Week 01

Computational Thinking in Bioinformatics

Who are we?

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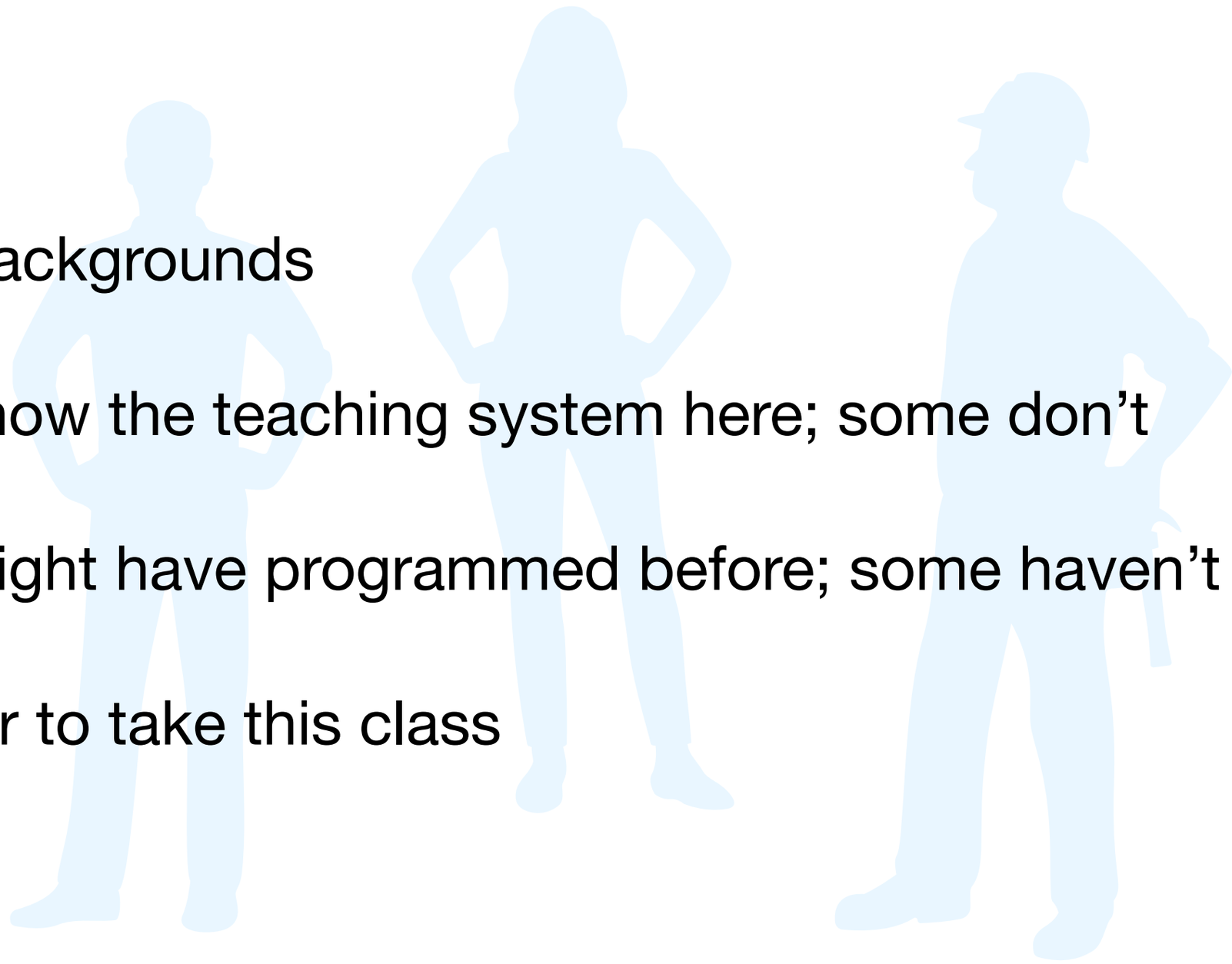
What is this class?

