

Python for 3rd - 6th graders

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Why?

- Jessica McKellar 2014 keynote about “teaching school students programming”
- Teaching my 3rd Grader
- Taking a well built curriculum and tools to rural children in India through “Kafal” (NGO)



A Registered Society: 145/2009-10

How?

- Young Coders curriculum and volunteer experience
<https://github.com/mechanicalgirl/young-coders-tutorial>
- Python for Kids
- Scratch
- Python turtle
- Python Tutorials

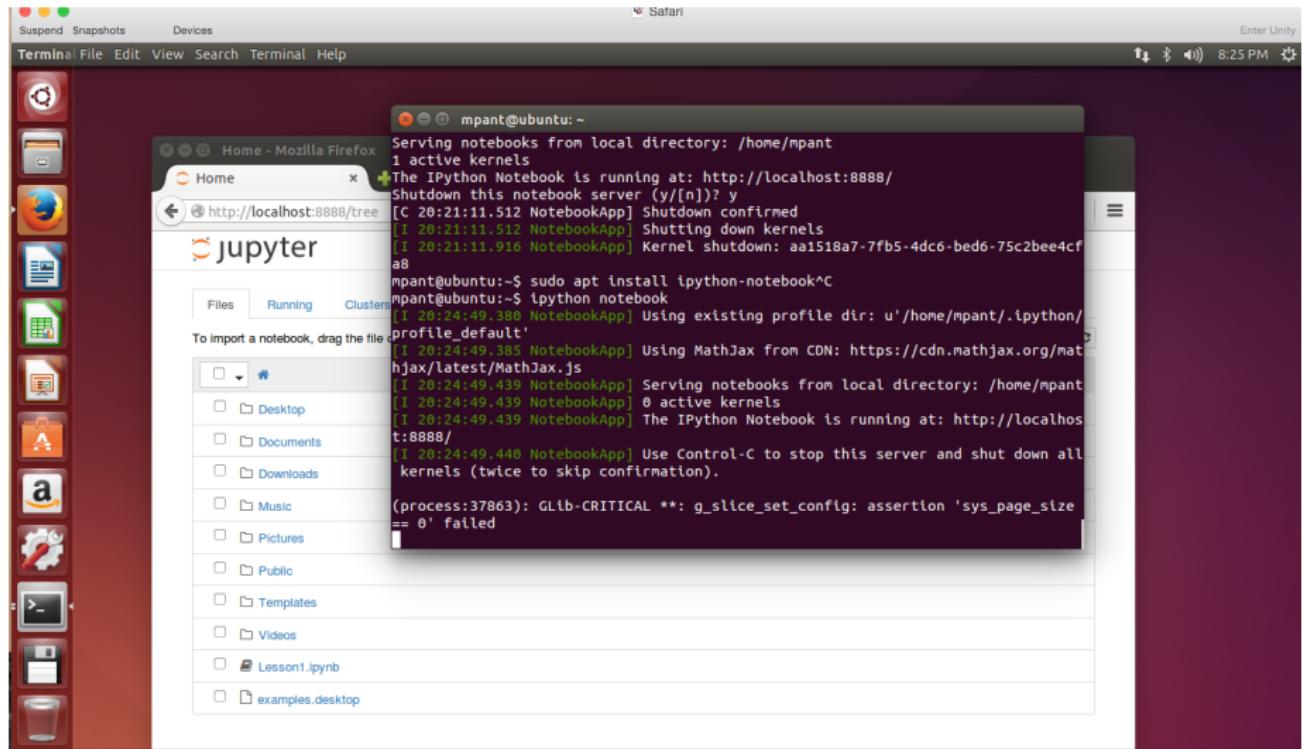
Preparing Curriculum

- Kept it simple and grade level
 - Math concepts
 - shapes , addition, subtraction, word problems
 - Language
 - strings & string operations
 - Color
 - Drawing
 - Turtle
 - Data Types
 - List , Dictionary
 - Write a script that prints your name

Tools

- Computers running Ubuntu - 2 child per computer
- Turtle / TurtleArt
- Scratch (MIT, 2.0)
- Ipython notebook

