Teaching London Computing

Programming for GCSE Topic 3.1: If Statements in Python

Queen Mary University of London

KING'S College LONDON

COMPUTING AT SCHOOL
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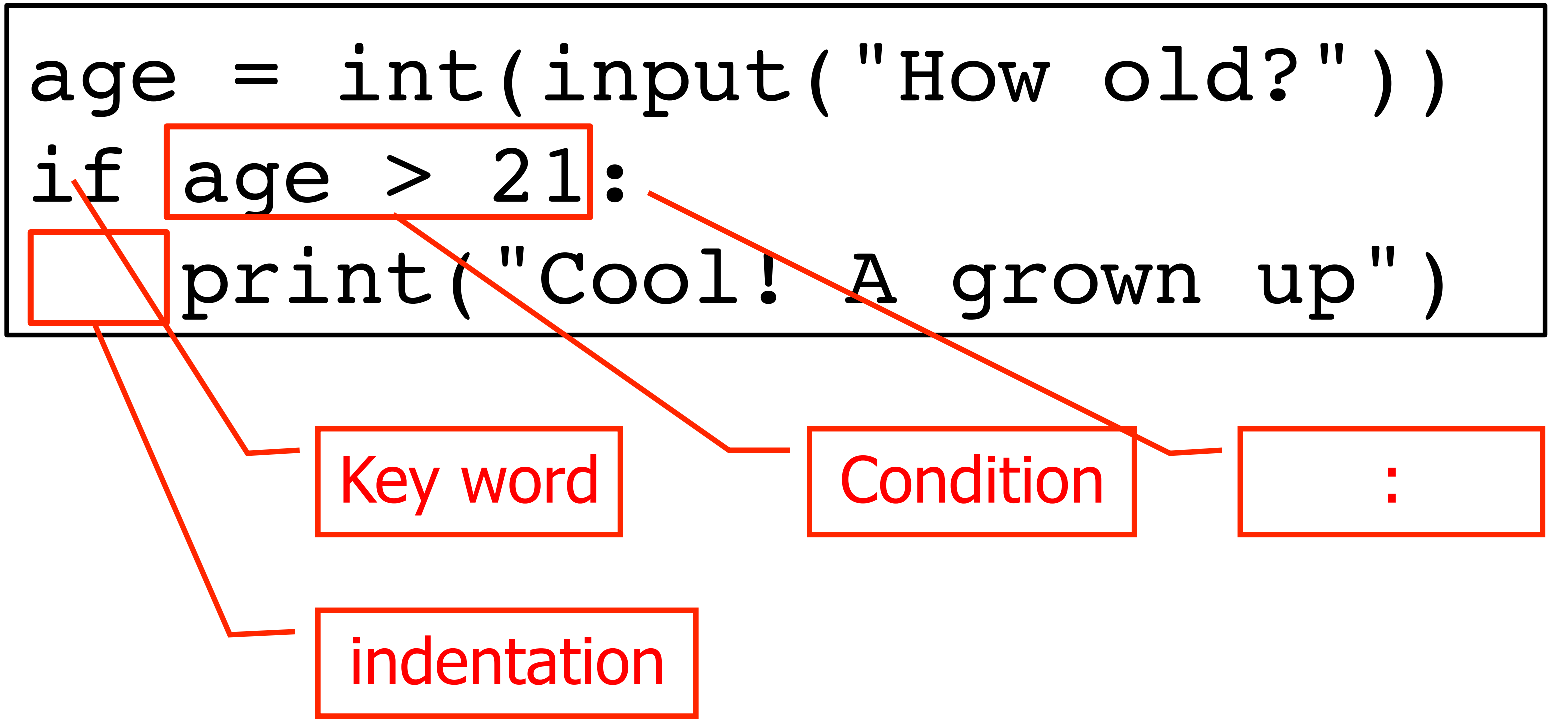
Aims

- If statement basics
- Visualising ‘If’
  - Language
  - Boxes
  - Scratch
- Comparisons
  - Boolean expressions
- More complex ‘If’ statements

