CIS 122

Strings and Things

Math Module Madness

- Python has a few built in mathy functions
  - int
  - abs
  - round
- But where's the heavy duty stuff?
  - log
  - sin
  - factorial

Math Module Madness

- Python stores extra variables / functions in modules
  - math
  - random
  - time
- Need to **import** module before using it
  - >>> import math
  - >>> math.sin(7)
- Modules use **dot notation**
- Why not make everything available all the time?

Math Module Madness

- So what's in the math module?
- Ask python for help
  - >>> help(math)
  - Make sure you import math first...
- For a briefer list, use dir
- IDLE makes things even easier
  - Tries to finish your word when you press <TAB>
  - What happens if you type "math." + <TAB> ?

String Things

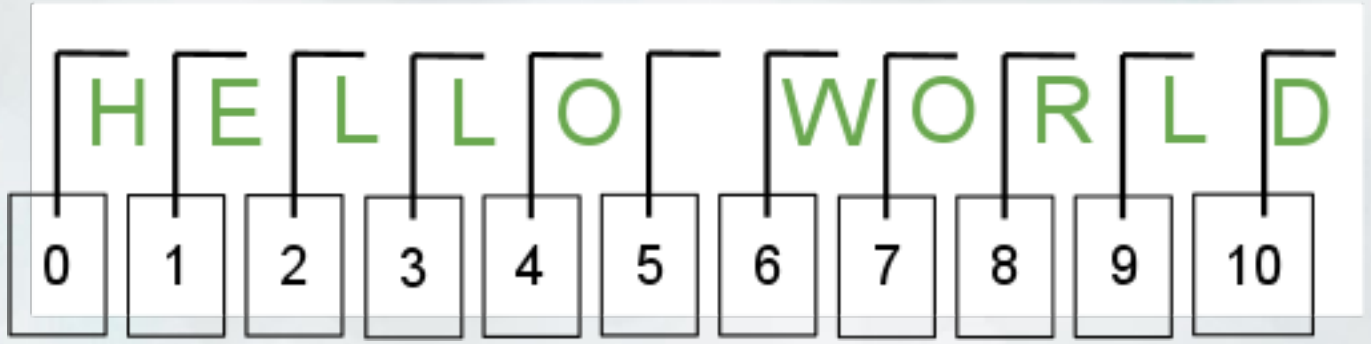
- We can perform mathematical operations with numbers
- What would we like to do with strings?

String Things

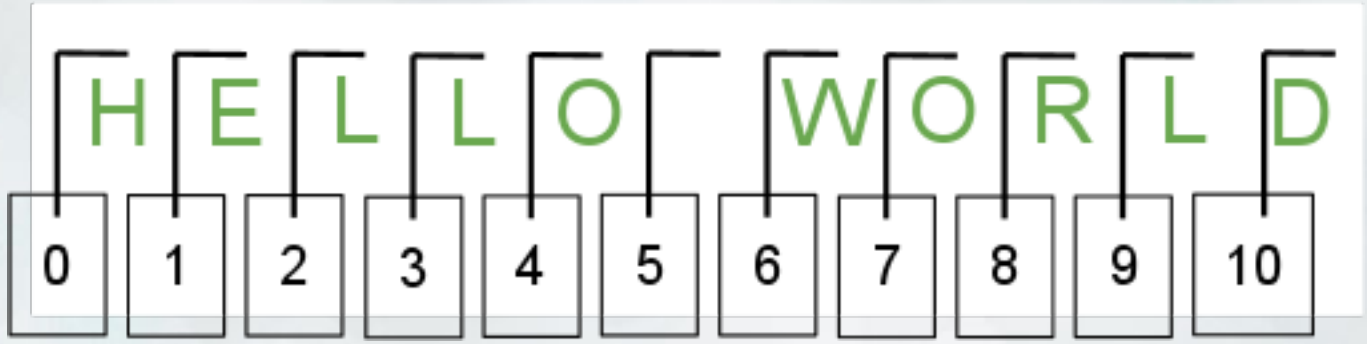
- String Length
  - >>> len("abc")
  - Works on any object with a "length"
- String Comparison
  - >>> "a" < "b"
  - What are Python's rules for string ordering?
  - (The ord function offers some insight)
- Substrings
  - Need to know a little more about strings first...

