CS1110

Lecture –1: Final review session

Announcements

Review materials

See website for a version of last year's final with conventions redone to match this year.

Slides by D. Gries, L. Lee, S. Marschner, W. White

Mistakes Were Made

I accidentally posted last semester's A7 solutions

to the Web. (I, Prof. Lee, and not an angel.)

- We are moving the solution to CMS so everyone in the class can see it, but not the world.
- We will grade A7 as if this hadn't happened.
- You should try to solve each step yourself before you look (but we are permitting you to look). Don't just copy; yours should be diff. in design.
- Credit Prof. White at top of file if you got/incorporated ideas from his solution.

Implement according to spec

```
class Document(object):
    """Instances represent scholarly documents.

    Instance variables:
      title [str]: title of the document
      authors [list of str]: names of authors, in the form 'Last, F.'
      works_cited [list of Document]: documents cited by this document.
    """

    def __init__(self, title, authors, works_cited):
        """A new document with given title, author list, and bibliography."""
        pass  # IMPLEMENT ME

    def biblio_entry(self):
        """A minimal bibliography entry for this document, authors followed by title.
        Example: Marschner, S., Lee, L., White, W. “Intro to Python.”"""
        pass  # IMPLEMENT ME
```

```
class Book(Document):
    """Instances represent books.

    Instance variables:
        publisher [str]: name of publisher
        pub_year [int]: year of publication
    """

    def __init__(self, title, authors, works_cited,
                       publisher, pub_year):
        """A new book with the given properties."""
        pass    # IMPLEMENT ME

class Article(Document):
    """Instances represent articles that appear in journals.

    Instance variables:
        journal [str]: title of the journal
        month [int]: month (January = 1, etc.) of issue in which article appears
        year [int]: year in which article appeared
    """

    def __init__(self, title, authors, works_cited,
                 journal, volume, issue, year):
        """A new journal article with the given properties."""
```

Implement the initializers for these subclasses according to their specs.

Implement method biblio_entry according to its spec. You may add anything you need to the class above the initializer.

```
class Article(Document):
    """Instances represent articles that appear in journals.

    Instance variables:
        journal [str]: title of the journal
        month [int]: month (1 = Jan, etc.) of issue
                        in which article appears
        year [int]: year in which article appeared
    """


    def __init__(self, title, authors, works_cited,
                 journal, volume, issue, year):
        """A new journal article with the given properties."""
        Document.__init__(self, title, authors, works_cited)
        self.journal = journal
        self.month = month
        self.year = year

    def biblio_entry(self):
        """A bibliography entry with journal information.  Example of format:
       Schmo, J., Doe, J. "On the counting of books." Acta Bibliotecnica, May 2003.
        """
        pass    # IMPLEMENT ME
```

Implement methods citing_documents and works_by according to spec.

```
class Library(object):
    """Instances represent library collections."""

    def __init__(self, documents):
        """A library containing the given documents."""
        self.documents = documents[:]

    def citing_documents(self, document):
        """A list of the documents that cite the given document."""

    def works_by(self, author):
        """A list of the documents authored by a particular person."""
```

```
class Doc(object):

    def __init__(self, title, authors, works_cited):
        self.title = title
        self.authors = authors[:]
        self.works_cited = works_cited[:]

    def bibliography(self):
        entries = []
        for doc in self.works_cited:
            entries.append(doc.biblio_entry())
        return '\n'.join(entries)


class Book(Doc):

    def __init__(self, title, authors, cited,
                 publisher, pub_year):
        Doc.__init__(self, title, authors, cited)
        self.publisher = publisher
        self.pub_year = pub_year

    def biblio_entry(self):
        return (", ".join(self.authors) + ' ' + self.title +
            '. ' + self.publisher + ", " +
            str(self.pub_year) + ".")
```

```
class Article(Document):

    MONTHS = [None, 'Jan', 'Feb', 'Mar', 'Apr', 'May',
        'Jun', 'Jul', 'Aug', 'Sep', 'Oct', 'Nov', 'Dec']

    def __init__(self, title, authors, cited,
                 journal, month, year):
        Doc.__init__(self, title, authors, cited)
        self.journal = journal
        self.month = month
        self.year = year

    def biblio_entry(self):
        return (", ".join(self.authors) + ' "' + self.title +
            '." ' + self.journal + ", " +
            self.MONTHS[self.month] + ' ' +
            str(self.year) + ".")


def do_test():
    a = Article("Article 1", ["Schmo, J."], [],
        "Nature", 5, 2003)
    b = Book("Moby Dick", ["Melville, H."], [a],
        "Harper", 1851)
    c = Article("On Whales", ["Peters, K."], [a,b],
        "Science", 7, 2004)
    print c.bibliography()
```

Can you refer to the value “Harper” when the indicated statements are executing? How?