Simple ‘If’ Statements

Simple 'If' Statement

- Change the statements in a program



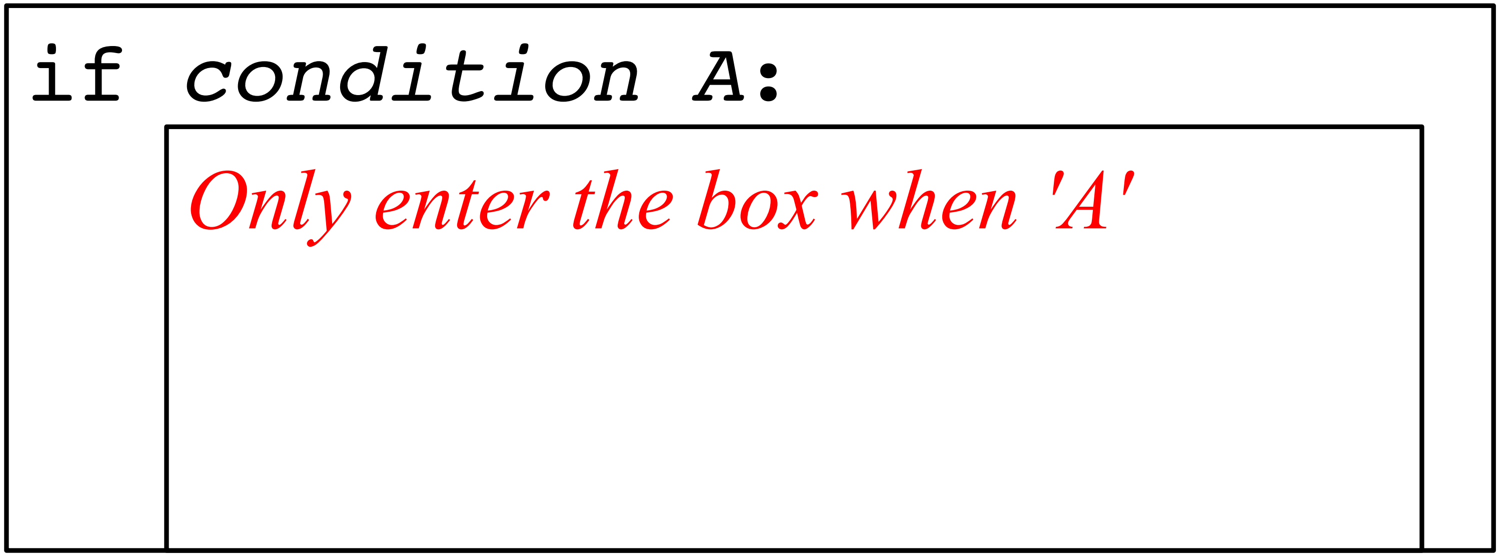
```
age = int(input("How old?"))
if age > 21:
    print("Cool! A grown up")
```

Visualising ‘If’

