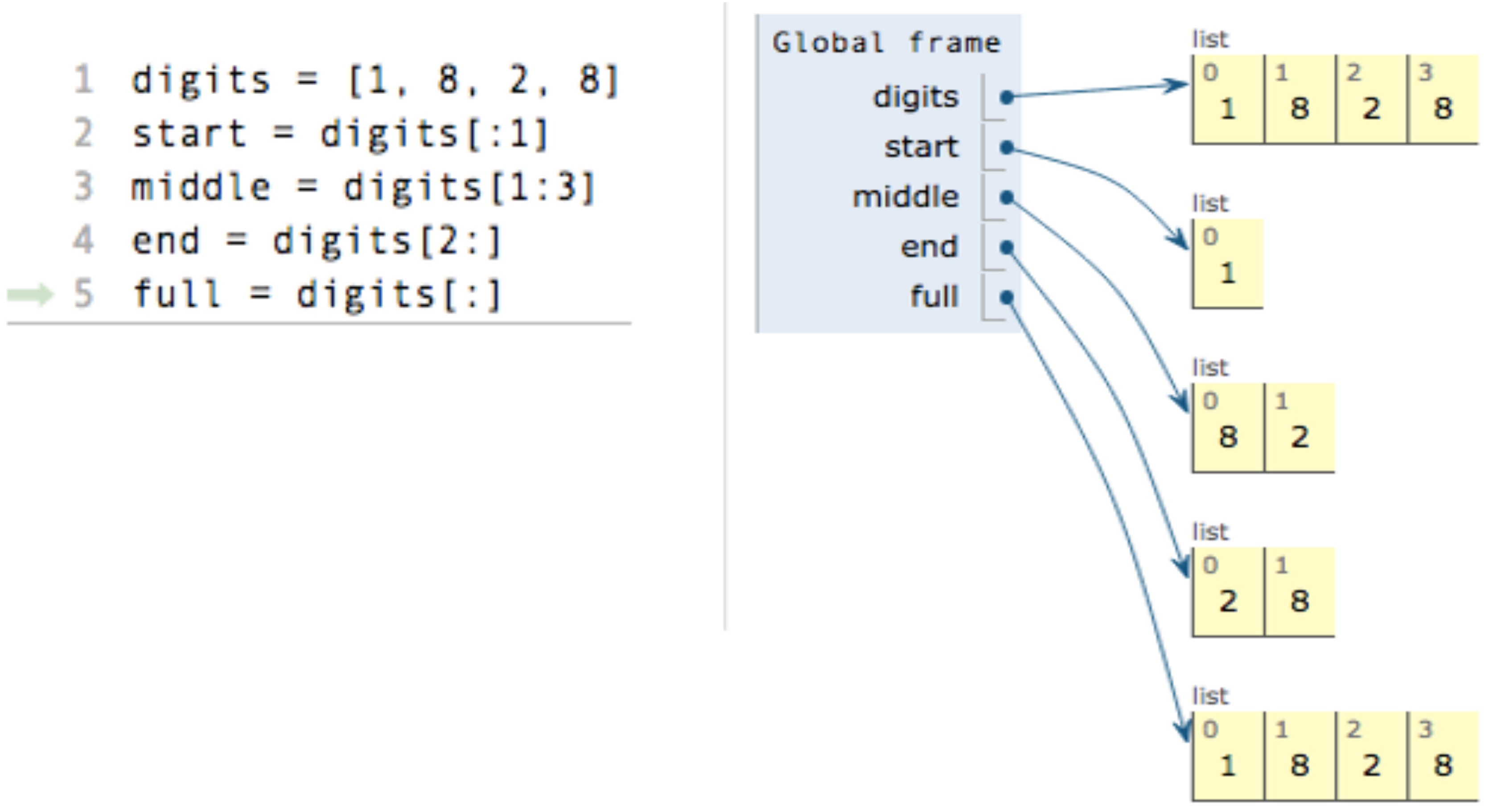


```
1  pair = [1, 2]
2
3  nested_list = [[1, 2], [],
4                 [[3, False, None],
5                  [4, lambda: 5]]]
```

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[[3,%20False,%20None],%0A%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



```
digits = [1, 8, 2, 8]
start = digits[:1]
middle = digits[1:3]
end = digits[2:]
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.
  ```

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.)
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```
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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"Line feed" character represents a new line

Dictionaries

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{'Dem': 0}
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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.

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def index(keys, values, match):
    """Return a dictionary from keys k to a list of values v for which
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    >>> index([7, 9, 11], range(30, 50), lambda k, v: v % k == 0)
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    """

    return ______________________________________________________
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