Python Development

FOSSEE

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IIT Bombay

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Day 2, Session 4

Outline

gcd revisited!

- Open `gcd.py`

```
def gcd(a, b):
    if a % b == 0:
        return b
    return gcd(b, a%b)

print gcd(15, 65)
print gcd(16, 76)
```

- `python gcd.py`

Find lcm using our gcd module

- Open `lcm.py`
- $lcm = \frac{a*b}{gcd(a,b)}$

```
from gcd import gcd
def lcm(a, b):
    return (a * b) / gcd(a, b)

print lcm(14, 56)
```

- `python lcm.py`

```
5
4
56
```

Writing stand-alone module

Edit `gcd.py` file to:

```
def gcd(a, b):
    if a % b == 0:
        return b
    return gcd(b, a%b)

if __name__ == "__main__":
    print gcd(15, 65)
    print gcd(16, 76)
```

- `python gcd.py`
- `python lcm.py`

Automating tests

```
if __name__ == '__main__':
    for line in open('numbers.txt'):
        numbers = line.split()
        x = int(numbers[0])
        y = int(numbers[1])
        result = int(numbers[2])
        if gcd(x, y) != result:
            print "Failed gcd test
                                for", x, y
```

Outline

Readability and Consistency

- Readability Counts!
  Code is read more often than its written.
- Consistency!
- Know when to be inconsistent.

A question of good style

```
amount = 12.68
denom = 0.05
nCoins = round(amount/denom)
rAmount = nCoins * denom
```

Style Rule #1

Naming is 80% of programming

A question of good style

```
amount = 12.68
denom = 0.05
nCoins = round(amount/denom)
rAmount = nCoins * denom
```

Style Rule #1

Naming is 80% of programming

Code Layout

- Indentation
- Tabs or Spaces?
- Maximum Line Length
- Blank Lines
- Encodings

Whitespaces in Expressions

- When to use extraneous whitespaces?
- When to avoid extra whitespaces?
- Use one statement per line

Comments

- No comments better than contradicting comments
- Block comments
- Inline comments

Docstrings

- When to write docstrings?
- Ending the docstrings
- One liner docstrings

More information at PEP8:
http://www.python.org/dev/peps/pep-0008/ 5 m

Outline

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Errors

```
In []: while True print 'Hello world'

  File "<stdin>", line 1, in ?
    while True print 'Hello world'
                   ^
SyntaxError: invalid syntax
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Exceptions

```
In []: print spam

Traceback (most recent call last):
  File "<stdin>", line 1, in <module>
NameError: name 'spam' is not defined
```

Exceptions

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In []: print spam

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Exceptions

```
In [1]: 1 / 0

Traceback (most recent call last):
  File "<stdin>", line 1, in <module>
ZeroDivisionError: integer division
or modulo by zero
```

Exceptions

```
In []: 1 / 0

Traceback (most recent call last):
  File "<stdin>", line 1, in <module>
ZeroDivisionError: integer division
or modulo by zero
```

Processing user input

```
prompt = 'Enter a number(Q to quit): '

a = raw_input(prompt)

num = int(a) if a != 'Q' else 0
```

What if the user enters some other alphabet?

Handling Exceptions

Python provides **try** and **except** clause.

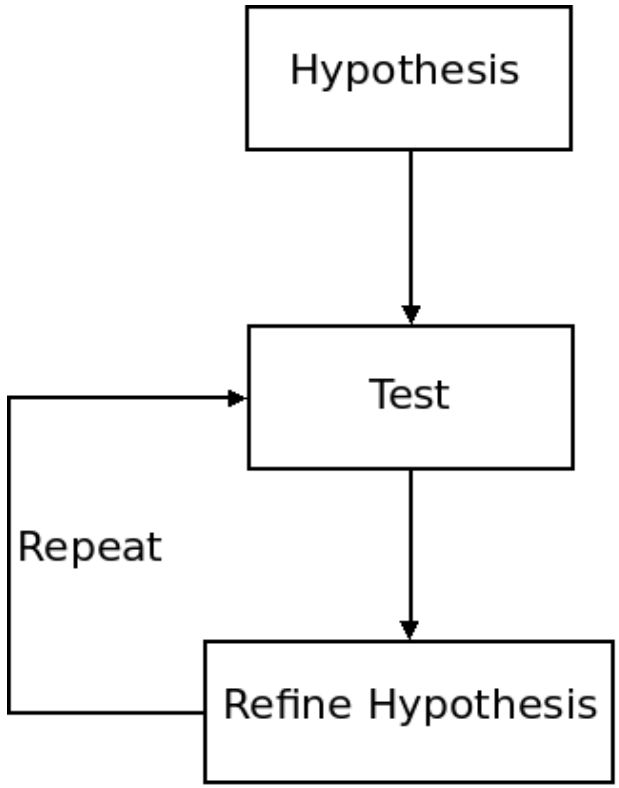
```
prompt = 'Enter a number(Q to quit): '

a = raw_input(prompt)
try:
    num = int(a)
    print num
except:
    if a == 'Q':
        print "Exiting ..."
    else:
        print "Wrong input ..."
```

Outline

Debugging effectively

- `print` based strategy
- Process:



Debugging effectively

- Using `%debug` in IPython

Debugging in IPython

```
In []: import mymodule
In []: mymodule.test()
---------------------------------------------------------------------------
NameError                 Traceback (most recent call last)
<ipython console> in <module>()
mymodule.py in test()
      1 def test():
----> 2     print spam
NameError: global name 'spam' is not defined

In []: %debug
> mymodule.py(2)test()
      0     print spam
ipdb>
```

Outline

Debugging: Exercise

```
science = {}

for record in open('sslc1.txt'):
    fields = record.split(';')
    region_code = fields[0].strip()

    score_str = fields[6].strip()
    score = int(score_str) if score_str != 'AA'
                           else 0

    if score > 90:
        science[region_code] += 1

pie(science.values(), labels=science.keys())
savefig('science.png')
```

Summary

We have covered:

- Following and Resolving Error Messages.
- Exceptions.
- Handling exceptions
- Approach for Debugging.