Anatomy of a String

Anatomy of a String

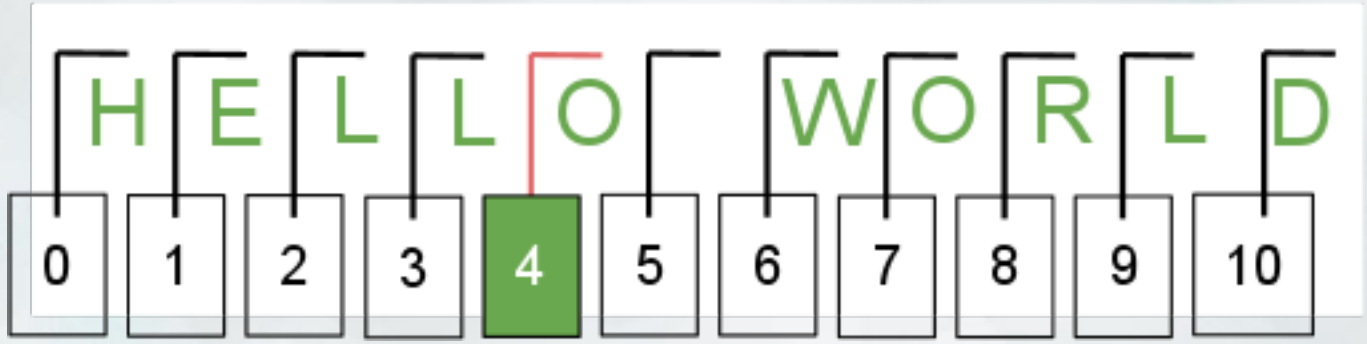


Anatomy of a String



Index into strings using bracket notation

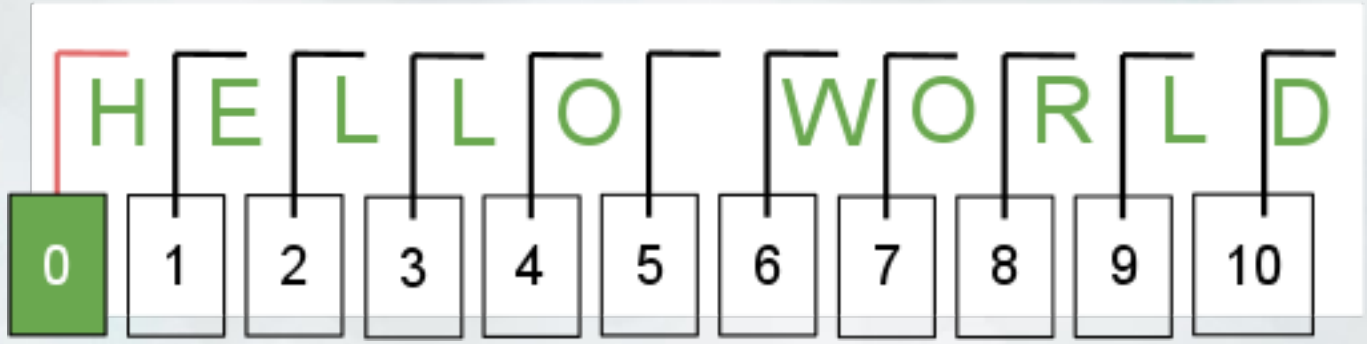
Anatomy of a String



Index into strings using bracket notation

```
>>> "HELLO WORLD"[4]
'O'
```

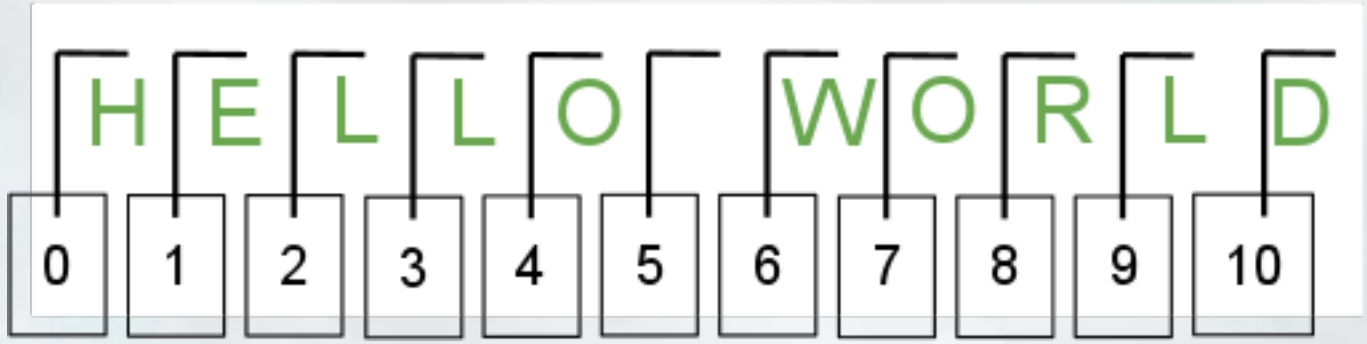
Anatomy of a String



Index into strings using bracket notation