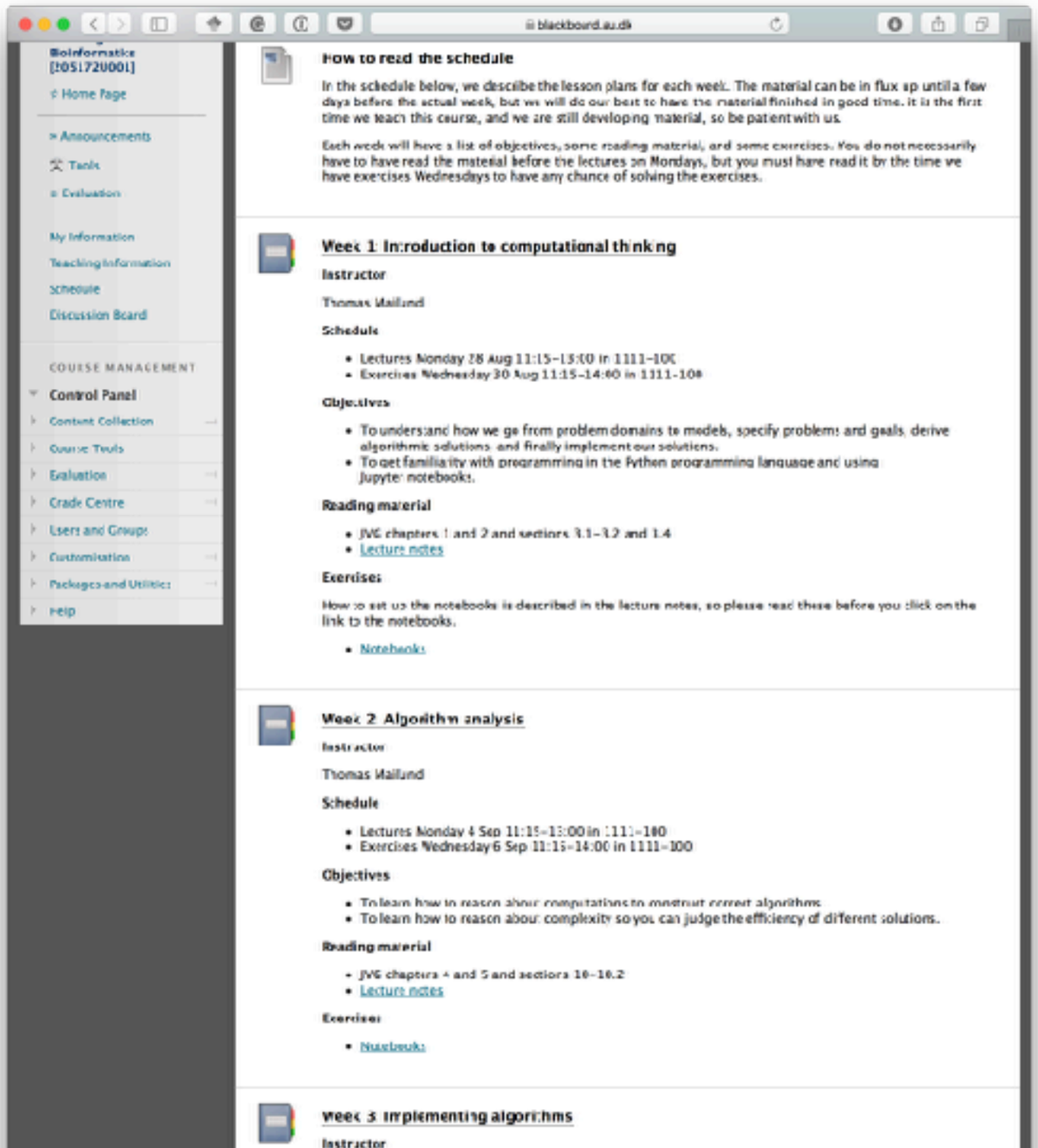
- Computational thinking is not a synonym for programming
  - Modelling
  - Deriving algorithms
  - Thinking about computational complexity
- The *class* is also about programming
  - The practical application of algorithms
  - Theory made manifest

Who are you?



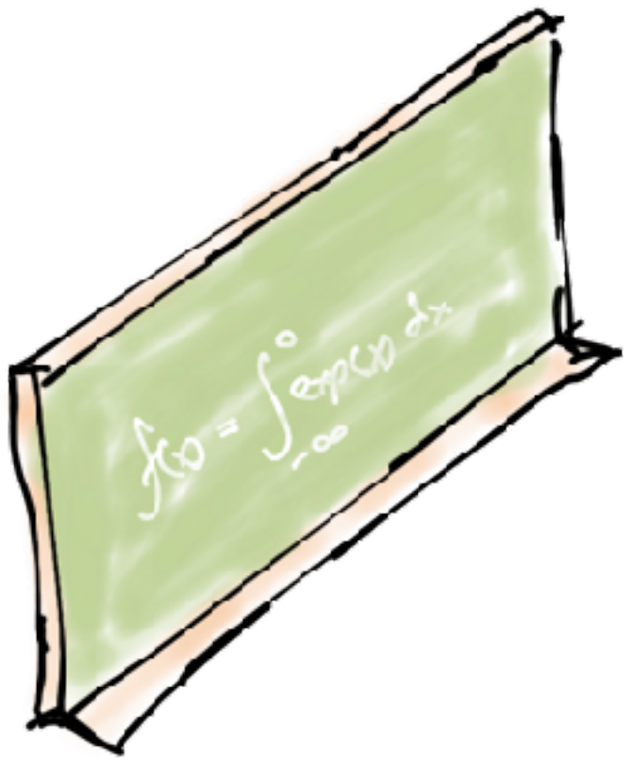
- Varied backgrounds
- Some know the teaching system here; some don’t
- Some might have programmed before; some haven’t
- First ever to take this class

The plan is pure fiction until realised



- We will have a schedule for each week before Monday
- Future weeks are in flux until a week begins
- We will adjust the plan to where we are at any given moment
- If you need us to speed up or slow down, let us know

