CS 1110

Prelim 1 Review
Spring 2013

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Announcements

Extended profs. office hours
Thursday 9:05-12:05
Thurston 102

Prelim study tips
See Piazza @168

Exam Info

- Prelim 1: 7:30–9:00PM, Thursday, March 7
  - Location: Kennedy 116 (Call Auditorium)
- To help you study:
  - Study guides, review slides are online
  - Solutions to Assignment 2 are online
- Arrive early! Helps reduce stress
- Grades will be released as soon as practical
  - CMS will let you know; hopefully by the weekend
  - Possibly not by drop deadline

What is on the Exam?

- Five Topics (+2pts for name, NetID, lab):
  - String manipulation (A1, Lab 2)
  - Call frames and the call stack (A2)
  - Functions on mutable objects (A3, Lab 3 & 5)
  - Testing and debugging (A1, Lab 3)
  - Short Answer (Terminology)

String Manipulation

```
def make_netid(name,n):
    """Returns a netid for name with suffix n

    Netid is either two letters and a number (if the student has no
    middle name) or three letters and a number (if the student has
    a middle name).  Letters in netid are lowercase.

    Example: make_netid('Walker McMillan White',2) is 'wmw2'

    Example: make_netid('Walker White',4) is 'ww4'

    Precondition: name is a string either with format '<first-name>
    <last-name>' or '<first-name> <middle-name> <last-name>';
    names are separated by spaces.  n > 0 is an int."""
```

Useful String Methods

Method	Result
s.index(s1)	Returns first position of s1 in s; error if not there
s.count(s1)	Returns number of occurrences of s1 in s
s.lower()	Returns copy of s with all letters lower case
s.upper()	Returns copy of s with all letters upper case
s.strip()	Returns copy of s with whitespace removed

- We will give you any methods you need
- But you must know how to slice strings!

String Manipulation

```
def make_netid(name,n):
    """Returns a netid for name with suffix n."""
    name = name.lower() # switch to lower case
    fpos = name.find(' ')   # find first space
    first = name[:fpos]
    last = name[fpos+1:]
    mpos = last.find(' ')    # see if there is another space
    if mpos == -1:
        return first[0]+last[0]+`n`   # remember, n is not a string
    else:
        middle = last[:mpos]
        last = last[mpos+1:]
        return first[0]+middle[0]+last[0]+`n`
```

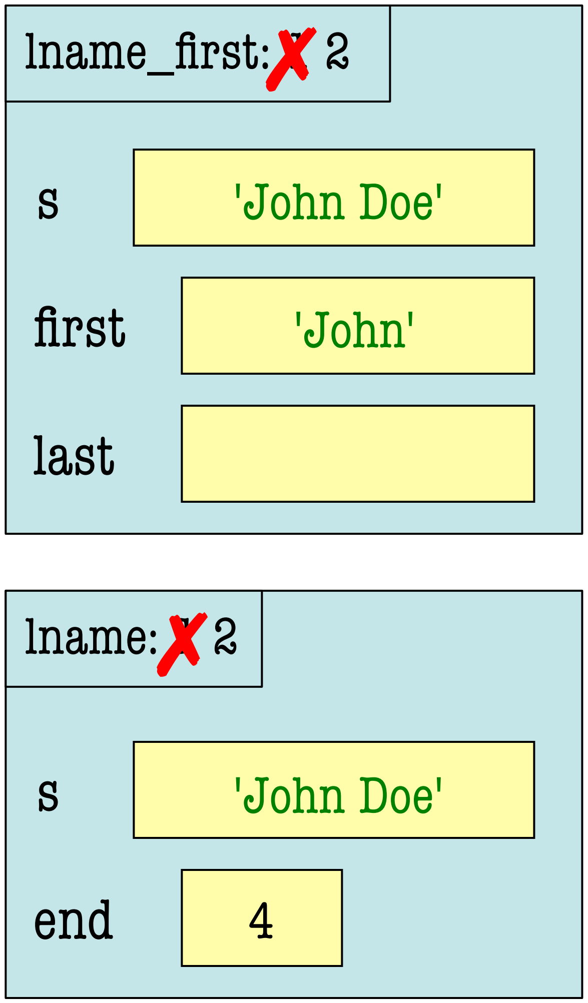
Call Stack Example

- Given functions to right
  - Function fname() is not important for problem
  - Use the numbers given
- Execute the call: lname_first('John Doe')
- Draw **entire** call stack when helper function lname completes line 1
  - Draw nothing else

```
    def  lname_first(s):
        """Precondition: s in the form
        <first-name> <last-name>"""
1       first = fname(s)
2       last = lname(s)
3       return last + ',' + first
```

```
    def  lname(s):
        """Prec: see last_name_first"""
1       end = s.find(' ')
2       return s[end+1:]
```

