ITP 115

String Processing

Input

- The **input** function in Python *always* returns a string even when we want the user to enter a number.
- We use the **int** function to convert the string to an integer.

```
name = input("Enter your name: ")
age = int(input("Enter your age: "))
```

Bad Input

- What if the user doesn't enter a number?

```
age = int(input("Enter your age: "))
```


```
Enter your age: twenty
Traceback (most recent call last):
  File "../Errors.py", line 6, in <module>
    age = int(input("Enter your age: "))
ValueError: invalid literal for int() with base 10: 'twenty'
```

String Error Checking Methods

- **`string`** is a variable holding a string

Method	Description
`string.`**`isalnum()`**	Returns **`True`** if **`string`** contains only letters and numbers Returns **`False`** otherwise
`string.`**`isalpha()`**	Returns **`True`** if **`string`** contains only letters Returns **`False`** otherwise
`string.`**`isdigit()`**	Returns **`True`** if **`string`** contains only digits Returns **`False`** otherwise
`string.`**`isspace()`**	Returns **`True`** if **`string`** contains only whitespace Returns **`False`** otherwise

Example – isdigit

- Use the **isdigit** method to make sure the user enters a number.

```
ageStr = input("Enter your age: ")
while ageStr.isdigit() == False:
   ageStr = input("Enter a number for your age: ")

age = int(ageStr)
```

Sequences Have Indices!

- Each individual item in a sequence is automatically given a position number
- This number is called an **index** and tells what position the item is in
- The **first index** is **zero (`0`)**
- The **last index** is the **number of items – 1**

Example: Strings and Indices

```
word = "spamalot"
```

0	1	2	3	4	5	6	7
s	p	a	m	a	l	o	t

- First index is **zero**
- Last index is the **length – 1**
  (8 letters, but last index is 7)

Sequences and Random Access

- Using indices, we can directly access single items from a sequences

- To read a single item from a sequence, we use the **[ ] operator**

- Syntax

```
sequenceVariable[index]
```

Strings – Random Access

0	1	2	3	4	5	6	7
s	p	a	m	a	l	o	t

```
msg = "spamalot"
print(msg[2])
```

a

```
print(msg[6])
```

o

Strings – Random Access

0	1	2	3	4	5	6	7
s	p	a	m	a	l	o	t

```
msg = "spamalot"
print(msg[13])
```

Error

Index Out of Range

- Only valid indices of a sequence are
  `0` to `length-1` *
- Error if you read index beyond `length-1`
  - Also called "Out of bounds"
- **Common mistake**
  - If a sequence has 5 items, what is the index of the last item?

** Python supports negative indices, which go from -1 to -(length). This is not common in programming languages and we won't use it*

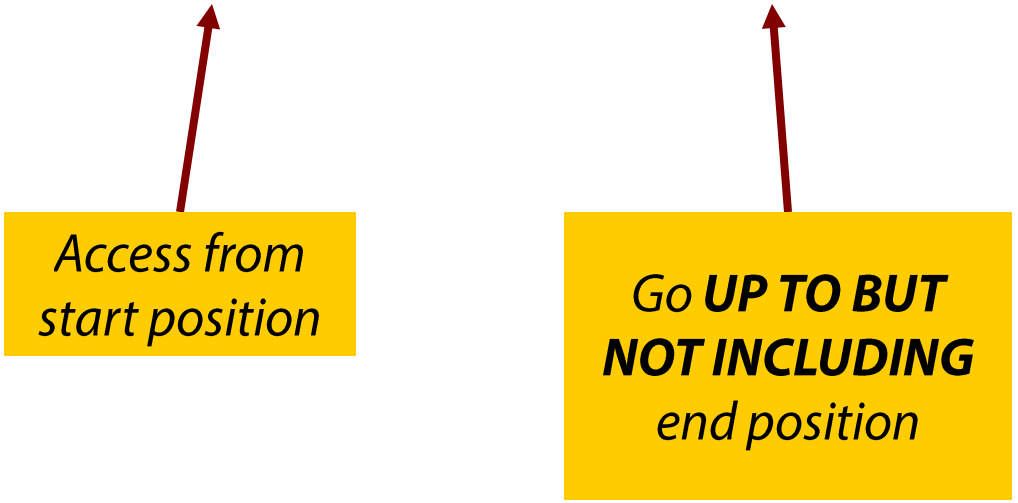
Slicing

- We can use `[index]` to get a single item from a sequence
- We can use **slicing** to get multiple items from a sequence
- Slicing works with any sequence (e.g. string, list, etc.)

Slicing

- Syntax

```
sequenceVariable[startPosition:endPosition]
```



Slicing Strings

0	1	2	3	4	5	6	7
s	p	a	m	a	l	o	t

Examples

```
print(msg[2:6])
```

```
amal
```

```
print(msg[3:4])
```

```
m
```

```
print(msg[0:7])
```

```
spamalo
```

Slicing Strings

0	1	2	3	4	5	6	7
s	p	a	m	a	l	o	t

- What if we want the whole string?

```
print(msg[0:8])
```

```
spamalot
```

Slicing Strings

- What if we want the whole string BUT we don't know how long the string is?

```
msg = input("Enter a word: ")
print(msg[0:len(msg)])
```

*This works because we go from **0** up to but not including **length***

Useful Slicing Tricks

0	1	2	3	4	5	6	7
s	p	a	m	a	l	o	t

- Start at beginning

```
print(msg[:3])
```

```
spa
```

- Go to end

```
print(msg[4:])
```

```
alot
```

- Entire word

```
print(msg[:])
```

```
spamalot
```

find()

- Searches a string for first match of a substring
- Returns a index the first match
- Syntax

```
index = string.find(subString)
```

Example `find()`

```
food     = "fish taco"

index    = food.find("c")

index    = food.find(" ")

newFood = food[index+1:]
```

food

0	1	2	3	4	5	6	7	8
f	i	s	h		t	a	c	o

index 7

index 4

newFood

0	1	2	3
t	a	c	o

Two Categories of Sequences

- Mutable – changeable
  - Can modify A SINGLE item in the sequence
- Immutable – unchangeable
  - Can **NOT** modify A SINGLE item in the sequence

Strings are Immutable

```
word = "game"
print (word)
word[0] = "l"
```

```
TypeError: 'str' object does not
           support item assignment
```