```
>>> "HELLO WORLD"[0]
'H'
```

Anatomy of a String

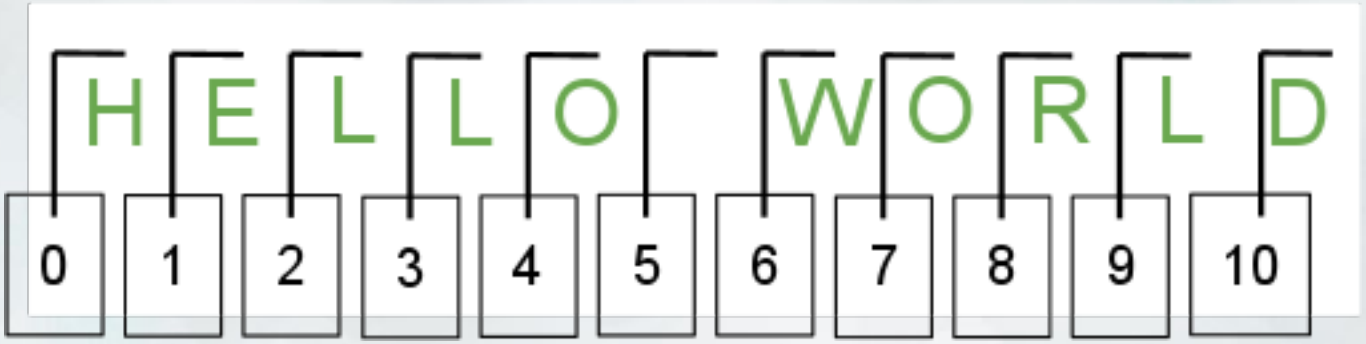


Index into strings using bracket notation

```
>>> "HELLO WORLD"[20]
???
```

What happens here?

Anatomy of a String

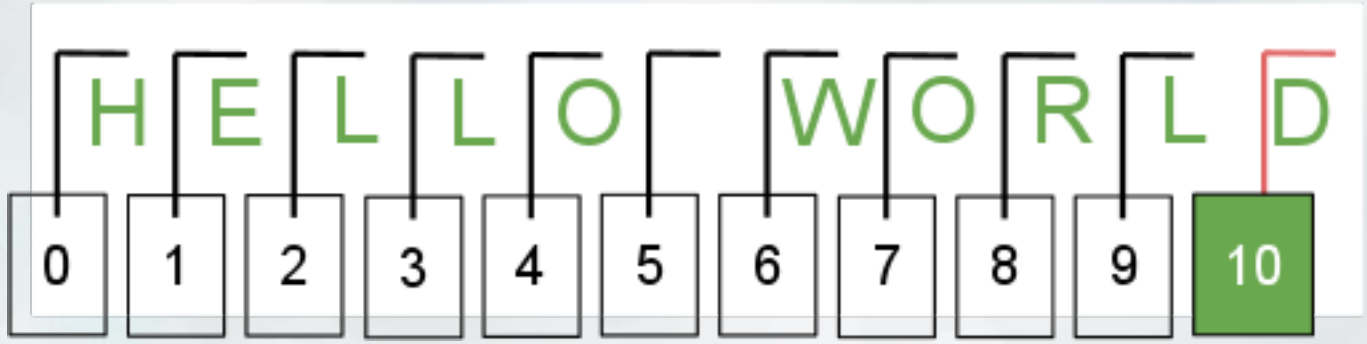


Index into strings using bracket notation

```
>>> "HELLO WORLD"[ len( "HELLO WORLD" ) ]
???
```

What about this?

