COMP10001 Foundations of Computing
String Manipulation and Conditionals

Semester 1, 2019
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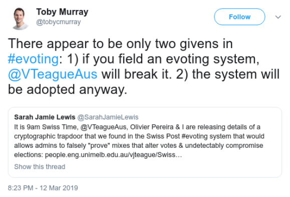
Lecture Agenda

- Last lecture — Grok Worksheets 1, 6
  - Variables and assignment
  - String basics
- This lecture — Grok Worksheets 3–4
  - String manipulation
  - Conditionals

Announcements

- Worksheets 0, 1 and 2 due end of this coming Monday ... don't need to do anything to "submit" your work; just get as many green diamonds as possible by then
- Guest lecturer for next Friday will be A/Prof Vanessa Teague:


Toby Murray
@tobycmurray

There appear to be only two givens in #evoting: 1) if you field an evoting system, @VTeagueAus will break it. 2) the system will be adopted anyway.

Sarah Jamie Lewis @SarahJamieLewis
It is 9am Swiss Time, @VTeagueAus, Olivier Pereira & I are releasing details of a cryptographic trapdoor that we found in the Swiss Post #evoting system that would allows admins to falsely "prove" mixes that alter votes & undetectably compromise elections: people.eng.unimelb.edu.au/vjteague/Swiss...
Show this thread

8:23 PM - 12 Mar 2019

What do We Know so Far?

Syntax

- Maths...
- `print()`, `len()`
- `int`, `float`, `str`
- `*`, `+` and `in` for strings
- Variables, assignment `=`

Semantics

- Maths expressions are resolved with BODMAS
- Types are important: overloading
- Assignment changes state

Lecture Outline

1 Strings: Indexing and Slicing

2 Conditionals

Sequences of Items

- One construct that pervades computing is a "sequence" (or "iterable" in Python-speak), i.e. the decomposition of an object into a well-defined ordering of items
  - text as sequences?
  - sounds as sequences?
  - images as sequences?
- Manipulation of objects tends to occur via "iteration" over iterables

String Manipulation

- As well as "assembling" strings via + and ∗, we are able to pull strings apart in the following ways:
  - "indexing" — return the single character at a particular location
  - "slicing" — extract a substring of arbitrary length
  - "splitting" — break up a string into components based on particular substrings

String Manipulation: Indexing

- Each character in a string can be accessed via "indexing" relative to its position from the left of the string (zero-offset) or the right of the string ([minus] one-offset):

I	t		w	a	s		a		d	a	r	k
0	1	2	3	4	5	6	7	8	9	10	11	12
−13	−12	−11	−10	−9	−8	−7	−6	−5	−4	−3	−2	−1

```
>>> story[-8]
's'
>>> story[5]
's'
```

String Manipulation: Slicing

- It is possible to "slice" a string by specifying a START and (non-inclusive) END int value:

```
>>> story[1:11]
't was a da'
```

N.B. the sliced substring length = START − END

- By default, START=0 and END is the length of the string:

```
>>> story[:-7]
'It was'
```

String Manipulation: Slicing

- It is also possible to specify slice "direction" (1 or -1):

```
>>> story[-1:-7:-1]
'krad a'
```

Here, the first argument is still the START and the second is still the END, but the default values are START=-1 and END = -(the length of the string + 1):

```
>>> s[-8::-1]
'saw tI'
>>> s[:-5:-1]
'krad'
```

Class Exercise

- Generate the "middle half" of a given string

Lecture Outline

1. Strings: Indexing and Slicing
2. Conditionals

Conditionals

You know, there's no such thing as unconditional love in a marriage as far as I'm concerned, 'cause let me tell you, there are some conditions.

O's Guide to Life: The Best of O, the Oprah Magazine, Volume 2

In Search of the Truth ...

- Often, we want to check whether a particular value satisfies some condition:
  - does it have four legs?
  - is it over 18?
  - is it tall, with rabbit ears, a grey back, whiskers, a creme stomach with grey markings on it, and (at times) an umbrella?

Source(s): http://fav.me/d4qp4si

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In Search of the Truth ...

- For this, we require:
  - a way of describing whether the test is satisfied or not
  - a series of comparison operators
  - a series of logic operators for combining comparisons
  - a way of conditioning behaviour on the result of a given test

Capturing Truth: The `bool` Type

- We capture truth via the `bool` (short for "Boolean") type, which takes the two values: `True` and `False`
- As with other types, we can "convert" to a `bool` via the `bool()` function:

```
>>> bool(3)
True
>>> bool(0)
False
>>> bool("banana")
True
```

Every type has a unique value for which `bool()` evaluates to `False`

Evaluating Truth: Comparison

- We evaluate truth via the following Boolean comparison operators:

	`==`	equality; NOT the same as =
	`>`, `>=`	greater than (or equal to)
operators:	`<`, `<=`	less than (or equal to)
	`!=`	not equal to
	`in`	is an element of

```
>>> 2 == 3
False
>>> 'a' <= 'apple'
True
>>> 'bomp' in 'bomp, bomp, bomp'
True
```

Combining Truth

- We combine comparison operators with the following logic operators:
  - `and`, `or`, `not`:

`and`	`True`	`False`
`True`	`True`	`False`
`False`	`False`	`False`

`or`	`True`	`False`
`True`	`True`	`True`
`False`	`True`	`False`

`not`	`True`	`False`
	`False`	`True`

- NB: precedence: `not` > `and` > `or`

Lecture Summary

- What is a sequence/iterable?
- Strings: what are indexing, slicing and splitting?
- What is the `bool` type?
- What Boolean comparison operators are commonly used in Python?
- What logic operators are commonly used in Python? What is the operator precedence?
- What are `if` statements and code blocks?
- How can you cascade conditions in Python?