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class Doc(object):

    def __init__(self, title, authors, works_cited):
        self.title = title
        self.authors = authors[:]
        self.works_cited = works_cited[:]

    def bibliography(self):
        entries = []
        for doc in self.works_cited:
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        return '\n'.join(entries)


class Book(Doc):

    def __init__(self, title, authors, cited,
                 publisher, pub_year):
        Doc.__init__(self, title, authors, cited)
        self.publisher = publisher
        self.pub_year = pub_year

    def biblio_entry(self):
        return (", ".join(self.authors) + ' ' + self.title +
                '. ' + self.publisher + ", " +
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    def biblio_entry(self):
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    def __init__(self, title, authors, cited,
                 journal, month, year):
        Doc.__init__(self, title, authors, cited)
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    def biblio_entry(self):
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        self.pub_year = pub_year

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        'Jun', 'Jul', 'Aug', 'Sep', 'Oct', 'Nov', 'Dec']

    def __init__(self, title, authors, cited,
                 journal, month, year):
        Doc.__init__(self, title, authors, cited)
        self.journal = journal
        self.month = month
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    def __init__(self, title, authors, cited,
                 publisher, pub_year):
        Doc.__init__(self, title, authors, cited)
        self.publisher = publisher
        self.pub_year = pub_year

    def biblio_entry(self):
        return (", ".join(self.authors) + ' ' + self.title +
            '. ' + self.publisher + ", " +
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```
class Article(Document):

    MONTHS = [None, 'Jan', 'Feb', 'Mar', 'Apr', 'May',
        'Jun', 'Jul', 'Aug', 'Sep', 'Oct', 'Nov', 'Dec']

    def __init__(self, title, authors, cited,
                 journal, month, year):
        Doc.__init__(self, title, authors, cited)
        self.journal = journal
        self.month = month
        self.year = year

    def biblio_entry(self):
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class Doc(object):

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            '. ' + self.publisher + ", " +
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```
class Article(Document):

    MONTHS = [None, 'Jan', 'Feb', 'Mar', 'Apr', 'May',
        'Jun', 'Jul', 'Aug', 'Sep', 'Oct', 'Nov', 'Dec']

    def __init__(self, title, authors, cited,
                 journal, month, year):
        Doc.__init__(self, title, authors, cited)
        self.journal = journal
        self.month = month
        self.year = year

    def biblio_entry(self):
        return (", ".join(self.authors) + ' "' + self.title +
            '." ' + self.journal + ", " +
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        "Harper", 1851)
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        "Science", 7, 2004)
    print c.bibliography()
```

Can you refer to the value “Oct” when the indicated statements are executing? How?

```
class Doc(object):

    def __init__(self, title, authors, works_cited):
        self.title = title
        self.authors = authors[:]
        self.works_cited = works_cited[:]

    def bibliography(self):
        entries = []
        for doc in self.works_cited:
            entries.append(doc.biblio_entry())
        return '\n'.join(entries)


class Book(Doc):

    def __init__(self, title, authors, cited,
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        Doc.__init__(self, title, authors, cited)
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        Doc.__init__(self, title, authors, cited)
        self.journal = journal
        self.month = month
        self.year = year

    def biblio_entry(self):
        return (", ".join(self.authors) + ' "' + self.title +
            '." ' + self.journal + ", " +
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    print c.bibliography()
```

Diagram the execution of the call do_test().

What Might You Be Asked

- Create your own Exception class
- Write code to raise an exception
- Follow the path of a raised exception
- Write a simple try-except code fragment

When Do Exceptions Happen?

Automatically Created

```
def void foo():
    x = 5 / 0
```

Python creates Exception for you automatically

Manually Created

```
def void foo():
    raise Exception('Test Exc.')
```

You create Exception manually by **raising** it

What value does foo() return?

```
def foo():
    x = 1
    try:
        x = 2
        x  = x+5
    except StandardError:
        x = x+10
    return x
```

(A)

(B)

raise StandardError()

(C): nowhere (no raise stmt)

What value does foo() return?

```
def foo():
    x = 1
    try:
        x = 2
        x  = x+5
    except StandardError:
        x = x+10
    return x
```

(A)

(B)

```
raise StandardError()
```

(C): nowhere (no raise stmt)

(A): returns 11;

(B): returns 12 – sometimes, only parts of try-blocks are executed

(C) returns 7 – except-block isn't executed if no exception

Exception Tracing

```
def first(x):
    print 'Starting first.'
    try:
        second(x)
    except:
        print 'Caught at first'
    print 'Ending first'

def second(x):
    print 'Starting second.'
    try:
        third(x)
    except:
        print 'Caught at second'
    print 'Ending second'
```

```
def third(x):
    print 'Starting third.'
    assert x < 1
    print 'Ending third.'
```

What is the output of first(2)?

More Exception Tracing

```
def first(x):
    print 'Starting first.'
    try:
        second(x)
    except:
        print 'Caught at first'
    print 'Ending first'

def second(x):
    print 'Starting second.'
    try:
        third(x)
    except:
        print 'Caught at second'
    print 'Ending second'
```