Indentation versus brackets

Boxes

- An 'if' statement has an inside

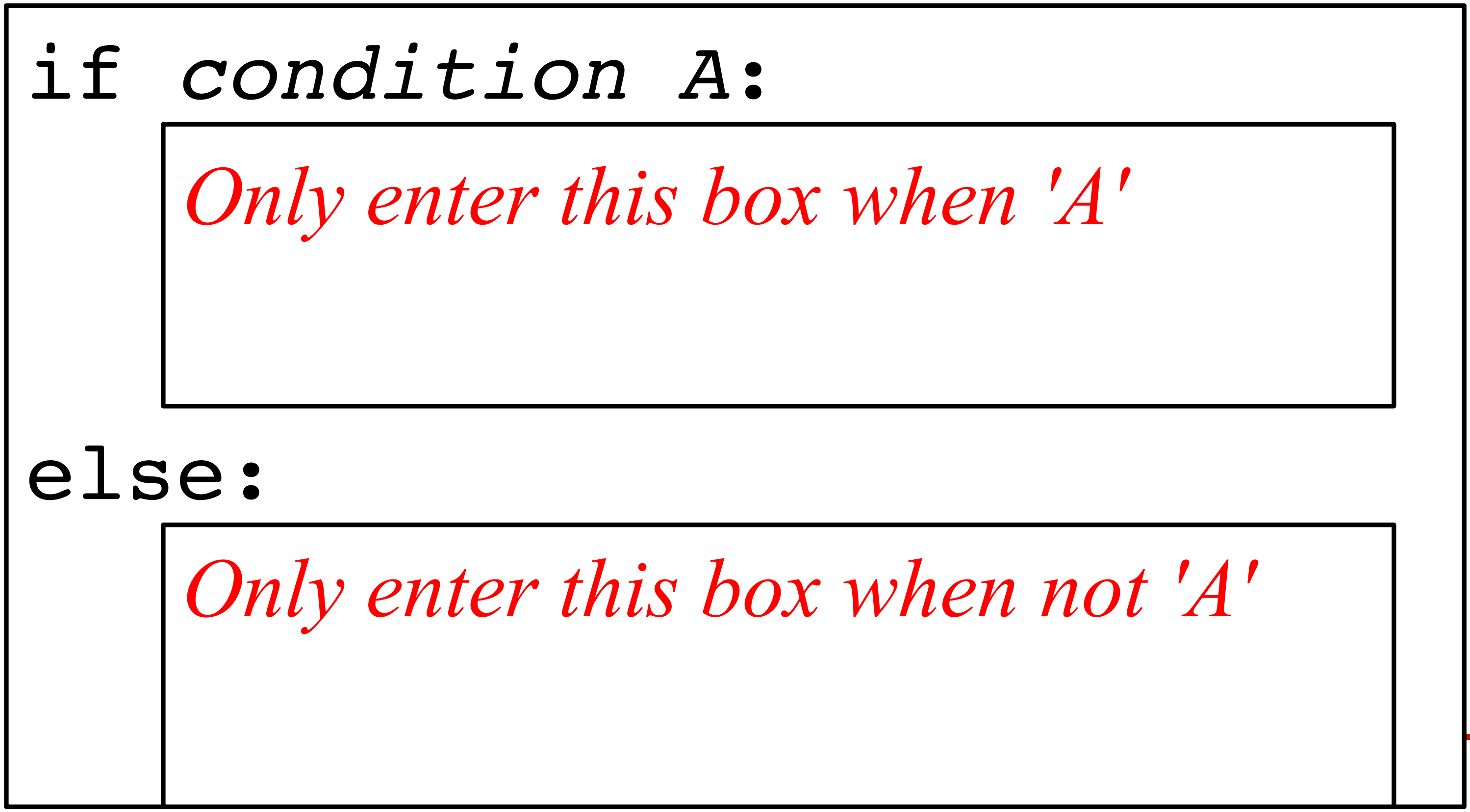


```
if condition A:
```

Only enter the box when 'A'

Boxes

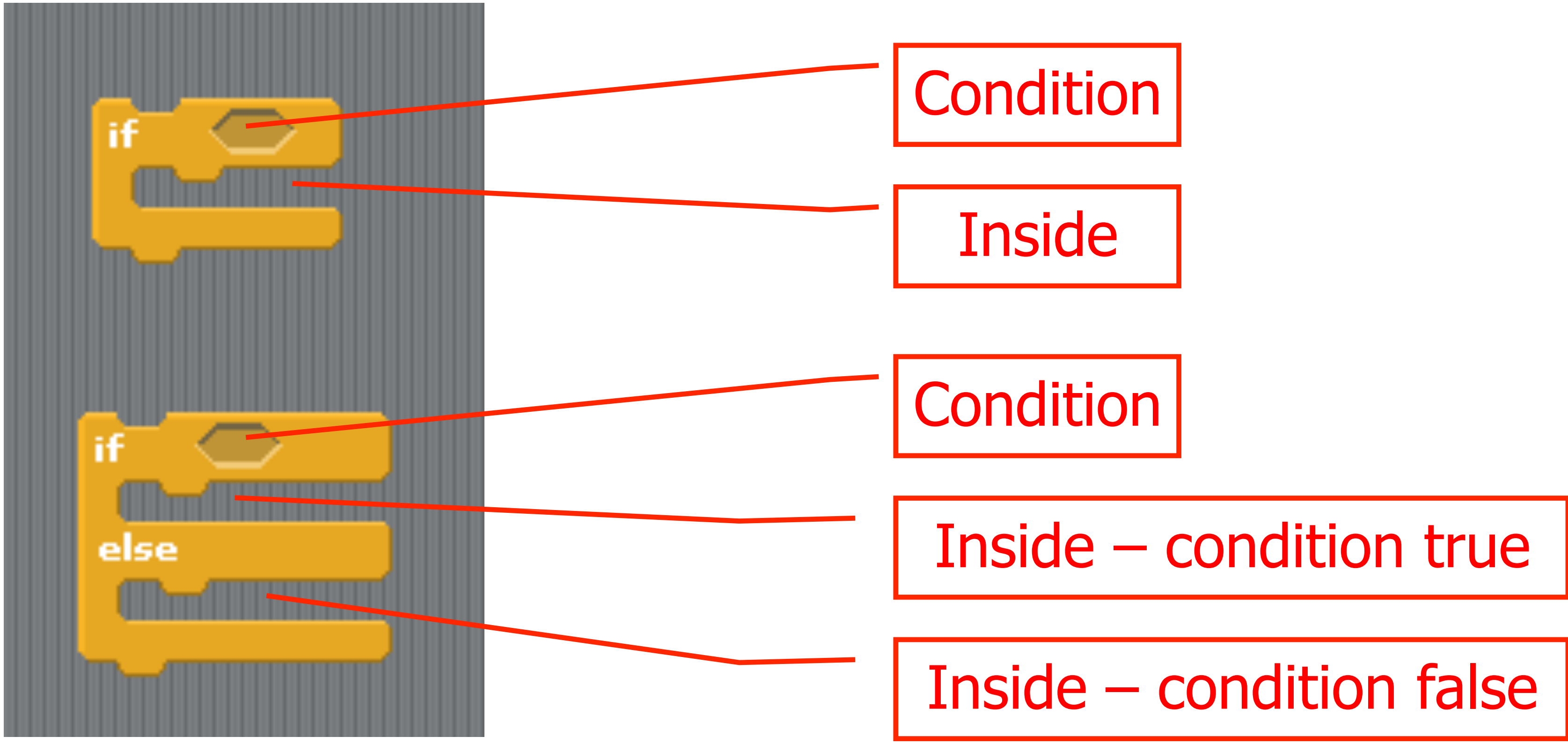
- An 'if' statement has an inside



```
if condition A:
    Only enter this box when 'A'
else:
    Only enter this box when not 'A'
```

