CSC148 winter 2015

linked lists, iteration, mutation — week 8

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Outline

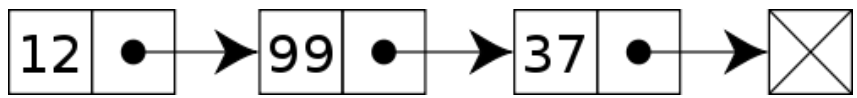
mutation

linked lists, two concepts

There are two useful, but different, ways of thinking of linked list structures

1. as lists made up of an item (value) and a sub-list (rest)

2. as objects (nodes) with a value and a reference to other similar objects



For now, will take the second point-of-view, and design a separate "wrapper" to represent a linked list as a whole.

a node class

```
class LLNode:
    '''Node to be used in linked list

    nxt: LLNode -- next node
                   None iff we're at end of list
    value: object --- data for current node
    '''

    def __init__(self, value, nxt=None):
        ''' (LLNode, object, LLNode) -> NoneType

        Create LLNode (self) with data value and successor nxt.
        '''
        self.value, self.nxt = value, nxt
```

a wrapper class for list

The list class keeps track of information about the entire list — such as its front, back, and size.

```
class LinkedList:
    '''Collection of LLNodes

    front: LLNode -- front of list
    back:  LLNode -- back of list'''

    def __init__(self):
        ''' (LinkedList) -> NoneType

        Create an empty linked list.
        '''
        self.front, self.back = None, None
        self.size = 0
```

division of labour

Most of the work of special methods is done by the nodes:

- `__repr__`
- `__str__`
- `__eq__`

Once these are done for nodes, it's easy to do them for the entire list.

walking a list

Make a reference to (at least one) node, and move it along the list:

```
cur_node = self.front
while <some condition here...>:
    # do something here...
    cur_node = cur_node.nxt
```

__contains__

Check (possibly) every node

```
cur_node = self.front
while <some condition here...>:
    # do something here...
    cur_node = cur_node.nxt
```

__getitem__

Should enable things like

```
>>> print(lnk[0])
5
```

... or even

```
>>> print(lnk[0:3])
5 -> 4 -> 3 ->|
```

append

We'll need to change...

- last node
- former last node
- **back**
- **size**
- possibly **front**

draw pictures!

delete_back

We need to find the **second last** node. Walk **two** references along the list.

```
prev_node, cur_node = None, lnk.front
# walk along until cur_node is lnk.back
while <some condition>:
    prev_node = cur_node
    cur_node = cur_node.nxt
```