Anatomy of a String

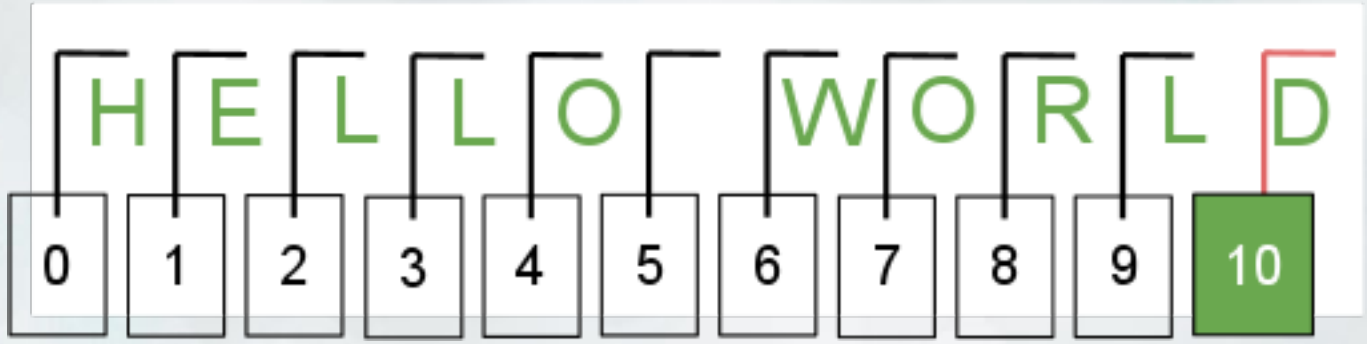


Index into strings using bracket notation

```
>>> "HELLO WORLD"[ len( "HELLO WORLD" ) - 1 ]
'D'
```

The last character of a string is NOT the length of the string!