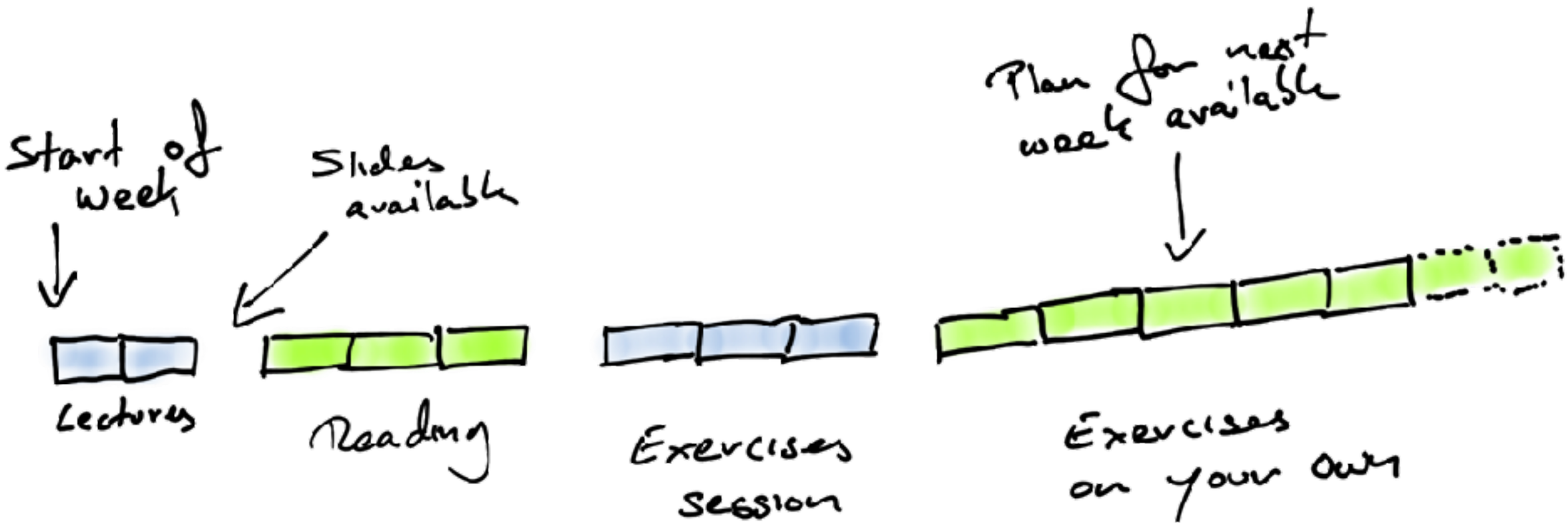
Practical information



- **Lectures**:
  - Mondays 11.15-13.00
  - Don’t worry a bout reading material ahead of time
  - Do the exercises from the previous week as we might discuss those

- **Exercises**:
  - Wednesday 11.15-14.00
  - Read the material ahead of time
  - Don’t worry about doing the exercises ahead of time