Sample setup



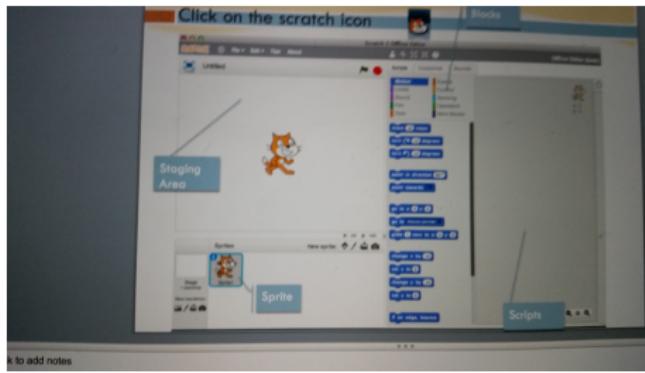
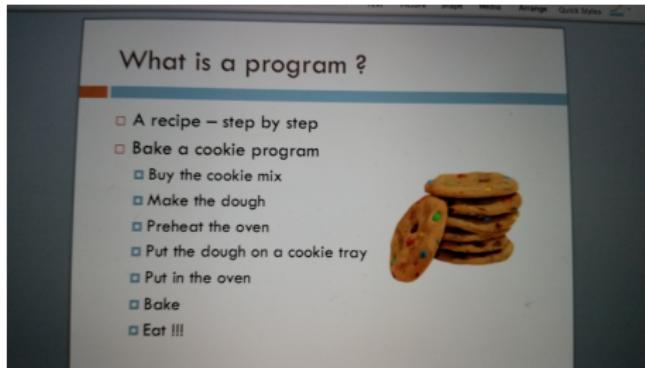
Setup

- Turtle
 - sudo apt-get install turtleart
 - \$> turtleart

- Scratch
 - sudo add-apt-repository "deb http://archive.ubuntu.com/ubuntu \$(lsb_release -sc) universe"
 - sudo apt-get update
 - sudo apt-get install scratch
 - \$> scratch

- IPython Notebook
 - sudo apt-get install python-setuptools
 - sudo apt-get install python-tk
 - sudo apt-get install ipython-notebook
 - \$> ipython notebook

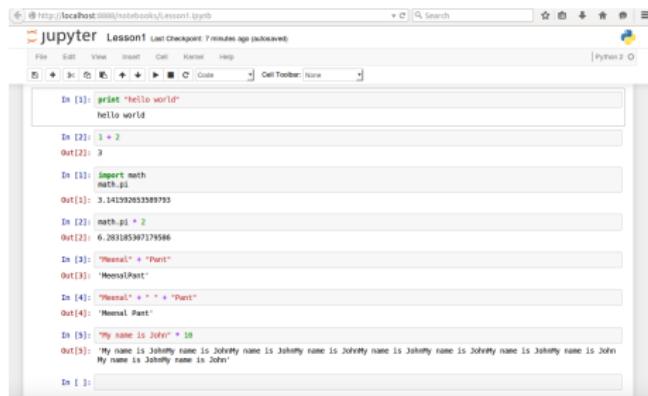
Lessons



Scratch

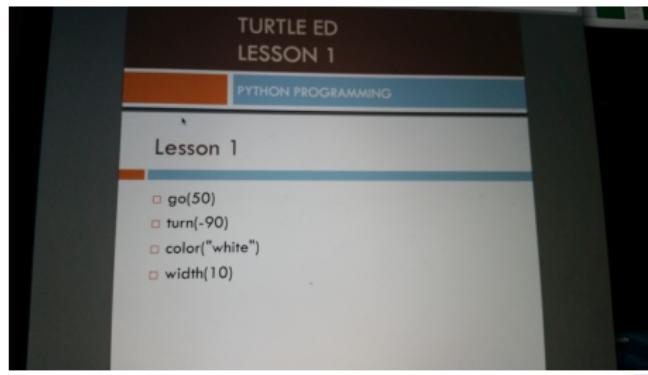
- Basic Building blocks
 - Drag and drop - using mouse
- Concepts
 - events
 - actions
 - sounds
 - motion
- Great for K - 3rd grade students
 - maze game
 - holiday card (MIT example library)

Lessons (contd.)