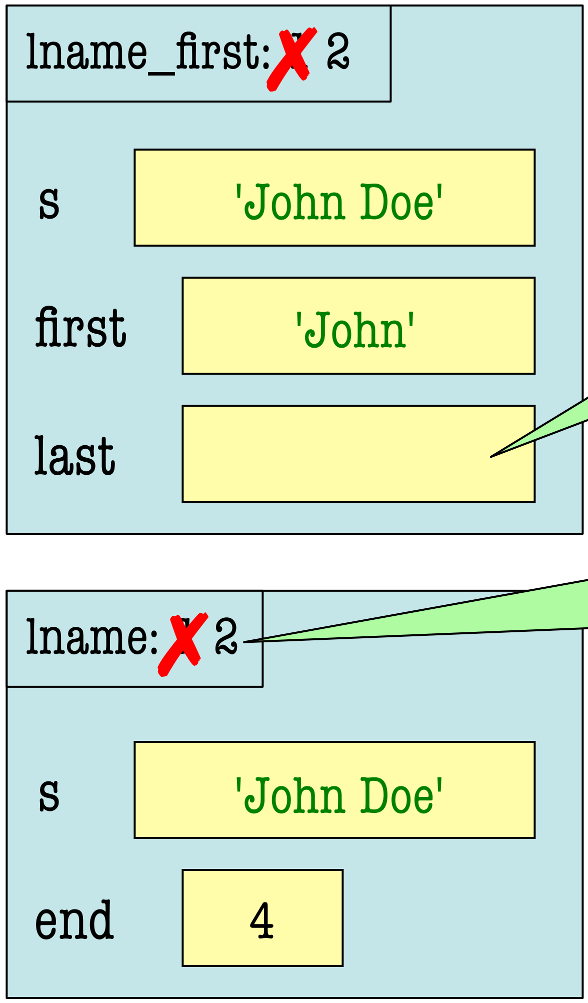
Call Stack Example: lname_first('John Doe')



```
  def lname_first(s):
      """Precondition: s in the form
      <first-name> <last-name>"""
1     first = fname(s)
2     last = lname(s)
3     return last + ',' + first

  def lname(s):
      """Prec: see last_name_first"""
1     end = s.find(' ')
2     return s[end+1:]
```

Call Stack Example: lname_first('John Doe')



```
def  lname_first(s):
                          s in the form
                          st-name>"""
        first = lname(s)
    2   last = lname(s)
                          + first

        """Prec: see last_name_first"""
    1   end = s.find(' ')
    2   return s[end+1:]
```

Omitting this is okay.
Line 2 is not complete.

Line 1 is **complete**.
Counter is next line.

Example with a Mutable Object

```
def shift(p):
    """Shift coords left
    Precondition: p a point"""
    temp = p.x
    p.x = p.y
    p.y = p.z
    p.z = temp
```

- May get a function on a mutable object

```
>>> p = Point(1.0,2.0,3.0)
>>> shift(p)
```