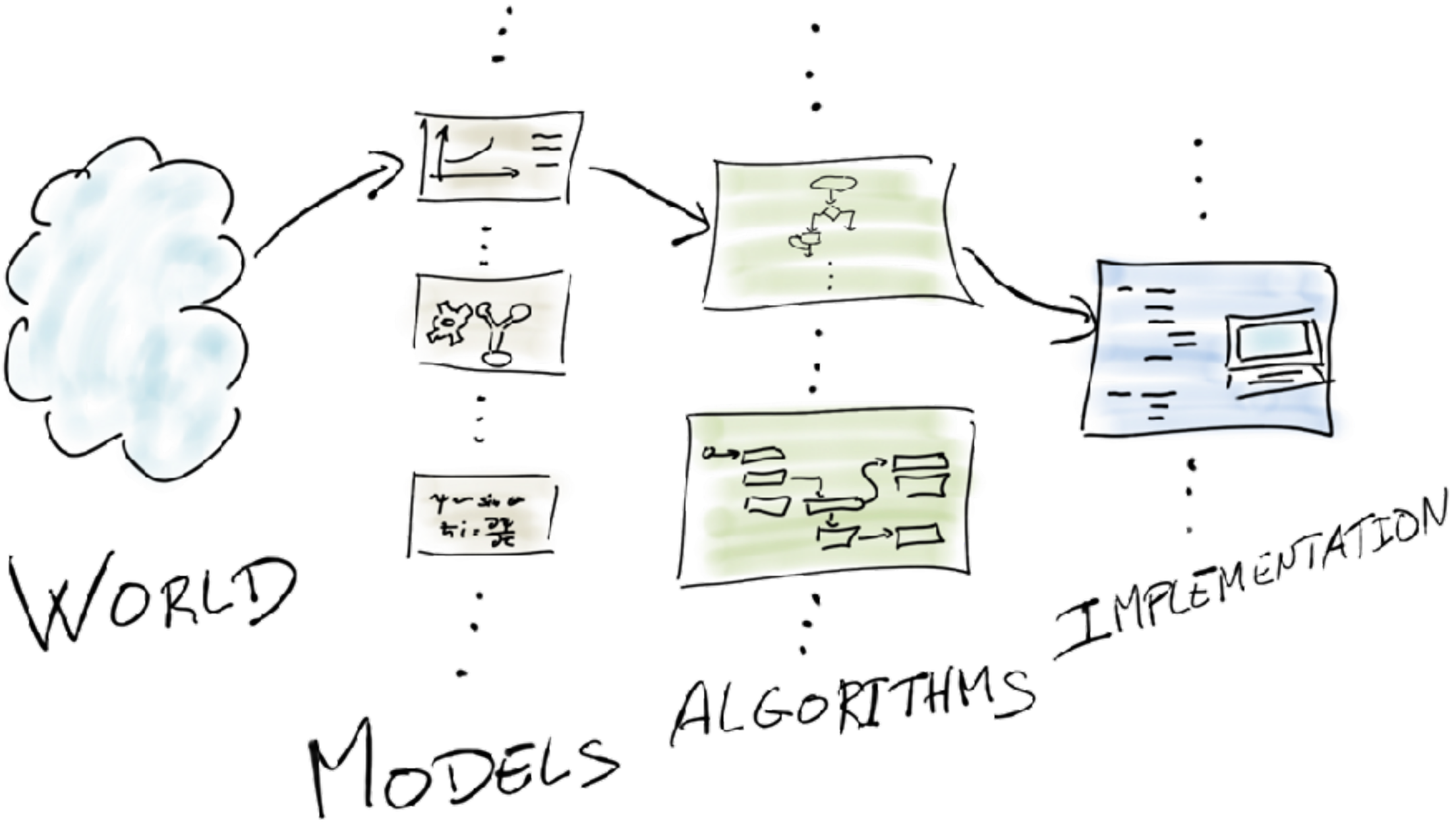
Organising your time



Organising your time

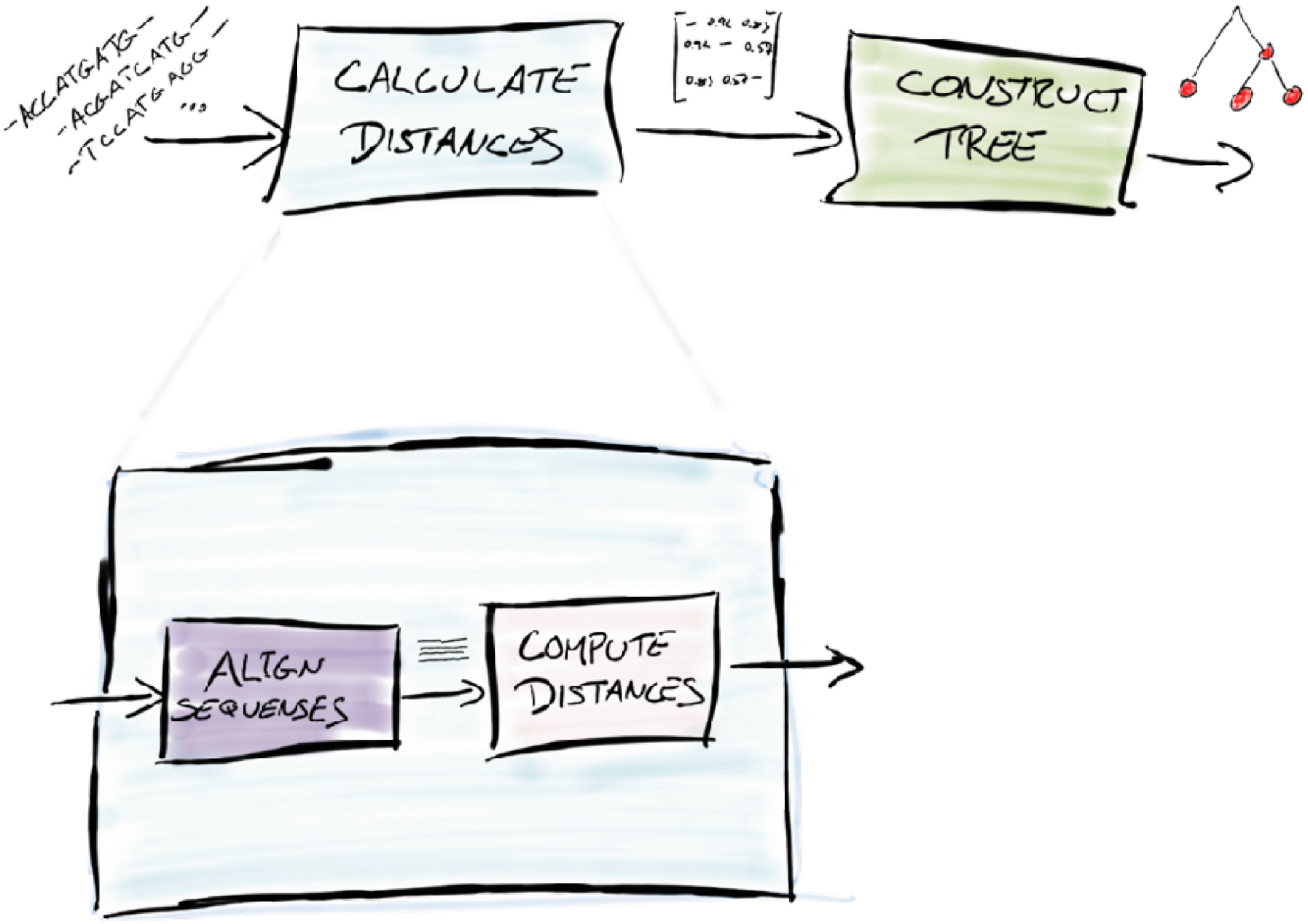
Problem solving

Models, algorithms and implementations


WORLD
MODELS
ALGORITHMS
IMPLEMENTATION

Designing algorithms

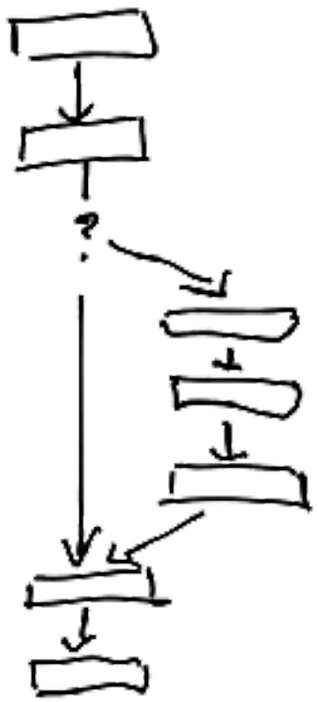

-ACLATGATG-
