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

PyGame

- it has the ability to initialise screen resolution or window size
- sprites, sound, collisions, keyboard, mouse, joystick events
- images, text can all be rendered to the 2D screen (or surface)
- fast image copies are achieved using the SDL (Simple DirectMedia Layer)

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

Game tools implemented in Python

- there are many, for example: ⟨https://www.blender.org⟩

Bouncing ball

```
#!/usr/bin/python3

import sys, pygame

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

pygame.init ()
screen = pygame.display.set_mode([width, height])
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(0)

    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
  - `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
- `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