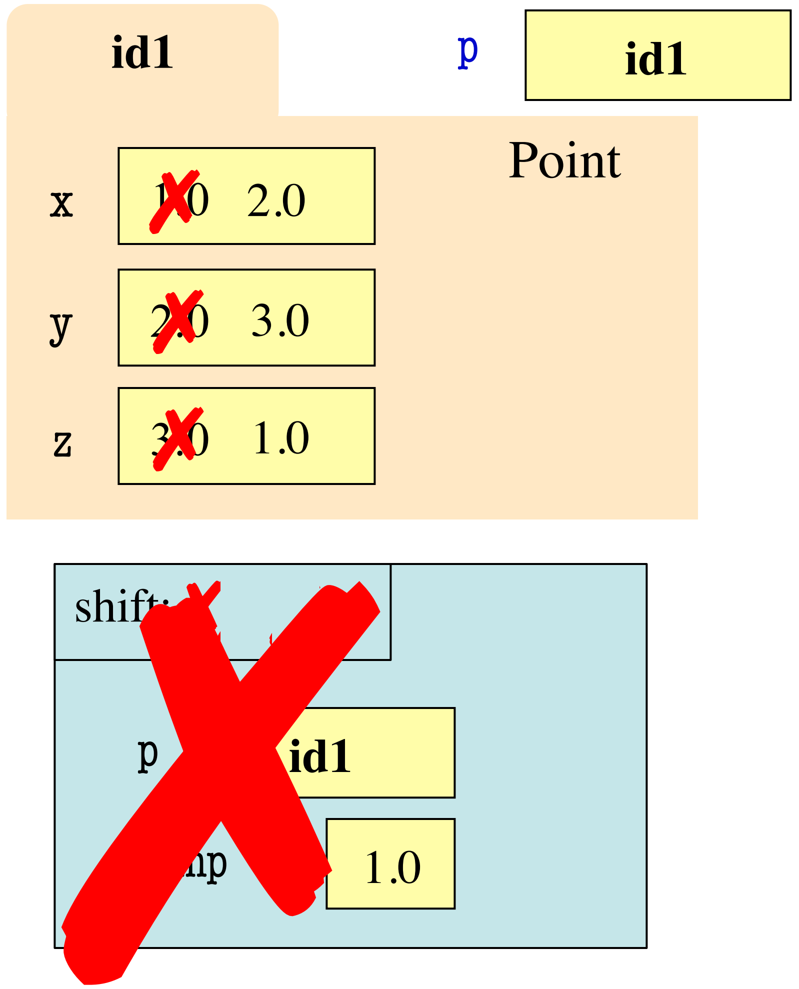
- You are not expected to come up w/ the “folder”
  - Will provide it for you
  - You just track changes

Example with a Mutable Object

```
def shift(p):
    """Shift coords left
    Precondition: p a point"""
1   temp = p.x
2   p.x = p.y
3   p.y = p.z
4   p.z = temp
```

```
>>> p = Point(1.0,2.0,3.0)
>>> shift(p)
```

Function Call



Objects: example from A3

- Type: RGB in colormodel.py
  - Constructor call: `colormodel.RGB(r,g,b)`

    --- assuming prior line `import colormodel`,

    and r, g, b are ints in interval 0..255

Attribute	Invariant
red	int, within range 0..255
green	int, within range 0..255
blue	int, within range 0..255

Function that Modifies Object

```
def increase10(rgb):
    """Increase each attribute by 10% (up to 255)
    Precondition: rgb an RGB object"""
    pass # implement me
```

Sample step

```
# store in t the value of rgb's red attribute
# Which of these is correct?  What do the others do?
t = colormodel.RED
t = rgb.red()
t = rgb.r
t = rgb.red
t = colormodel.rgb.red
```

Sample step – answer in bold

```
# store in t the value of rgb's red attribute
# Which of these is correct?  What do the others do?
t = colormodel.RED # refers to something in colormodel
t = rgb.red() # call to function "in" rgb
t = rgb.r # attribute r of rgb, but there's no such attribute
```
t = rgb.red `# <obj name>.<attr name> is the way to access`
```
t = colormodel.rgb.red # refers to something in rgb in
                       #colormodel
```

Should increase10 have return statement?

Should increase10 have return statement?

No; the spec doesn't say so.

Function that Modifies Object

```
def increase10(rgb):
    """Increase each attribute by 10% (up to 255)"""
    red = rgb.red  # puts red attribute value in local var
    red = 1.1*red # increase by 10%
    red = int(round(red))  # convert to closest int
    rgb.red = min(255,red)  # cannot go over 255
    # Do the others in one line
    rgb.green = min(255,int(round(1.1*rgb.green)))
    rgb.blue = min(255,int(round(1.1*rgb.blue)))
```

Procedure:
no return

```
def multcap(x):
    """Returns: min of nearest int to x*1.1 and 255.
    Precond: x a number"""
    return min(int(round(x*1.1)), 255)

def increase10(rgb):
    """Increase each attribute by 10% (up to 255)"""
    # alternate solution with massive map
    alist = map(multcap, [rgb.red, rgb.green, rgb.blue])
    rgb.red = alist[0]
    rgb.green = alist[1]
    rgb.blue = alist[2]
```

Procedure:
no return

Code up a test case for increase10 (assume in module reviewp1)

```
testcolor = colormodel.RGB(10,100,255)
reviewp1.increase10(testcolor)
cunittest2.assert_equals(colormodel.RGB(11,110,255),
                          testcolor)
```

Why not this?

```
cunittest2.assert_equals(colormodel.RGB(11,110,255),
                          reviewp1.increase10(testcolor))
```

No return value to compare against.

