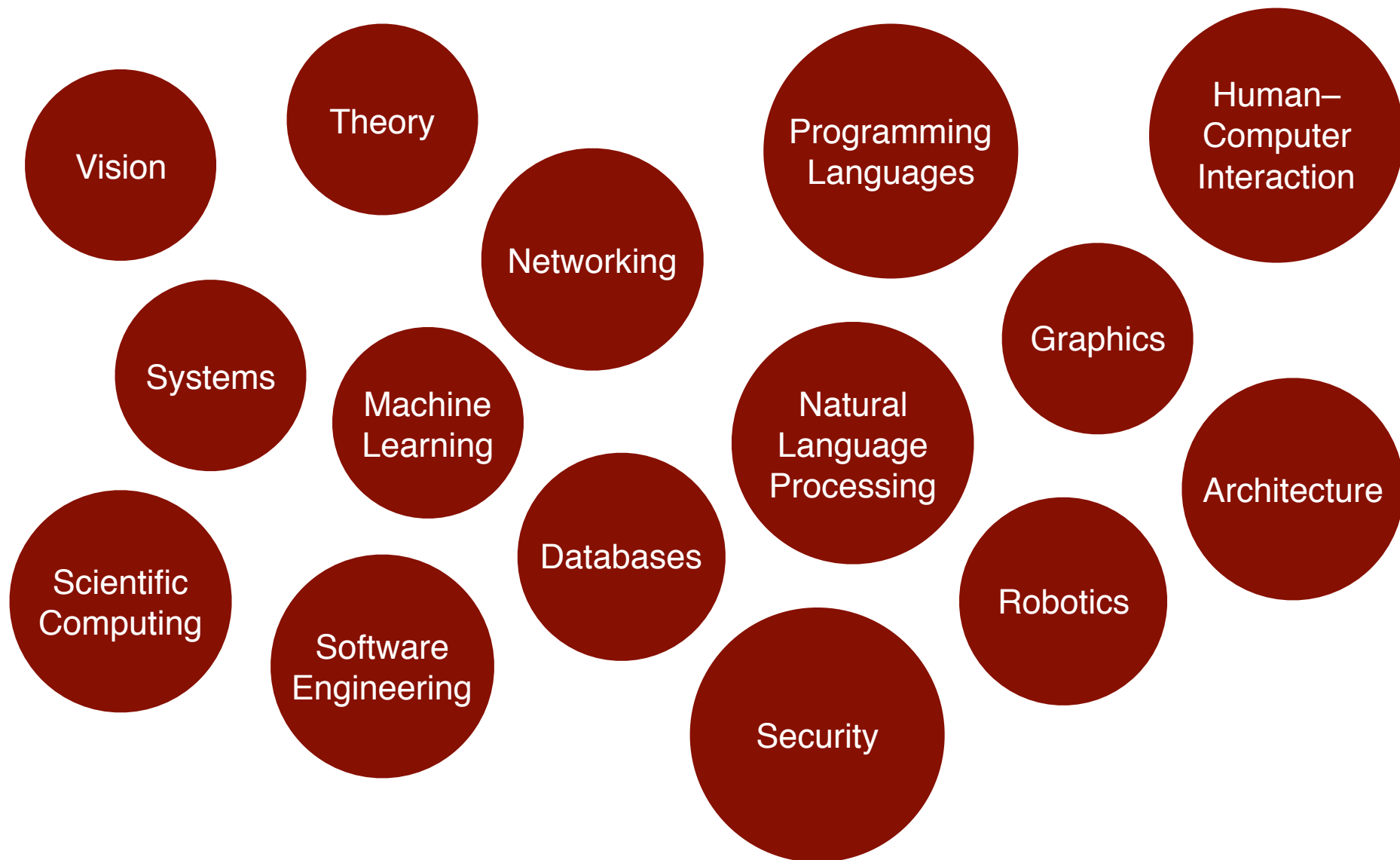


Lecture 1: Introduction to Computer Science

CS 51P

September 4, 2019

Computer Science



Computational Thinking

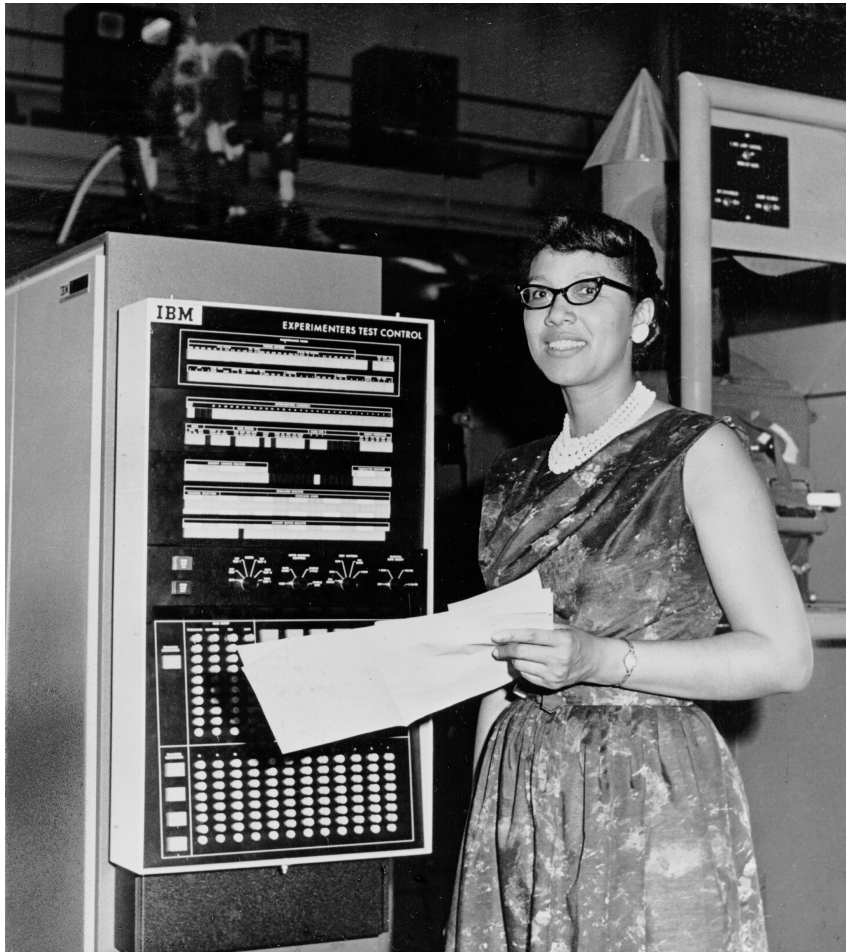


Programming

```
endif
endif
if intStep = COOKING_TOAST
intCookLevel# = intCookLevel# - .05
`Color the Bread (not the crust)
if intCookLevel# >= 5
intRed = ((intCookLevel#-5)/5) * (intRedLight1 - intRedMedium1)
intGreen = ((intCookLevel#-5)/5) * (intGreenLight1 - intGreenMedium1)
intBlue = ((intCookLevel#-5)/5) * (intBlueLight1 - intBlueMedium1)
if intRed < 0 then intRed = 0
if intGreen < 0 then intGreen = 0
if intBlue < 0 then intBlue = 0
if intLevel = 1
color limb intCurrentBread, 2, rgb(intRed+intRedMedium1, intGreen
color limb intCurrentBread, 3, rgb(intRed+intRedMedium1, intGreen
endif
if intLevel = 2 or intLevel = 3 or intLevel = 4
color limb intCurrentBread, 1, rgb(intRed+intRedMedium1, intGreen
endif
else
intRed = (intCookLevel#/5) * (intRedMedium1 - intRedDark1)
intGreen = (intCookLevel#/5) * (intGreenMedium1 - intGreenDark1)
intBlue = (intCookLevel#/5) * (intBlueMedium1 - intBlueDark1)
if intRed < 0 then intRed = 0
if intGreen < 0 then intGreen = 0
if intBlue < 0 then intBlue = 0
if intLevel = 1
color limb intCurrentBread, 2, rgb(intRed+intRedDark1, intGreen+i
color limb intCurrentBread, 3, rgb(intRed+intRedDark1, intGreen+i
endif
endif
```

DELL

Example



If you run a 10 kilometer race in 43 minutes 30 seconds, what is your average time per mile? (Hint: there are 1.61 kilometers in a mile).

What is your average speed in miles per hour?

