PyGame

- is a set of Python modules which sits on top of the excellent SDL library

- allows you to create fully featured games and multimedia programs in the python language

- PyGame is highly portable and runs on nearly every platform and operating system

Is Python suitable for gaming?

- 30 frames per second is often quoted as the minimum necessary for smooth graphics
  - this means you must compute the next frame in under 1/30 of a second ≈ 30 milliseconds

- for 2D games PyGame is a very good solution
  - rapid prototyping
  - you can convert any slow pieces of Python into C if necessary and call these from Python
  - classically 90% of the time is spent in 10% of the code

Is Python suitable for gaming?

- abridged ⟨`http://www.pygame.org/docs/tut/intro/intro.html`⟩

- games are often split into two components
  - game engine
  - game logic

- most of the time the game engine must run really fast whereas the game logic requires less processing power
  - game engine - written in C exploiting the SDL and presented as PyGame modules
  - game logic - your python code

Is Python suitable for gaming?

■ scripting is used in games such as Quake3 and Unreal (although not Python..)

■ in 2001 Rebel Act Studios released "Severance: Blade of Darkness"

■ this used their own custom 3D engine
  ■ the rest of the game is written with Python

■ game was a bloody action 3rd person perspective fighter
  ■ third party addons for this game are available and they are Python source files

Bouncing ball

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

import sys, pygame

width = 320
height= 240
size  = width, height
speed = [2, 2]
black = 0, 0, 0


pygame.init()
screen = pygame.display.set_mode(size)
ball = pygame.image.load("ball.png").convert()
ballrect = ball.get_rect()
```

Bouncing ball

■
```
while True:
    for event in pygame.event.get():
        if event.type == pygame.QUIT:
            sys.exit()

    ballrect = ballrect.move(speed)
    if ballrect.left < 0 or ballrect.right > width:
        speed[0] = -speed[0]
    if ballrect.top < 0 or ballrect.bottom > height:
        speed[1] = -speed[1]

    screen.fill(black)
    screen.blit(ball, ballrect)
    pygame.display.flip()
```

■ the ball can be taken from here: ball.png ⟨`ball.png`⟩

Commentary

- Reference ⟨`http://www.pygame.org/docs/tut/intro/intro.html`⟩

- `import pygame` imports the package with all the available PyGame modules `pygame.init()` initialises each of these modules

- `pygame.display.set_mode()` creates the graphic window

Commentary

- PyGame represents images as Surface objects
  - PRG "display.set_mode()" creates a new Surface object that represents the actual displayed graphics
  - any modification to this Surface becomes visible on the monitor

- `pygame.image.load().convert()` loads in the ball image
  - we convert it to a fast internal format

Commentary

- the program is initialised and ready to run so we enter an infinite loop in which we check for user input, move the ball, and then draw the ball

- `ballrect = ballrect.move(speed)` updates the ball position

- the two `if` statements check to see whether the ball has touched the edge of the window
  - the `then` section bounces the ball back

- `screen.fill(black)` erases everything on the screen

- `screen.blit(ball, ballrect)` redraw the ball at the new position

Commentary

- `pygame.display.flip()` now make the screen visible

Detail

- notice that PyGame uses double buffering
  - we can update the `screen` piece at a time and the user sees nothing
  - only when we call `pygame.display.flip()` does the screen become visible
  - ensures speed and near instant updates

- it also allows us to use high level techniques such as `screen.fill(black)` without much of a performance penalty

Tutorial

- try out the bouncing ball example and modify the example so that the ball travels at a slower and faster speed

- try adding a second ball..

- now make the ball travel slower at the top of the screen and faster at the bottom (adding gravity)

- read the 13 rules on PyGame usage ⟨`http://www.pygame.org/docs/tut/newbieguide.html`⟩