Anatomy of a String

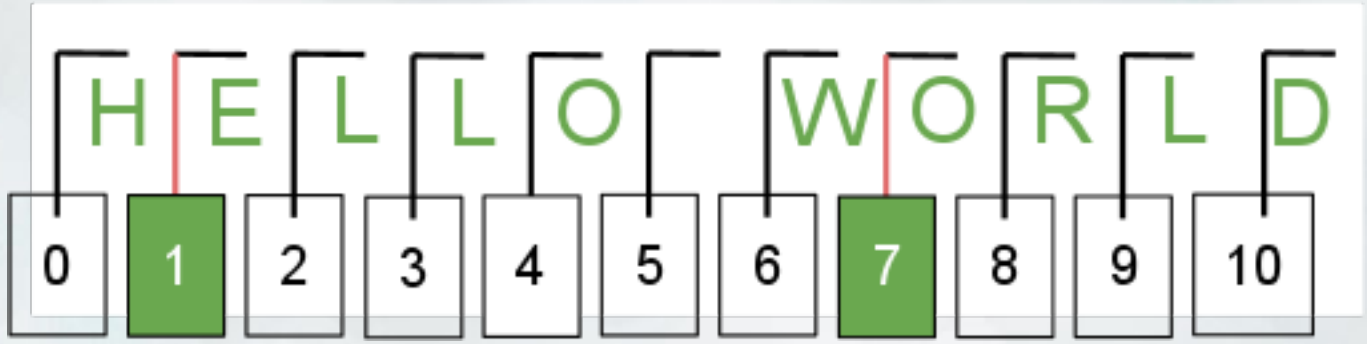


Index into strings using bracket notation

```
>>> "HELLO WORLD"[-1]
'D'
```

Here's a shortcut

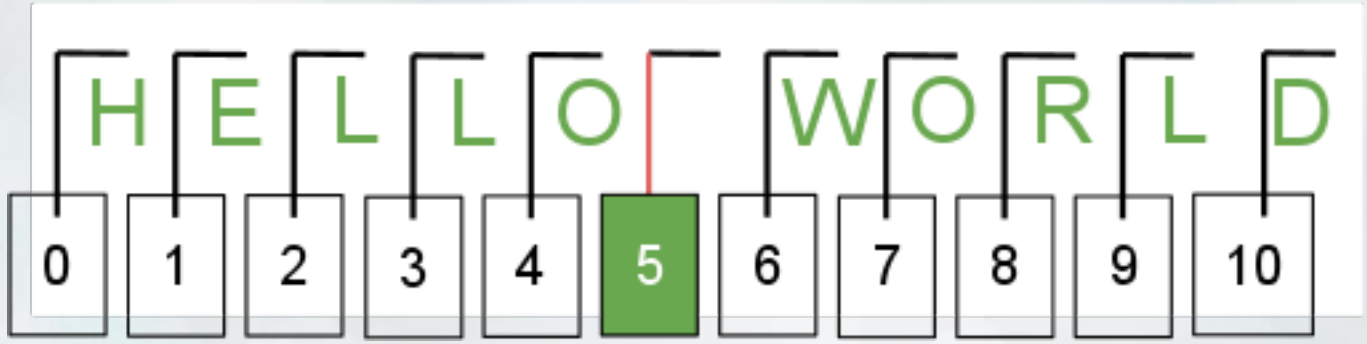
Anatomy of a String



Get substrings using bracket notation

```
>>> "HELLO WORLD"[1:7]
'ELLO W'
```

Anatomy of a String

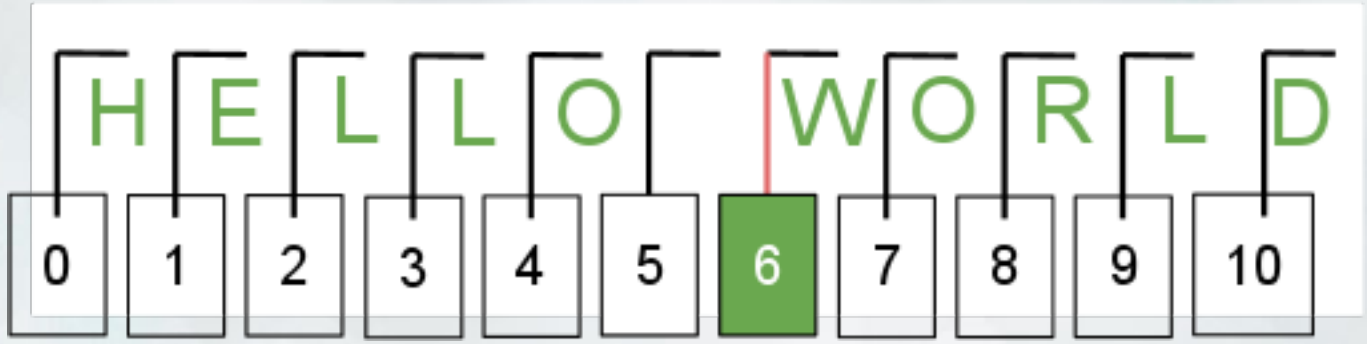


Get substrings using bracket notation

```
>>> "HELLO WORLD"[:5]