-ACGATCATG-
-TCCATGAGG-
"..."
Infer
Tree


-ACCATGATG-
-ACGATCATG-
-TCCATGAGG-
...
CALCULATE DISTANCES
CONSTRUCT TREE
ALIGN SEQUENSES
COMPUTE DISTANCES

Introduction to programming

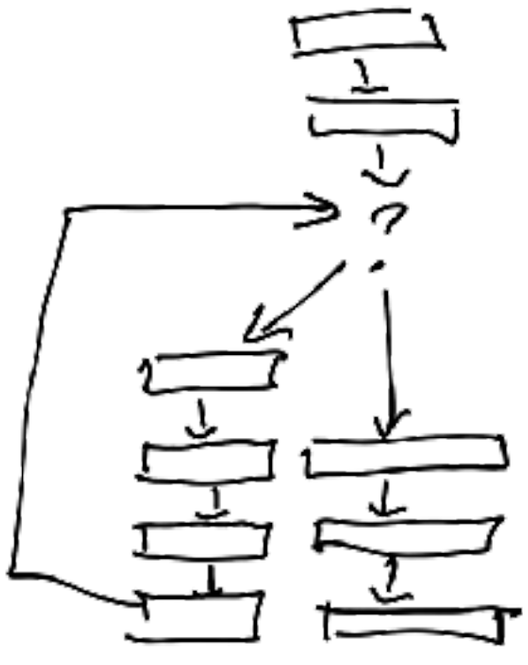
Sequential

Branching



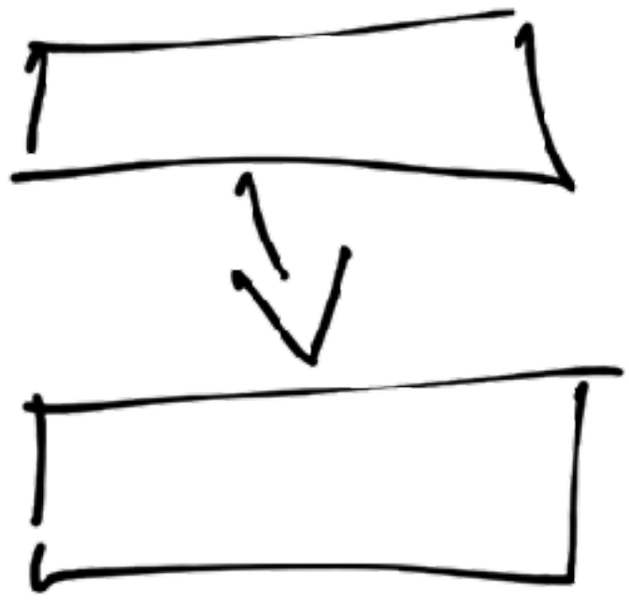
(Conditional)