If in Scratch

- Scratch blocks make the ‘inside’ idea obvious



Condition

Inside

Condition

Inside – condition true

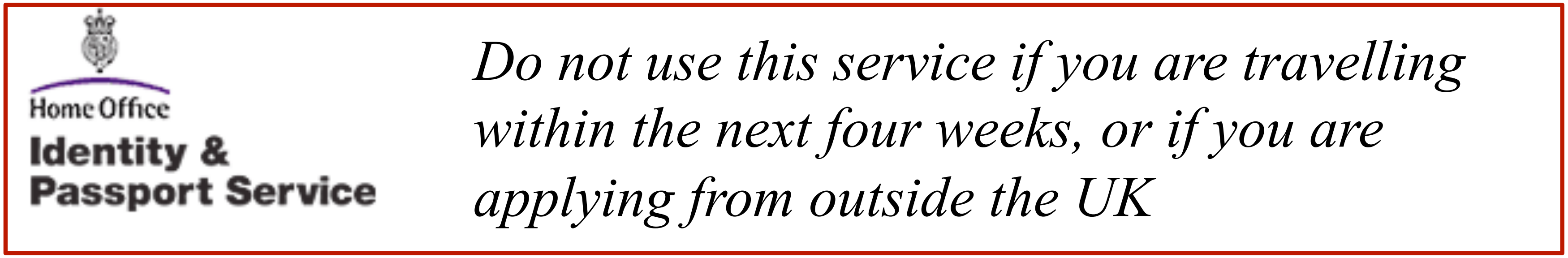
Inside – condition false

Other Languages

- Java uses
  - ( ) – condition in brackets; no colon
  - '{' – start of box
  - '}' – end of box
- Pascal
  - THEN instead of the colon
  - BEGIN – start of box
  - END – end of box

'If' Language

- Many instructions have 'if' language



Home Office
Identity & Passport Service

Do not use this service if you are travelling within the next four weeks, or if you are applying from outside the UK

```
if travelling in next 4 weeks:
   print("Do not use this service")
elif applying from outside UK:
   print("Do not use this service")
else:
   print("Ok; use this service")
```

Comparisons

True and false expression – used in 'if'

True and False Expressions

- Comparisons
- Result can be 'True' or 'False'

Operator	Meaning
`x > y`	x is greater than y
`x < y`	x is less than y
`x == y`	x is equals to y
`x != y`	x is NOT equal to y
`x <= y`	x is less than or equal to y
`x >= y`	x is greater than or equal to y

Examples

- What are the values of the following?

Expression	True or False?
`10 > 5`	
`2 + 3 < 10`	
`10 != 11`	
`10 <= 10`	
`10 >= 11`	

Comparison of Strings

- Comparison operators work for strings
- Look at the following examples

```
>>> "David" < "David Cameron"
True
>>> "Dave" < "David"
True
>>> "Tom" < "Thomas"
False
>>> "Bill" < "William"
True
>>> "AAA" < "AAB"
True
>>> "AAA" < "aaa"
True
>>> "aaa" < "AAA"
False
```

Using ASCII ordering, letter by letter

'=' and '=='

- Do not confuse
- Assignment
  - Operator =
  - Set variable to value (of expression)
- Equality
  - Operator ==
  - Compare two expressions

More Complex Conditional Statements

Else and Else If

- 'If' statement with an alternative

```
if condition:
    statement 1 – when condition true
else:
    statement 2 – when condition false
```

```
if condition A:
    statement 1 – when condition A true
elif condition B:
    statement 2 – when A false and B true
else:
    statement 3 – when both A and B false
```

Compare these programs:

```
age = input("How old are you?")
if age < 22:
   print("Ah, youth!")
if age >= 22:
   print("Cool! A grown up")
```

Equivalent

```
age = input("How old are you?")
if age < 22:
   print("Ah, youth!")
else:
   print("Cool! A grown up")
```

Teaching Issue

- Strong understanding of statements within statements
  - Needed for loops too
- Only 'if' and 'if … else' are essential
- Boolean expression: true and false as values

Summary

- 'If' allows statements in the program to vary
- Comparison operator create 'conditions' (also called 'boolean expressions')
- Python uses 'indentation' to inside the 'if' from outside
- 'Inside' versus 'outside' essential for next topic: loops