'HELLO'
```

If you leave off an index, Python goes to the beginning / end

Anatomy of a String

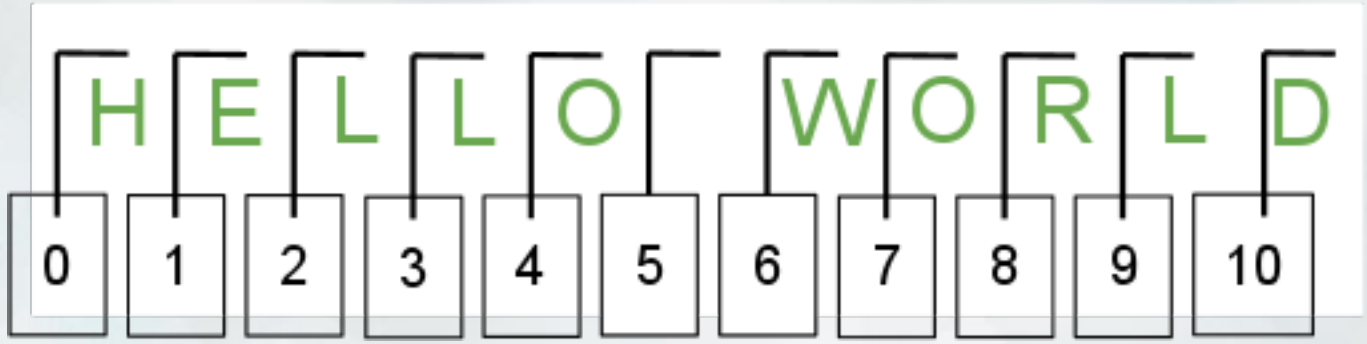


Get substrings using bracket notation

```
>>> "HELLO WORLD"[6:]
'WORLD'
```

If you leave off an index, Python goes to the beginning / end

Anatomy of a String

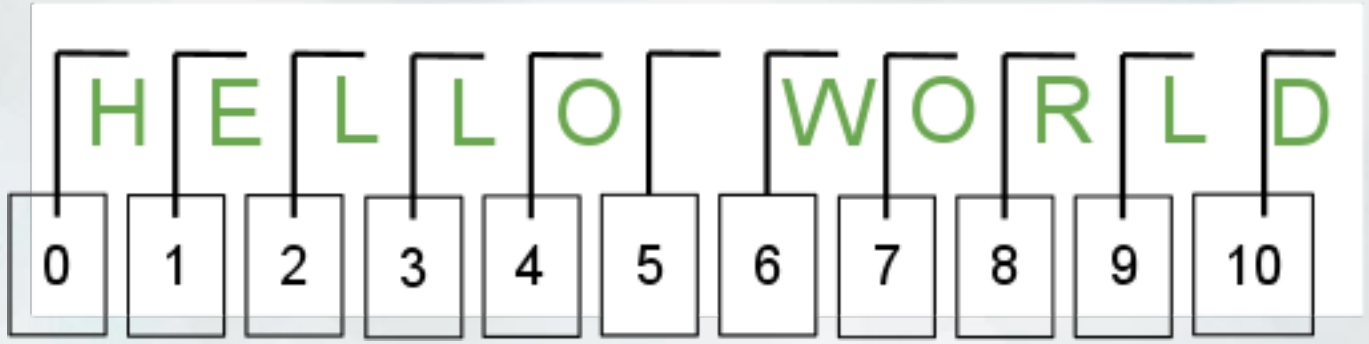


Get substrings using bracket notation

```
>>> "HELLO WORLD"[:]
'HELLO WORLD'
```