Looping

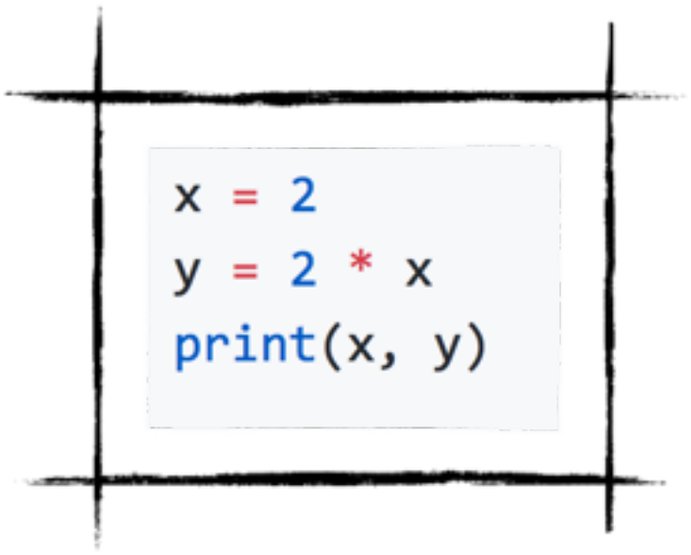


Sequential execution

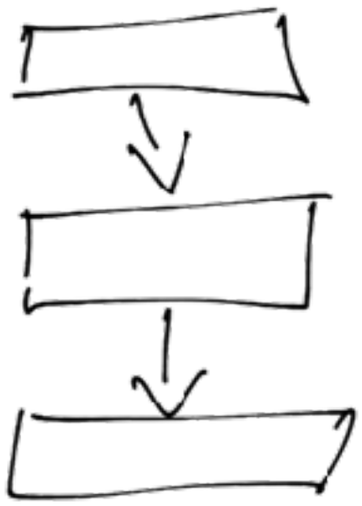
```
print("Hello")
print("World")
```

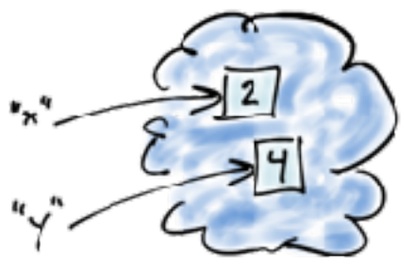


Variables (program state)