- Type: Length in module ell
  - Constructor call: `ell.Length(ft,in)`

    --- assuming prior line `import ell` and `ft` and `in` are ints, given:

Attribute	Invariant
feet	int, non-negative, = 12 in
inches	int, within range 0..11 inclusive

```
def difference(len1,len2):
    """Returns: Difference between len1 and len2
    Result is returned in inches
    Precondition: len1 and len2 are length objects
    len1 is longer than len2"""
    pass # implement me
```

Function that Does Not Modify Object

```
def difference(len1,len2):
    """Returns: Difference between len1 and len2

    Result is returned in inches

    Precondition: len1 and len2 are length objects
    len1 is longer than len2"""
    feetdif = (len1.feet-len2.feet)*12
    inchdif = len1.inches-len2.inches # may be negative
    return feetdif+inchdif
```

Picking Test Cases

```
def pigify(w):
    """Returns: copy of w converted to Pig Latin
    'y' is a vowel if it is not the first letter
    If word begins with a vowel, append 'hay'
    If word starts with 'q', assume followed by 'u';
    move 'qu' to the end, and append 'ay'
    If word begins with a consonant, move all
    consonants up to first vowel (or to end of w, if
none) to end and add 'ay'
    Precondition: w contains only (lowercase)
letters, and at least one letter"""
```

Picking Test Cases

```
def pigify(w):
    """Returns: copy of w converted to Pig Latin"""
    …
```

- Test Cases (Determined by the rules):

yield => ieldyay	(y as consonant)
byline => ylinebay	(y as vowel)
are => arehay	(Starts with vowel)
quiet => ietquay	(Starts with qu)
ship => ipshay	(Starts with consonant(s))
bzzz => bzzzay	(All consonants)

Tracing Control Flow

```
def first(x):
1.      print 'Starting first.'
2.      second(x)
3.      print 'Ending first'

def second(x):
1.      print 'Starting second.'
2.      if third(x):
3.          pass
4.      else:
5.          print 'Caught False at second'
6.      print 'Ending second'
```

```
def third(x):
1.      print 'Starting third.'
2.      print 'Ending third.'
3.      return x < 1
```

What is the output of first(2)?

Tracing Control Flow

```
def first(x):
1.      print 'Starting first.'
2.      second(x)
3.      print 'Ending first'

def second(x):
1.      print 'Starting second.'
2.      if third(x):
3.          pass
4.      else:
5.          print 'Caught False at second'
6.      print 'Ending second'
```

```
def third(x):
1.      print 'Starting third.'
2.      print 'Ending third.'
3.      return x < 1
```

What is the output of first(2)?

```
'Starting first.'
'Starting second.'
'Starting third.'
'Ending third'
'Caught False at second'
'Ending second'
'Ending first'
```

Tracing Control Flow

```
def first(x):
1.     print 'Starting first.'
2.     second(x)
3.     print 'Ending first'

def second(x):
1.     print 'Starting second.'
2.     if third(x):
3.         pass
4.     else:
5.         print 'Caught False at second'
6.     print 'Ending second'
```

```
def third(x):
1.     print 'Starting third.'
2.     print 'Ending third.'
3.     return x < 1
```

What is the output of first(0)?

Tracing Control Flow

```
def first(x):
1.      print 'Starting first.'
2.      second(x)
3.      print 'Ending first’

def second(x):
1.      print 'Starting second.'
2.      if third(x):
3.          pass
4.      else:
5.          print 'Caught False at second’
6.      print 'Ending second’
```

```
def third(x):
1.      print 'Starting third.'
2.      print ’Ending third.'
3.      return x < 1
```

What is the output of first(0)?

```
'Starting first.'
'Starting second.'
'Starting third.'
'Ending third'
'Ending second'
'Ending first'
```

Looking for inspiration?

"""What most schools don't teach: Learn about a new "superpower" that isn't being taught in 90% of US schools."""

https://www.youtube.com/watch?feature=player_embedded&v=nKIu9yen5nc