61A Lecture 12

Monday, September 30

Announcements

- Homework 3 due Tuesday 10/1 @ 11:59pm
- Optional Hog Contest due Thursday 10/3 @ 11:59pm
- Homework 4 due Tuesday 10/8 @ 11:59pm
- Project 2 due Thursday 10/10 @ 11:59pm
- Guerrilla Section 2 this Saturday 10/5 & Sunday 10/6 10am–1pm in Soda
  - Topics: Data abstraction, sequences, non-local assignment
  - Meet outside Soda 306

For Statements

(Demo)

Sequence Iteration

```
def count(s, value):
    total = 0
    for element in s:
        if element == value:
            total = total + 1
    return total
```

Name bound in the first frame of the current environment (not a new frame)

For Statement Execution Procedure

```
for <name> in <expression>:
    <suite>
```

1. Evaluate the header `<expression>`, which must yield an iterable value (a sequence).
2. For each element in that sequence, in order:
   A. Bind `<name>` to that element in the first frame of the current environment.
   B. Execute the `<suite>`.

Sequence Unpacking in For Statements

A sequence of fixed-length sequences

```
>>> pairs = ((1, 2), (2, 2), (2, 3), (4, 4))
>>> same_count = 0
```

A name for each element in a fixed-length sequence

Each name is bound to a value, as in multiple assignment

```
>>> for x, y in pairs:
        if x == y:
            same_count = same_count + 1

>>> same_count
2
```

Ranges

The Range Type

A range is a sequence of consecutive integers.*

```
..., -5, -4, -3, -2, -1, 0, 1, 2, 3, 4, 5, ...
                 range(-2, 2)
```

Length: ending value − starting value

Element selection: starting value + index

(Demo)

```
>>> tuple(range(-2, 2))
(-2, -1, 0, 1)
```
Tuple constructor

```
>>> tuple(range(4))
(0, 1, 2, 3)
```
With a 0 starting value

* Ranges can actually represent more general integer sequences.

Membership & Slicing

The Python sequence abstraction has two more behaviors!

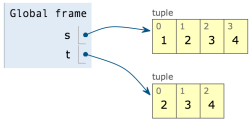
Membership.

```
>>> digits = (1, 8, 2, 8)
>>> 2 in digits
True
>>> 1828 not in digits
True
```

Slicing.

```
>>> digits[0:2]
(1, 8)
>>> digits[1:]
(8, 2, 8)
```
Slicing creates a new object

```
1 s = (1, 2, 3, 4)
2 t = s[1:]
```



Lists

```
['Demo']
```

http://docs.python.org/py3k/library/stdtypes.html#mutable-sequence-types

List Comprehensions

```
[<map exp> for <name> in <iter exp> if <filter exp>]
```

Short version: `[<map exp> for <name> in <iter exp>]`

A combined expression that evaluates to a list using this evaluation procedure:

1. Add a new frame extending the current frame.
2. Create an empty *result list* that is the value of the expression.
3. For each element in the iterable value of `<iter exp>`:
   A. Bind `<name>` to that element in the new frame from step 1.
   B. If `<filter exp>` evaluates to a true value, then add the value of `<map exp>` to the result list.

Dictionaries

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

Limitations on Dictionaries

Dictionaries are **unordered** collections of key-value pairs.

Dictionary keys do have two restrictions:

- A key of a dictionary **cannot be** an object of **a mutable built-in** type.
- Two **keys cannot be equal.** There can be at most one value for a given key.

This first restriction is tied to Python's underlying implementation of dictionaries.

The second restriction is an intentional consequence of the dictionary abstraction.

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

Identity and Equality

(Demo)

Example: http://goo.gl/5AbYNM