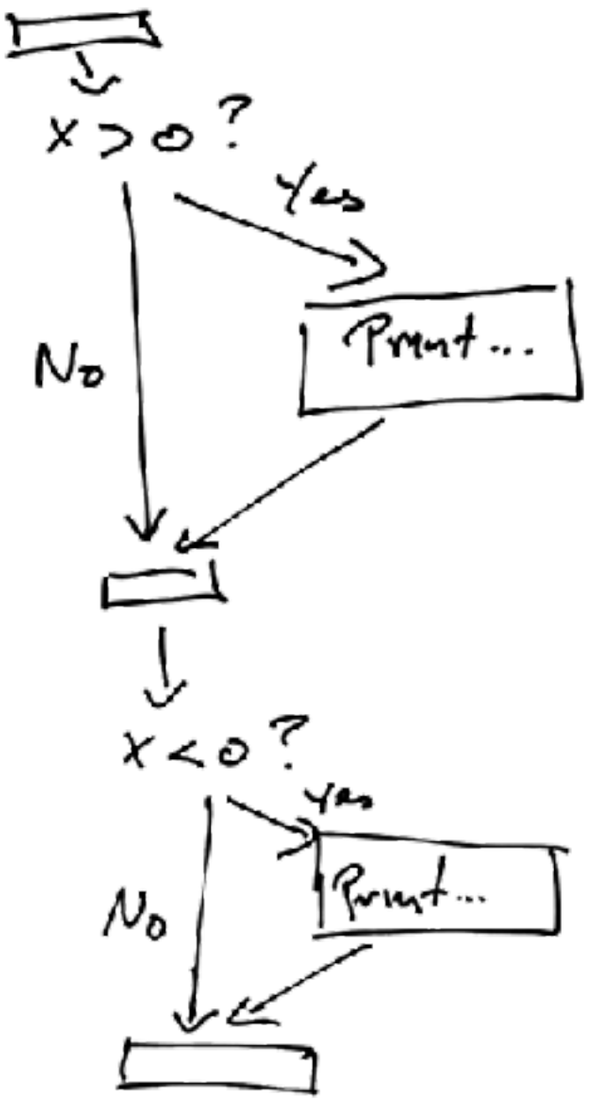
```
x = 2
y = 2 * x
print(x, y)
```





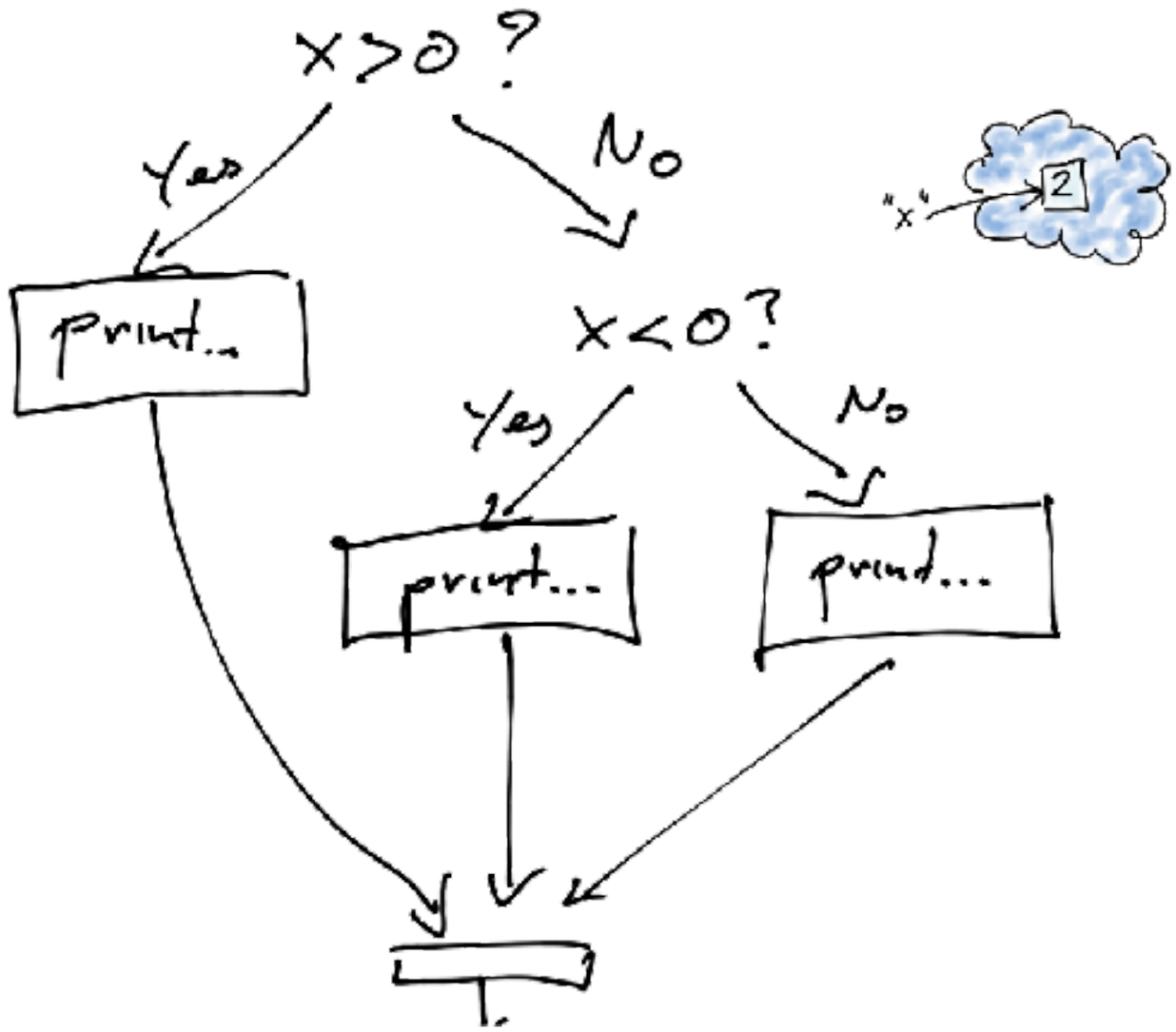
Branching

```
if x > 0:
  print("x is positive")
if x < 0:
  print("x is negative")
```



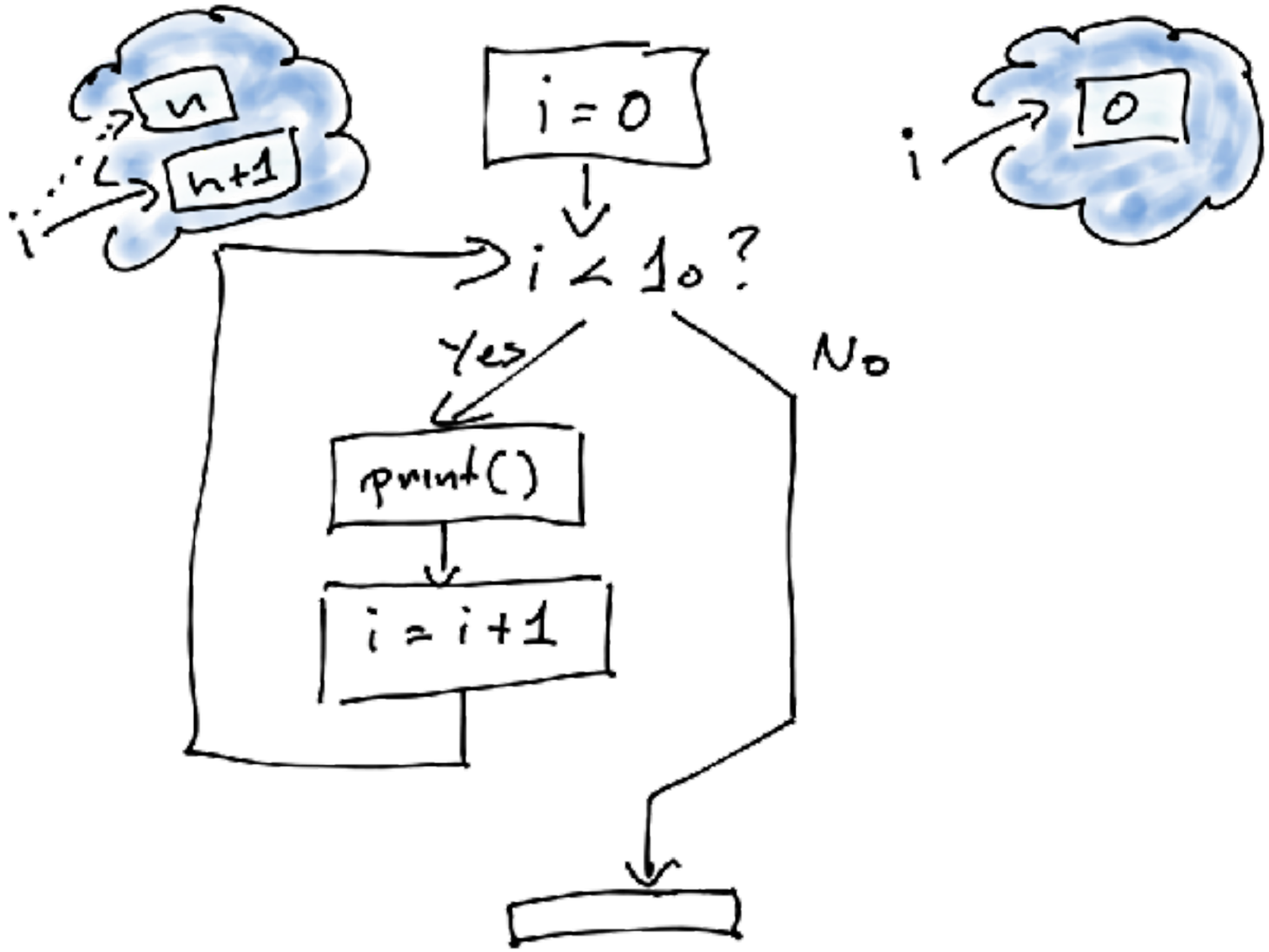
Branching

```
if x > 0:
  print("x is positive")
elif x < 0:
  print("x is negative")
else:
  print("x is zero")
```