```
def third(x):
    print 'Starting third.'
    assert x < 1
    print 'Ending third.'
```

What is the output of first(2)?

'Starting first.'

'Starting second.'

'Starting third.'

'Caught at second'

'Ending second'

'Ending first'

Exceptions and Dispatch-On-Type

```
def first(x):
    print 'Starting first.'
    try:
        second(x)
    except IOError:
        print 'Caught at first'
    print 'Ending first'

def second(x):
    print 'Starting second.'
    try:
        third(x)
    except AssertionError:
        print 'Caught at second'
    print 'Ending second'
```

```
def third(x):
    print 'Starting third.'
    if x < 0:
        raise IOError()
    elif x > 0:
        raise AssertionError()
    print 'Ending third.'
```

What is the output of first(-1)?

Exceptions and Dispatch-On-Type

```
def first(x):
    print 'Starting first.'
    try:
        second(x)
    except IOError:
        print 'Caught at first'
    print 'Ending first'

def second(x):
    print 'Starting second.'
    try:
        third(x)
    except AssertionError:
        print 'Caught at second'
    print 'Ending second'
```

```
def third(x):
    print 'Starting third.'
    if x < 0:
        raise IOError()
    elif x > 0:
        raise AssertionError()
    print 'Ending third.'
```

What is the output of first(-1)?

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

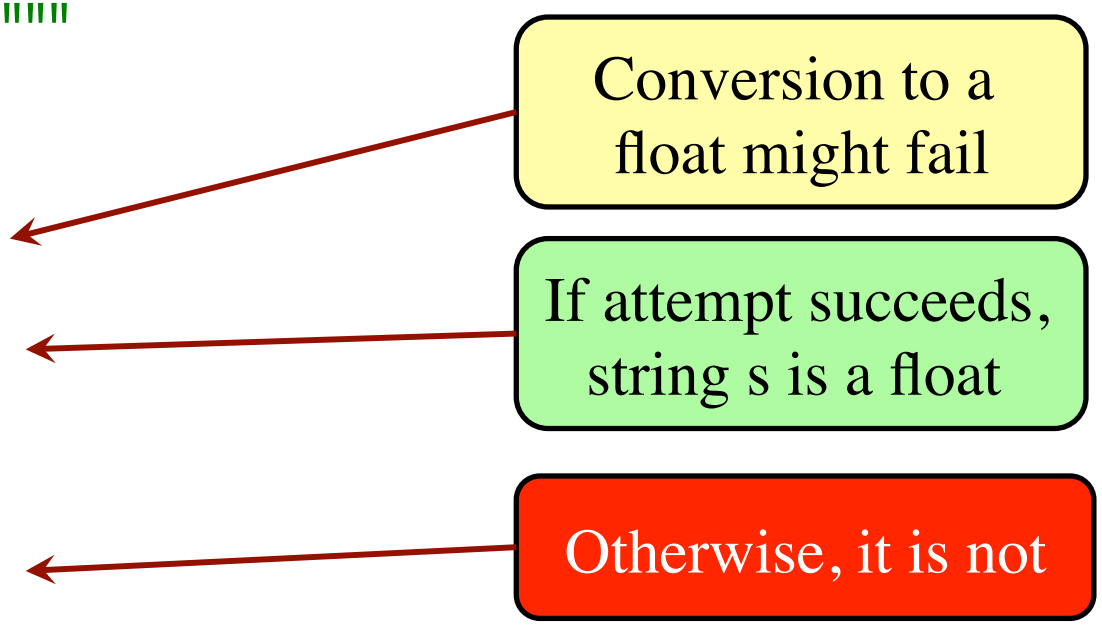
Programming With Try-Except

```
def isfloat(s):
    """Returns: True if string
    s represents a float.
    False otherwise"""
    # Implement me
```

float(s) returns an error if s does not represent a float

Programming With Try-Except

```
def isfloat(s):
    """Returns: True if string
    s represents a float.
    False otherwise"""
    try:
        x = float(s)
        return True
    except:
        return False
```



Loop question

```
def zrun(b,n):
    """Returns: [i,j] where b[i..j-1] is the first occurrence of
     n 0's in a row.  (OK if b[j] is 0).
    If there is no such run, i == j.
    Pre: n >= 0.  b a list of ints (possibly empty).
    Examples: zrun([5,0,0,0,0,0,2,0,0,0,0,0,0], 2) returns [1,3]
                    zrun([5,0,0,2,0,0,0], 3) returns [4,7]
                    zrun([1,0,0,2,0,0,0],5) could return [0,0]
    """
```

Suggested invariant: b[i..j-1] is a "candidate run":

b[i..j-1] are zeroes; b[i-1] not zero (if it exists)

Loop solution

```
j = 0
i = j
# invariant: b[i..j-1] a candidate run.  More precisely,
# b[i..j-1] are 0; b[i-1] not zero (might not exist)
while j < len(b):
    if j-i == n:
        return [i,j]
    elif b[j] != 0: #no longer have a candidate run
        j += 1
        i = j
    else:
        j += 1

# if here, j is len(b)
if j - i == n:
    return [i,j]
else:
    return [0,0]
```