If you leave off an index, Python goes to the beginning / end

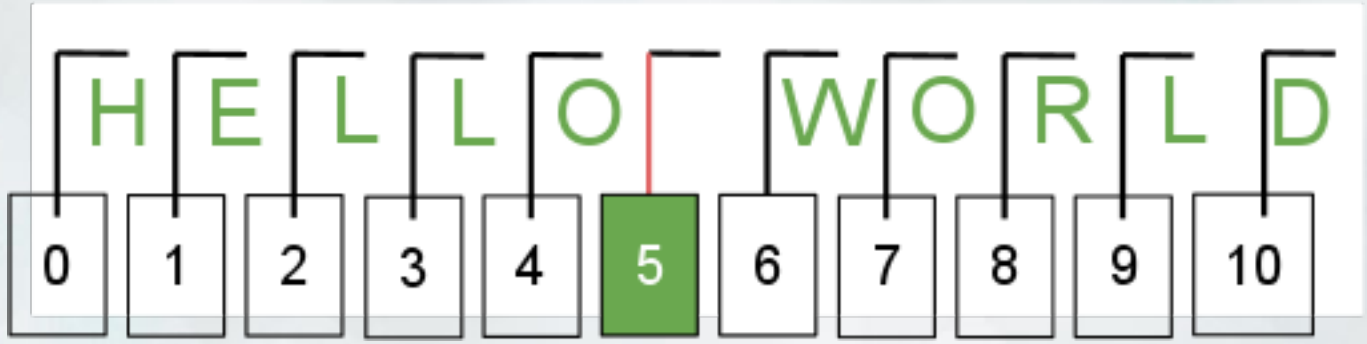
Anatomy of a String



Get substrings using bracket notation

```
>>> "HELLO WORLD"[5:5]
???
```

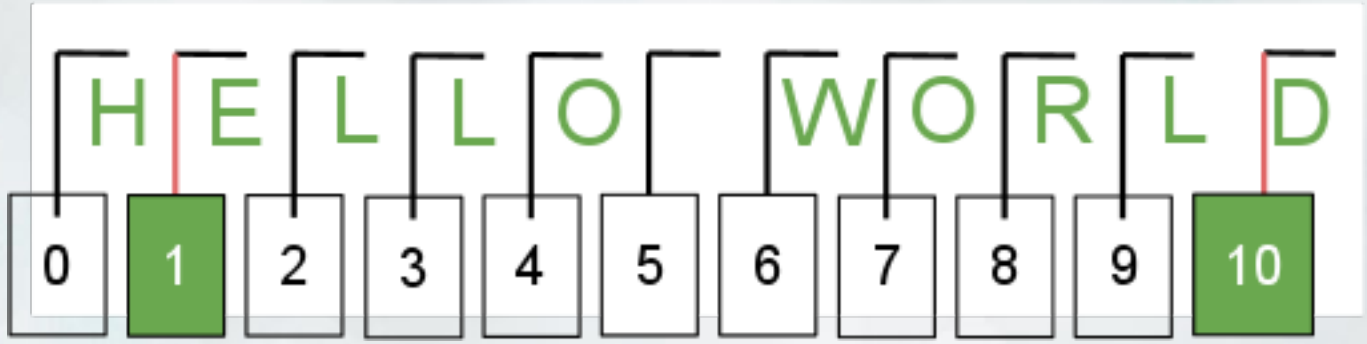
Anatomy of a String



Get substrings using bracket notation

```
>>> "HELLO WORLD"[5:5]
''
```

Anatomy of a String

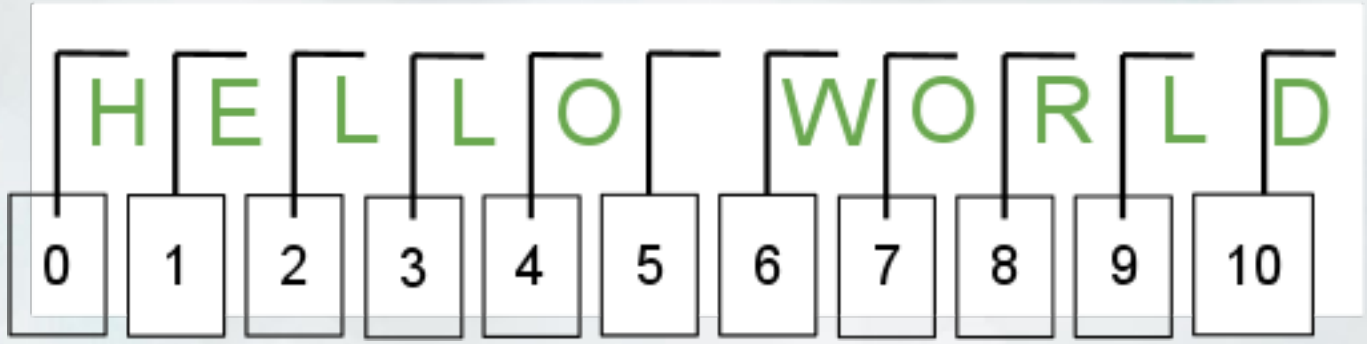


Get substrings using bracket notation

```
>>> "HELLO WORLD"[1:10:2]
'EL OL'
```

You can even tell Python to skip characters

Anatomy of a String

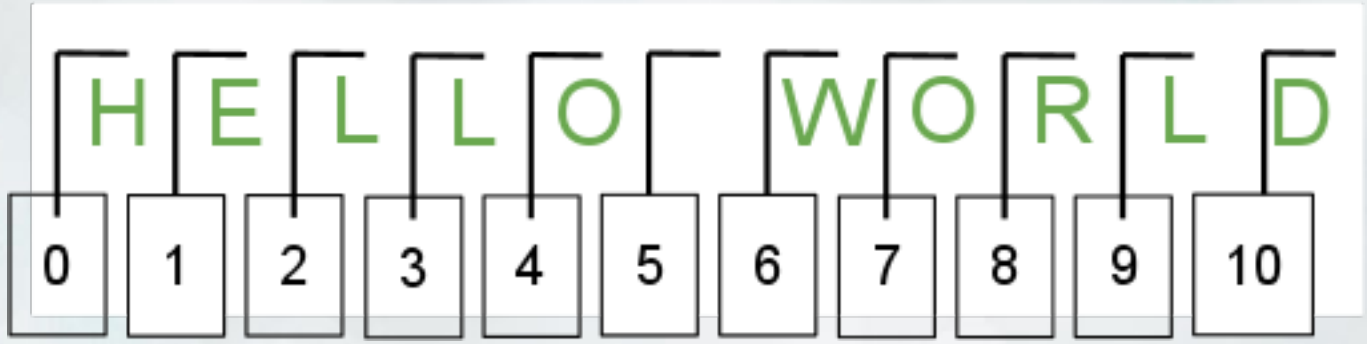


Get substrings using bracket notation

```
>>> "HELLO WORLD"[::5]
'H D'
```

You can even tell Python to skip characters

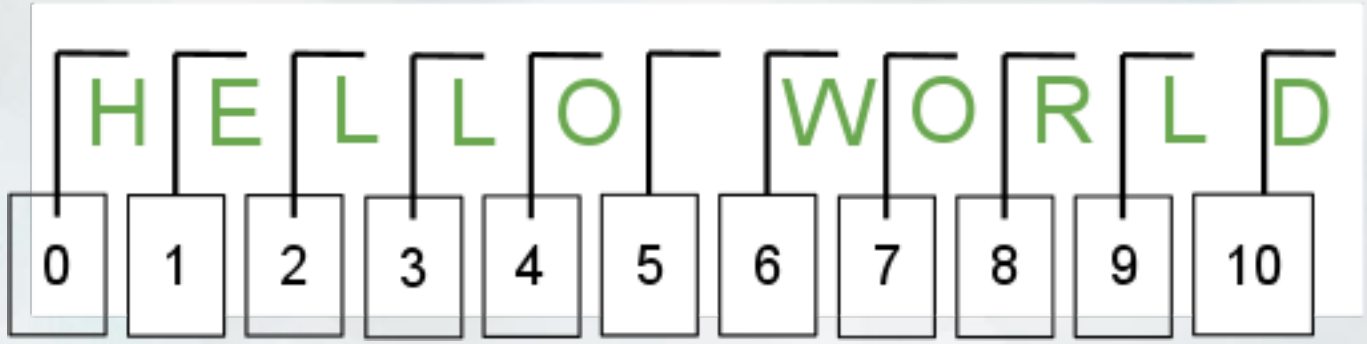
Anatomy of a String



Get substrings using bracket notation

```
>>> "HELLO WORLD"[::-1]
???
```

Anatomy of a String



Get substrings using bracket notation

```
>>> "HELLO WORLD"[::-1]
'DLROW OLLEH'
```

String Things

- String Indexing
  - s[i]
  - Return the character in string s at position i
  - Start counting from zero!
- You can index with negative numbers too
  - s[-i]
  - Return the ith character from the right
  - Start counting from one!
- Why isn't Python consistent?

String Things

- String slicing
  - s[i:j]
  - Return a subset of characters in s
  - Starting at character i,
  - Up to (but not including) character j
- What happens if i > j?
- If you leave off an index, defaults to beginning / end
  - s[i :] - all characters from character i onward
  - s[: i] - all characters up to (but not including) character i

String Things

- String slicing with skips
  - s[i:j:k]
  - Start at character i
  - Count up by k...
  - Stop before character j

- You can skip backwards too!
  - What are Python's rules?

String Things

- Skipping backwards
  - s[i:j:-k]
  - Start at character j
  - Count down by k
  - Stop before character i
- What if j < i?