ENGG1003 - Monday Week 3

Loops and branching

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Lecture overview

1. `for` loop §3.1
   - principles
   - live demo

2. `while` loop §3.2
   - principles
   - live demo

3. branching: `if`, `elif` and `else` §3.3
   - principles
   - live demo

1) for loop

- many computations are repetitive by nature and programming languages have certain loop structures to deal with this
- one such loop structure is the for loop
- printing the 5 times table
- **at console—begin with live demo**

- first loop for i in [1, 2, 3, 4, 5, 6, 7, 8, 9, 10]:
- code fragment LLp60

A typical for loop

- general loop structure
- general format: LLp60 code fragment

Indentation and nested loops

- indentation—critical!
- nested loops? maybe / maybe-not

Combining for loop and array

- average height
- §3.1.3
- program on LLp62

range function

- motivation:
- range(start, stop, step)
- eg: range(0,5,1)
- why tf the weird indexing?

Live demo: for loop

2) while loop

- for loop runs for prespecified number of iterations
    - do NOT cover break and continue
- The other basic loop construction in Python is the while loop, which runs as long as a condition is **True**
- Boolean type §2.2.10

Boolean Expressions

- screenshot LLp46, LLp47
- but present at the console live demo, then skip over slides
- conditions `True` and `False`
- Boolean type
- light touch: and, or, not but don't present truth tables (??)— refer back to lecture 1. Hmmm

more Booleans—live demo

- XXX

Example: Finding the Time of Flight

- context/description
- we modify/extend earlier example

- figure 3.1 ball height vs time

- show whole program LLp65

- zoom into 3 lines of code p65

- plot as * then zoom in to see time where crossing occurs
- slowly and meticulously consider y[i] ¿= condition

Characteristics of a Typical while Loop

- xxx

Characteristics of a Typical while Loop (ctd.)

- xxx

Infinite Loops

- It is possible to have a while loop in which the condition never evaluates to False, meaning that program execution can not escape the loop!
- this is referred to as an infinite loop

3) branching: if, elif and else)

- context
- extended Example: Judging the Water Temperature (need to change numbers!)
- will build up a program in stages

One if-test

- screenshot/code LLp68

Two if-tests

- LLp68

An if-else Construction

- LLp69

An if-elif-else Construction

- LLp69

general form of an if-elif-else

- §3.3.2

branching summary

- if
- if / else
- if / elif / else

Lecture summary