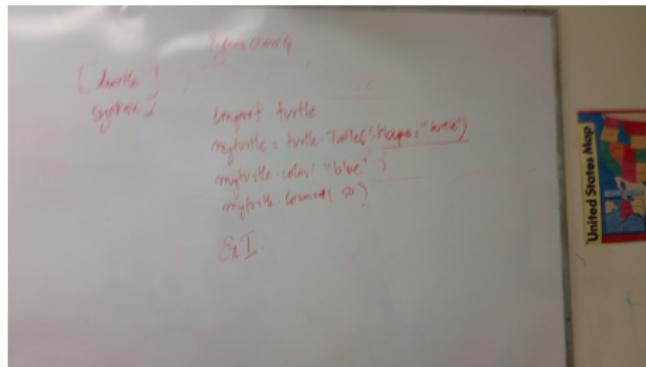


The screenshot shows a Jupyter Notebook interface with several code cells and their corresponding outputs:

- In [1]: `print("Hello world")`
Output: hello world
- In [2]: `1 + 2`
Output: 3
- In [3]: `import math
math.pi`
Output: 3.141592653589793
- In [4]: `math.pi * 2`
Output: 6.283185307179586
- In [5]: `"Meenal" + "Pant"`
Output: MeenalPant
- In [6]: `"Meenal" * 10`
Output: Meenal Meenal Meenal Meenal Meenal Meenal Meenal Meenal Meenal Meenal
- In []:



Lessons (contd.)



Jupyter Notebook screenshot showing Python Turtle code execution:

```
In [4]: bob = turtle.Turtle()  
In [7]: bob.forward(50)  
In [8]: bob.right(90)  
In [9]: bob.forward(50)  
In [10]: bob.right(90)  
In [11]: bob.forward(50)  
In [12]: bob.right(90)  
In [13]: bob.forward(50)  
In [14]: turtle.done()  
In [15]:
```

The notebook interface shows the code being run in cells, with the output window displaying the turtle graphics window.

Lessons (contd.)

Python Turtle Graphics

Turtle examples - Mozilla Firefox

http://localhost:8888/notebooks/turtle-examples.ipynb

jupyter Turtle examples

File Edit View Insert Cell

In [18]:

```
import turtle
star = turtle.Turtle()
for i in range(50):
    star.forward(5)
    star.right(144)
turtle.done()
```

In [*]:

```
import turtle
spiral = turtle.Turtle()
for i in range(20):
    spiral.forward(5)
    spiral.right(144)
turtle.done()
```

In [1]:



Python Turtle Graphics

(Bash) Turtle examples - Mozilla Firefox

http://localhost:8888/notebooks/Turtle-examples.ipynb

jupyter Turtle examples Last Checkpoint: a few seconds ago

File Edit View Insert Cell Kernel Help

In [18]:

```
import turtle
spiral = turtle.Turtle()
for i in range(50):
    spiral.forward(5)
    spiral.right(144)
turtle.done()
```

In [*]:

```
import turtle
painter = turtle.Turtle()
painter.pencolor("blue")
for i in range(50):
    painter.forward(50)
    painter.left(123)
    for i in range(100):
        painter.forward(100)
        painter.left(123)
        for i in range(100):
            painter.forward(100)
            painter.left(123)
painter.done()
```

In [1]:



Making it real

- Presented a proposal to FUSD school district to introduce Python 3rd grade onwards - Rejected
- Next I pitched my presentation to an after school program - Accepted!
 - 12 kids signed up
 - Conducted 8 sessions so far. 1 hour once a week



Lessons Learned

- Visual aids work better !
- Started with idle and switched to Ipython Notebook - Kids loved it!
- Interactive programming works
- Puzzles are favorites
- Indentation is hard - IPy notebook makes it easier

Future Plans

- After school program has got affected due to Common Core preparation
- Working towards a more consistent program to engage students
- Need volunteers and more outreach opportunities

Demo and Q&A

Thanks!

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Slides Made with Markdown, pandoc and beamer