A2 - some still to come
- use MarkUs re-mark & indicate (small) change → discount.
T2 - online - see navbar.

CSC148 fall 2013

names, tracing, abstraction, recursion
week 12

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November 28, 2013

Outline

memory model

tracing... or not

consequences of recursion

how much detail for developers?

memory model

Enough detail to predict results and efficiency of our code — more detail than end users, less than compiler/interpreter designers. In Python:

- Every **name** contains a **value**

What if a name is used 2 or more times?

- Every **value** is a reference to the address of an object

searching for names

python looks, in order:

- innermost scope (function body, usually) **local**
- enclosing scopes **nonlocal**
- **global** (current module or `__main__`)
- built-in names
- see scopes and namespaces

intense example

Try running python docs namespace example to check your comfort level

methods

The first parameter, **conventionally** called self, is a reference to the instance:

```
>>> class Foo:
...     def f(self):
...         return "Hi world!"
...
>>> f1 = Foo()
```

Now **Foo.f(f1)** means **f1.f()**

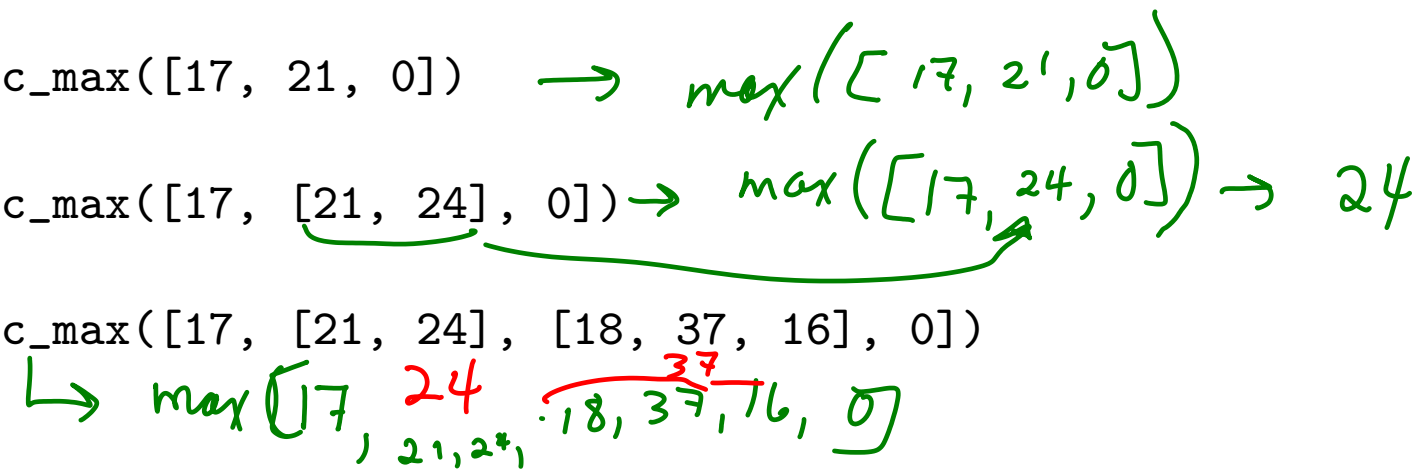
hunting for a method...

Start in the nearest subclass and work upwards, for example visualize method

don't trace too far!

```
def rec_max(L):
    """
    Return the maximum number in possibly nested list of numbers.

    >>> rec_max([17, 21, 0])
    [illegible]
    >>> rec_max([17, [21, 24], 0])
    [illegible]
    >>> rec_max([17, [21, 24], [18, 37, 16], 0])
    [illegible]
    """
    return max([rec_max(x) if isinstance(x, list) else x for x in L])
```



Recommended:

- trace the simplest (non-recursive) case
- trace the next-most complext case, **plug in known results**
- same as previous step...

TMI tracing

In contrast to the step-by-step, plus abstraction (previous slide), you **could** trace this in the visualizer

TMI tracing

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