

Python and VPython

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Agenda

- Quick VPython Demo
 - Introduction
 - Hello World
 - Command Line Interpreter
 - Basic Syntax
 - Looping and Iterating
 - Functions
 - Vpython
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 - Handy References
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Quick VPython Demo: *bounce.py*

- Login
 - hsld55x
 - hs00*55
 - Open X-terminal
 - /sw/bin/vpython2.4
 - File -> Open -> bounce.py
 - F5 to run
 - Button emulation: Alt-Button, Apple-Button
 - Code examination
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Introduction

- Python is:
 - Free
 - Open-source
 - Windows/Mac/Linux ready
 - Object-oriented
 - Can run over Java (Jython)
 - Can be compiled to PIC ASM code (Pyastra)
 - FUN!
 - Python:
 - Comes packaged with a simple IDE
 - Allows for cross-platform GUI development
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Hello World

- From within any IDLE window
 - File -> New Window

```
print "Hello World!"
```

- Ctrl-S
 - Save as /tmp/helloworld.py
 - F5
- Or in Java:

```
class HelloWorld {  
    public static void main(String[] args) {  
        System.out.println("Hello World!");  
    }  
}
```

Command Line Interpreter

- Lets kids converse with the computer
- Opens by default with IDLE
- Run -> Python Shell
- Conversation sheet of assignment, calculation, and print statements

```
a = 1
b = "one"
c = [1,2,3]
print c
print c[1]
c = "s"
print c
```

Basic Syntax

- Control statements (if, elif, else, while) end with a colon
 - Indenting is mandatory.
 - Accidentally use assignment instead of equivalence operator impossible (unlike PHP)
 - use of = instead of == generates an error
if a=3: # Syntax error
 print a
if a==3: # What you want
 print a
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Other Handy Code Fragments

- Keyboard interaction

```
a = raw_input("First number: ")
b = raw_input("Second number: ")
print "The sum is " + str( float(a) * float(b) )
```
 - Null value
None
 - Random number generator

```
import random
print random.random()
print random.uniform(1,4.5)
print random.randint(1,10)
```
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Conditional Statements

```
if a==4:  
    print "Great"  
elif a==3:  
    print "Good"  
else:  
    print "Not so much"
```

- and, or, not keywords supported

```
ok = raw_input("Do you agree? ")  
if ok in ('y', 'ye', 'yes', 'YES', 'Y', 'Yes'): print "Yay!"
```

Looping and Iterating

- For loops are used to iterate over a list.
- For traditional for looping, you can either:

```
counter = 0
while counter < 10:
    print counter
    counter = counter + 1
    if counter==6: break # If you feel like busting out early.
```

```
for counter in range(0, 10):
    print counter
```

Iterating Over Lists

```
griffiths = ['Peter','Lois','Stewey']  
for member in griffiths:  
    print member, len(member)
```

```
griffiths = ['Peter','Lois','Stewey']  
for i in range(len(griffiths)):  
    print i, griffiths[i]
```

```
for number in range(1, 10, 2):  
    print number
```

Functions

```
def hello(firstname="Buddy", amount=0):  
    print "Hello, " + firstname + "!"  
    print "You owe me $" + str(amount) + "."  
    return
```

```
hello("Alex")
```

```
hello()
```

```
hello("Guy", 4)
```

```
hello(amount=3, firstname="Kate")
```

Vpython – Keyboard Interaction

```
from visual import *
prose = label()
while 1:
    if scene.kb.keys:
        s = scene.kb.getkey()
        if len(s) == 1:
            prose.text += s
        elif (s == 'backspace' or s == 'delete') and
            len(prose.text) > 0:
            prose.text = prose.text[:-1]
        elif s == 'shift+delete':
            prose.text = "
```

Vpython – Keyboard Interaction

Keywords

- 'up', 'down', 'left', 'right'
 - 'escape'
 - 'backspace'
 - 'f3'
 - 'shift+f3'
 - 'ctrl+alt+shift+f3'; the order is always ctrl, alt, shift.
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VPython – Mouse Position

- Mouse position relative to a particular plane in space:

```
temp =  
    scene.mouse.project(normal=(0,1,0),point=(0,3,0))
```

```
if temp: # temp is None if no intersection with plane  
    ball.pos = temp
```



Vpython – Add a ball array

- Open bounce.py
- Save as /tmp/bounces.py

```
balls = []
balls.append(sphere(pos=(0,4,0), color=color.red))
balls.append(sphere(pos=(3,7,2), color=color.blue))

for ball in balls:
    ball.velocity = vector(0,-1,0)
```

Project

- Lab time will be available to develop your Python skills as you complete a project of your choice.
 - Quiz game
 - Soccer game
 - Flight simulator
 - Brickbreaker
 - Space invaders
 - Virtual worlds
 - 3-D GUI
 - GUI stuff (Google: “Thinking in tkinter”)
 - Save your projects to home directory or stick
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Handy References

Online Copy of This Presentation

<http://www.WebStaffRoom.ca> (Search for “Python”)

Python Quick Reference Guide

<http://rgruet.free.fr/PQR25/PQR2.5.html>

VPython Documentation

<http://vpython.org/webdoc/visual>

Thank You

- Questions?