Machine Language

```
lcfi2:
    movl    %edi, -4(%rbp)
    cmpl   $0, -4(%rbp)
    jle    LBB0_2
## BB#1:
    leaq   L_.str(%rip), %rdi
    movb  $0, %al
    callq  _printf
LBB0_2:
    xorl   %eax, %eax
    retq
L_.str:
    .asciz "x is a positive number"
```

```
if (x>0):
    print ("x is a positive number")
```

High-level languages

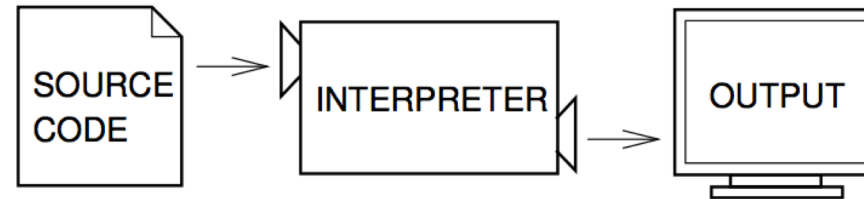


Figure 1.1: An interpreter processes the program a little at a time, alternately reading lines and performing computations.

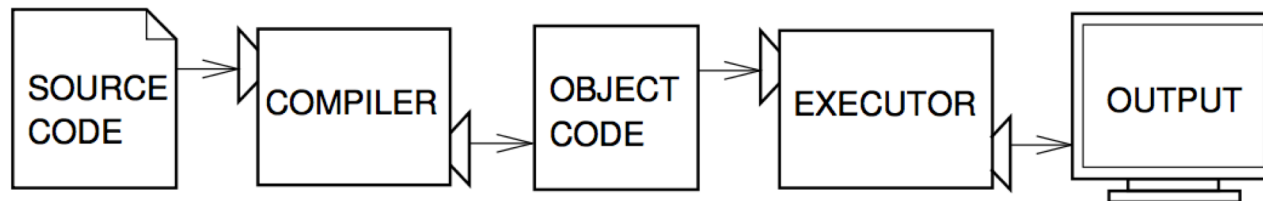


Figure 1.2: A compiler translates source code into object code, which is run by a hardware executor.

Python

- Python 3.7
- PyCharm CE
 - projects
 - editor window
 - console at bottom

If you run a 10 kilometer race in 43 minutes 30 seconds, what is your average time per mile? (Hint: there are 1.61 kilometers in a mile).

What is your average speed in miles per hour?