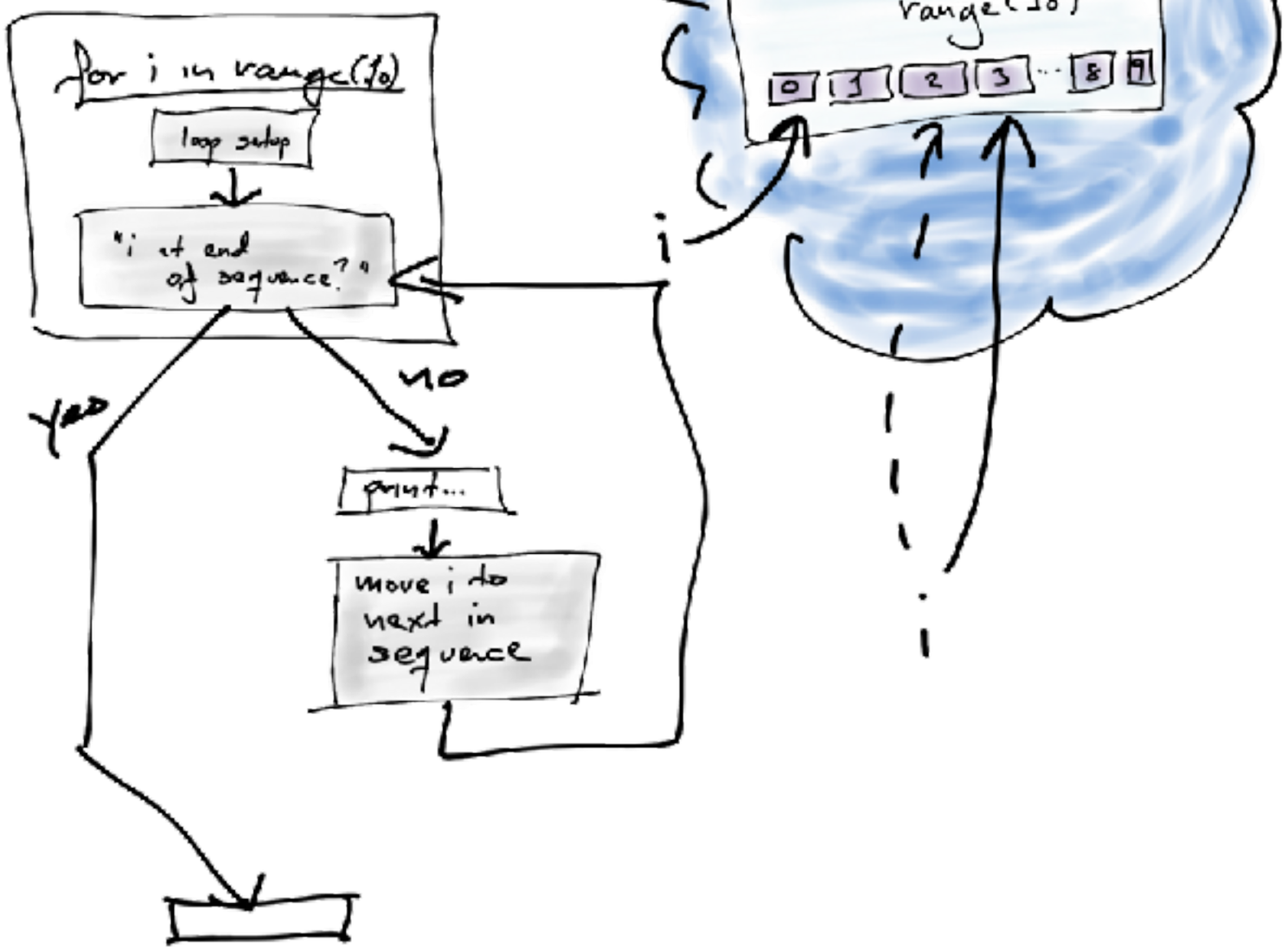
Looping (while)

```
i = 0
while i < 10:
   print("i =", i)
   i = i + 1
```



Looping (for)

```
for i in range(10):
  print("i =", i)
```



Getting started!

https://goo.gl/u9RQZm