

The first lecture

- this module consists of two pieces of coursework
 - in the first term, [Missile Command/Marble Madness](#) ([CS2S566_CW1_missile.pdf](#)) implemented in Python and Pygame
 - in the second term, a game implemented in C#
- both pieces of coursework are worth 50%

Python

- Python is a scripting language

Python Gotha's

- blocks are defined by indentation!
- turn off tabs in your favourite editor
- in your own programs examples never create a name clash with a Python library module

Python verses similar tools

- Python is a scripting language
 - it can be compiled if necessary to increase speed

- is more powerful than many other scripting languages, Tcl
 - applicable to larger systems development (games, net admin)

- has a much cleaner syntax than Perl
 - easier to maintain

- does not compete head on with Java
 - Java is a systems language like C++

Python and games

- [examples of games which use Python](http://wiki.python.org/moin/PythonGames) `<http://wiki.python.org/moin/PythonGames>`

Python can be simple

- ```
#!/usr/bin/python
print "hello world"
```

# Python Modules allow for problem decomposition

- similar to Modula-2

- ```
#!/usr/bin/python  
  
title = "hello world"
```

- above is called `myfile.py`

- ```
#!/usr/bin/python

import myfile
print myfile.title
```

- when run prints hello world

## Alternative import

```
#!/usr/bin/python

from myfile import title
print title
```

- note that all python modules need to be saved as *name.py*
  - so in our example the module `myfile` was saved into a file called `myfile.py`



# Python builtin types

- python contains many builtin types
  - use them..
- builtin objects make simple programs easy to understand
  - lists, dictionaries, exist, don't reinvent the wheel
- built in objects are more efficient than custom data types

## Builtin objects



|              |                                      |
|--------------|--------------------------------------|
| numbers      | 3.14159, 1234                        |
| strings      | 'spam', "fred's"                     |
| lists        | [1, [2, 'three'], 4]                 |
| dictionaries | {'food':'spam', 'taste':'yum'}       |
| tuples       | (1, 'spam', 4, 'U')                  |
| files        | text=open('/etc/passwd', 'r').read() |

# Expression operators



|                          |                                   |
|--------------------------|-----------------------------------|
| or, and, not             | logical operators (short circuit) |
| <, <=, >, >=, ==, <>, != | comparison operators              |
| x   y                    | bitwise or                        |
| z & y                    | bitwise and                       |
| x << y                   | shift left by y bits              |
| x >> y                   | shift right by y bits             |
| x[i]                     | indexing                          |
| x[i:y]                   | slicing                           |
| x.y                      | qualifying (imports)              |
| x(y)                     | function calls                    |

# Strings

- concatenation via +
  - repeated via \*

- ```
#!/usr/bin/python  
print "hi " * 4
```

- yields

- ```
hi hi hi hi
```

## Slicing

- given a string, `s = "hello world"`
  - can obtain portion of string via: `s[2:5]`
  - yields: `llo`
- first character has index 0
  - and also -11
  - last character index is 10 in this example
  - last character index is also -1
- negative values start at right and move to the left
- strings can be sliced using positive and negative values

## Using dir

- often you may wish to see what methods a module provides
  - run python interactively

```
python
Python 1.5.2
>>> import string
>>> dir(string)
['capitalize', 'capwords', 'center', 'count', \
 'digits', 'expandtabs', 'find', 'hexdigits', \
 'index', 'index_error', 'join', 'joinfields', \
 'letters', 'ljust', 'lower', 'lowercase', \
 'lstrip', 'maketrans', 'octdigits', 'replace', \
 'rfind', 'rindex', 'rjust', 'rstrip', 'split', \
 'splitfields', 'strip', 'swapcase', \
 'upper', 'uppercase', 'whitespace', 'zfill']
```

- displays methods available

## Methods and documentation

- [python online docs](http://floppsie.comp.glam.ac.uk/python/html/index.html) `<http://floppsie.comp.glam.ac.uk/python/html/index.html>`
  - under GNU/Linux
  
- tutorial/laboratory
  - read through the online tutorial under the web address above
  - read about functions and scope rules
    - name resolution, LGB rule
    - local, global, builtin scope

# Statements

- assignment, calls, print, if/else/elif, for, while, break/continue
- try, except, raise,
- def, return
  - function definitions and returning values



# Statements

- class
- assert
- exec
- del
- global

## Example 8 times table

```
#!/usr/bin/python

for n in range(1, 13):
 print n, "x 8 =", n*8
```

## Example 8 times table

```
python eight.py
1 x 8 = 8
2 x 8 = 16
3 x 8 = 24
4 x 8 = 32
5 x 8 = 40
6 x 8 = 48
7 x 8 = 56
8 x 8 = 64
9 x 8 = 72
10 x 8 = 80
11 x 8 = 88
12 x 8 = 96
```

## Example of for loop

```
#!/usr/bin/python

for n in range(2, 10):
 print 'n is', n
else:
 print 'finished for loop, n is', n
```

## Example of for loop


```
./py7.py
n is 2
n is 3
n is 4
n is 5
n is 6
n is 7
n is 8
n is 9
finished for loop, n is 9
```

## Tricky example code

```
#!/usr/bin/python

for n in range(2, 10):
 print 'n is', n
 for x in range (2, n):
 print 'x is', x
 if n % x == 0:
 print n, 'equals', x, '*', n/x
 break
 else:
 print n, 'is a prime number'
```

## Tricky example code



```
./py6.py
2 is a prime number
3 is a prime number
4 equals 2 * 2
5 is a prime number
6 equals 2 * 3
7 is a prime number
8 equals 2 * 4
9 equals 3 * 3
```

# Graphical hello world as an example of Python simplicity

```
#!/usr/bin/python

import Tkinter

def makebutton(message):
 w = Tkinter.Button(text=message, command='exit')
 w.pack()
 w.mainloop()

makebutton("Hello world")
```



# Tutorial

- to undertake these tutorials you will need to refer to the [python online docs](http://floppsie.comp.glam.ac.uk/python/html/index.html) (`http://floppsie.comp.glam.ac.uk/python/html/index.html`)
  
- write a program using a while loop
  - to write out the nine times table
  
- write a program using a for loop
  - to write out the seven times table
  
- write a program using a function and if else statement
  - to write out the 3 times table