Terminology

- Value
- Type
- Operator
- Expression
- Error

Expressions

ex·pres·sion

/ik'spreSHən/ 

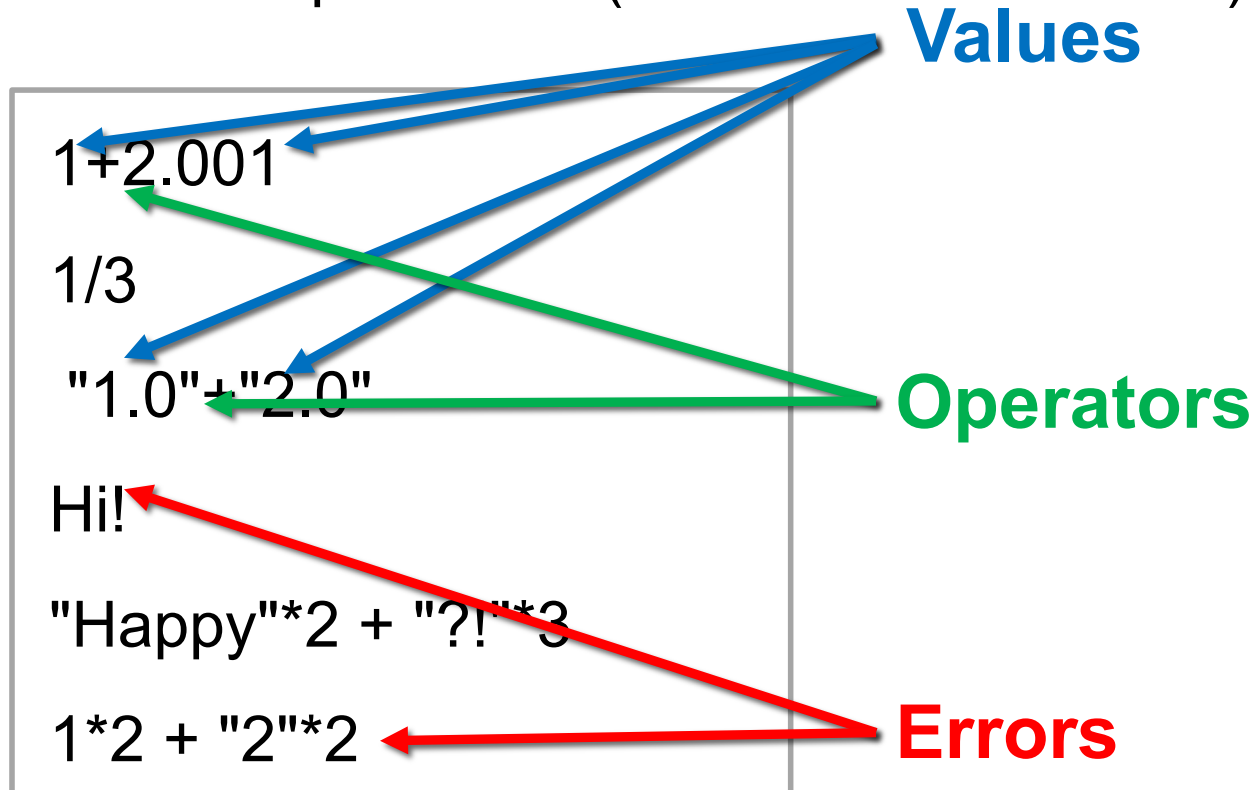
noun

noun: **expression**; plural noun: **expressions**

1. the look on someone's face that conveys a particular emotion.
"a sad expression"
synonyms: look, appearance, air, manner, countenance, mien
"an expression of harassed fatigue"
2. a word or phrase, especially an idiomatic one, used to convey an idea.
"nowhere is the expression "garbage in, garbage out" any truer"
synonyms: idiom, phrase, idiomatic expression; [More](#)
 - **MATHEMATICS**
a collection of symbols that jointly express a quantity.
"the expression for the circumference of a circle is $2\pi r$ "

Python Expressions

- Expressions represent a value
- Python evaluates expressions (similar to a calculator)



Errors

- Two types of errors:
 - `SyntaxError`: invalid syntax
 - `TypeError`: unsupported operand type(s) for +: 'int' and 'str'

1+2.001

1*3

"1.0"+"2.0"

Hi!

"Happy"*2 + "?!"*3

1*2 + "2"*2

```
>>> Hi!  
File "<input>", line 1  
  Hi!  
  ^  
SyntaxError: invalid syntax  
>>> 1*2 + "2"*2  
Traceback (most recent call last):  
  File "<input>", line 1, in <module>  
TypeError: unsupported operand type(s) for +: 'int' and 'str'
```

Types and Functions

- How to find out the type?

```
"Happy"*2 + "?!"*3
```

```
1*2 + "2"*2
```

- What if you want to change the type?

- Functions

- `type()`
- `str()`, `int()`, `float()`

```
type(3.0)
```

```
1*2 + int("2")*2
```

```
str(1)*2 + "2"*2
```

Exercise

`3 * 2.001`

`("A"*2 + "?"*3) * 2`

`1/2`

`"1.0"+2.0`

`1.0*2 + 2*2`

`14 % 5`

`1.1 ** 2`

Python Programs

If you run a 10 kilometer race in 43 minutes 30 seconds, what is your average time per mile? (Hint: there are 1.61 kilometers in a mile).

variables!

Variables

- A variable is a name that refers to a value
 - names should be meaningful
 - by convention words separated by an underscore
 - names cannot be a keyword (e.g. *print*), cannot include spaces, must begin with a letter

and	del	from	not	while
as	elif	global	or	with
assert	else	if	pass	yield
break	except	import	print	
class	exec	in	raise	
continue	finally	is	return	
def	for	lambda	try	

Assigning variables

- Can assign a value to a variable
- Right hand side can be any expression (anything that is, or that evaluates to, a value)

```
x = 12.001
```

```
a_string = 1*str(2) + "2"*2
```

```
x_type = type(1+2.001)
```

Example: Writing a Python Program

If you run a 10 kilometer race in 43 minutes 30 seconds, what is your average time per mile? (Hint: there are 1.61 kilometers in a mile).

If you run a 10 kilometer race in 43 minutes 30 seconds, what is your average speed in miles per hour? (Hint: there are 1.61 kilometers in a mile).

Course Logistics

All information is on the Course website:

<http://www.cs.pomona.edu/~ebirrell/classes/cs51p/2019fa/>