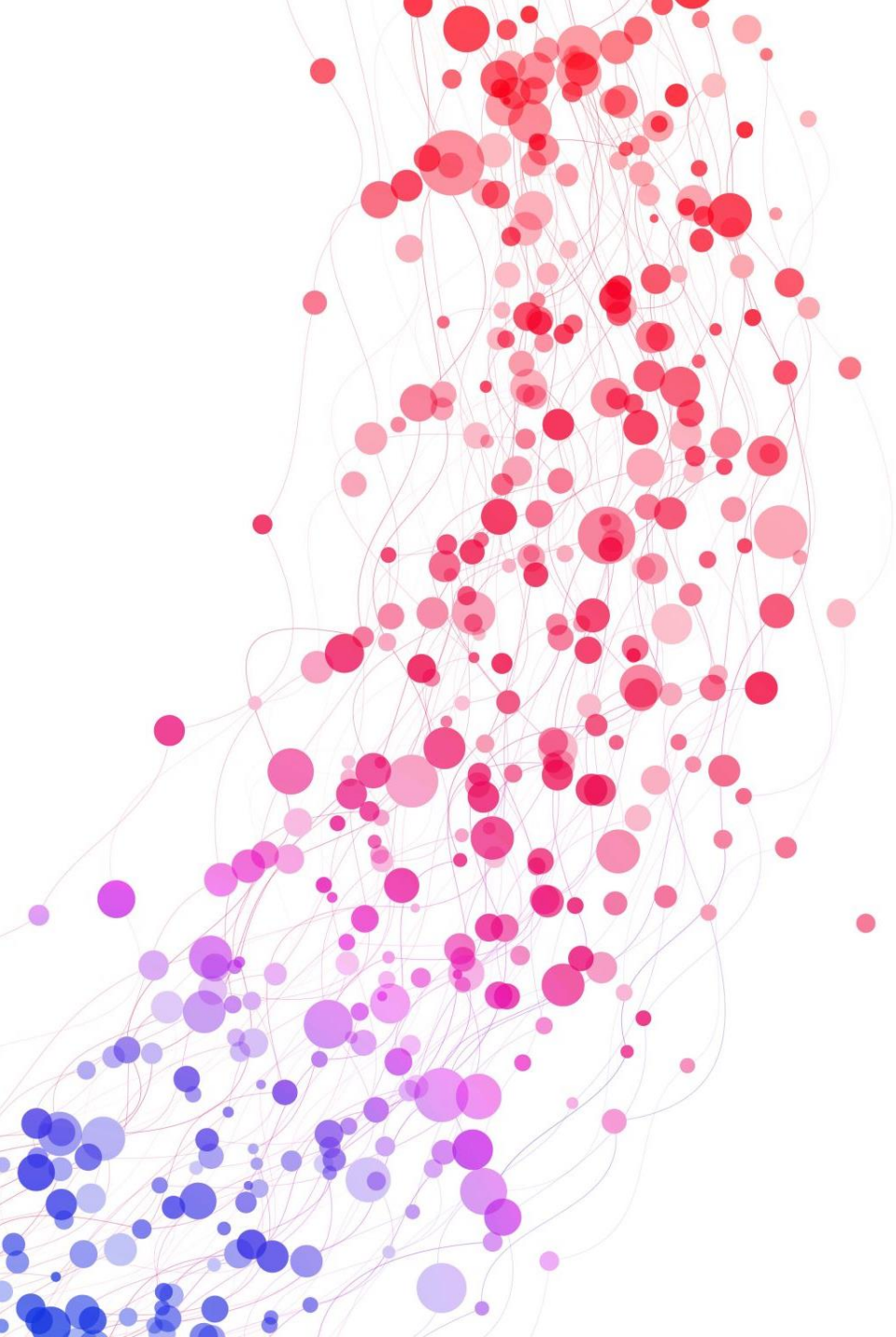


PROGRAMMING PARADIGMS IN PYTHON

(FUNCTIONAL & REACTIVE)

MUTHUKUMARAN NAVANEETHAKRISHNAN

SESSION I

- History on Programming Paradigms
- Introduction to Functional Programming
- Functional Programming in Python
  - lambda
  - map
  - filter
  - reduce
  - Partials & higher order functions

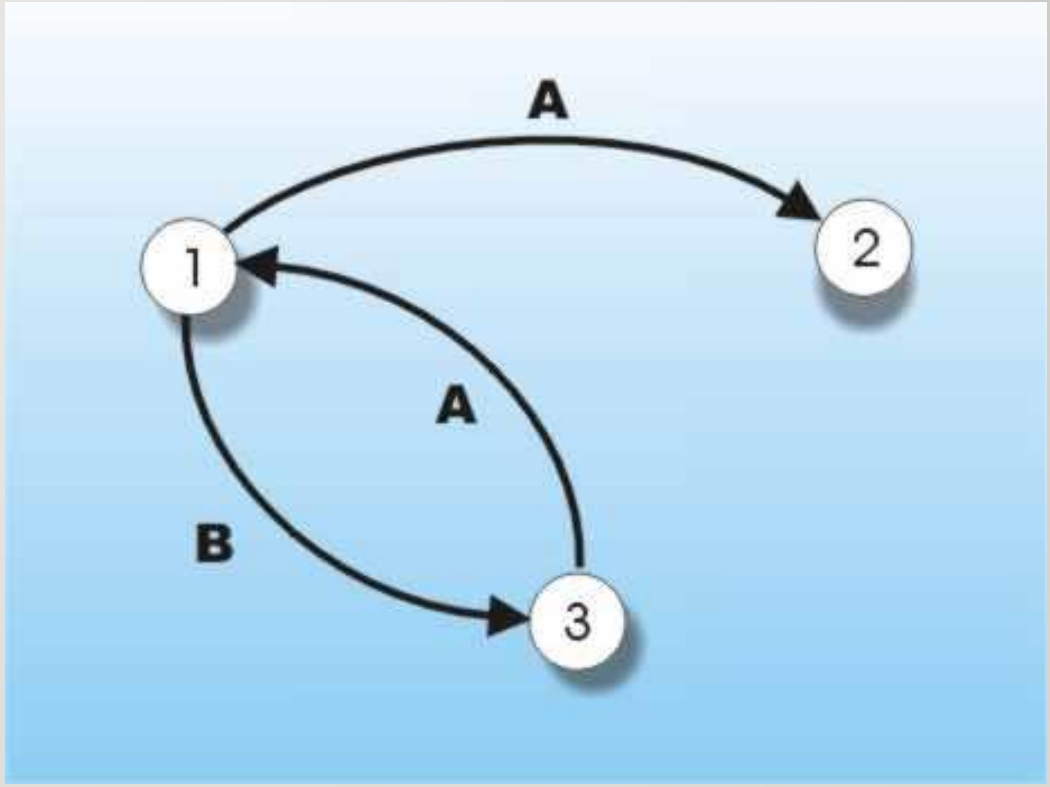
HISTORY

WHERE IT ALL BEGINS

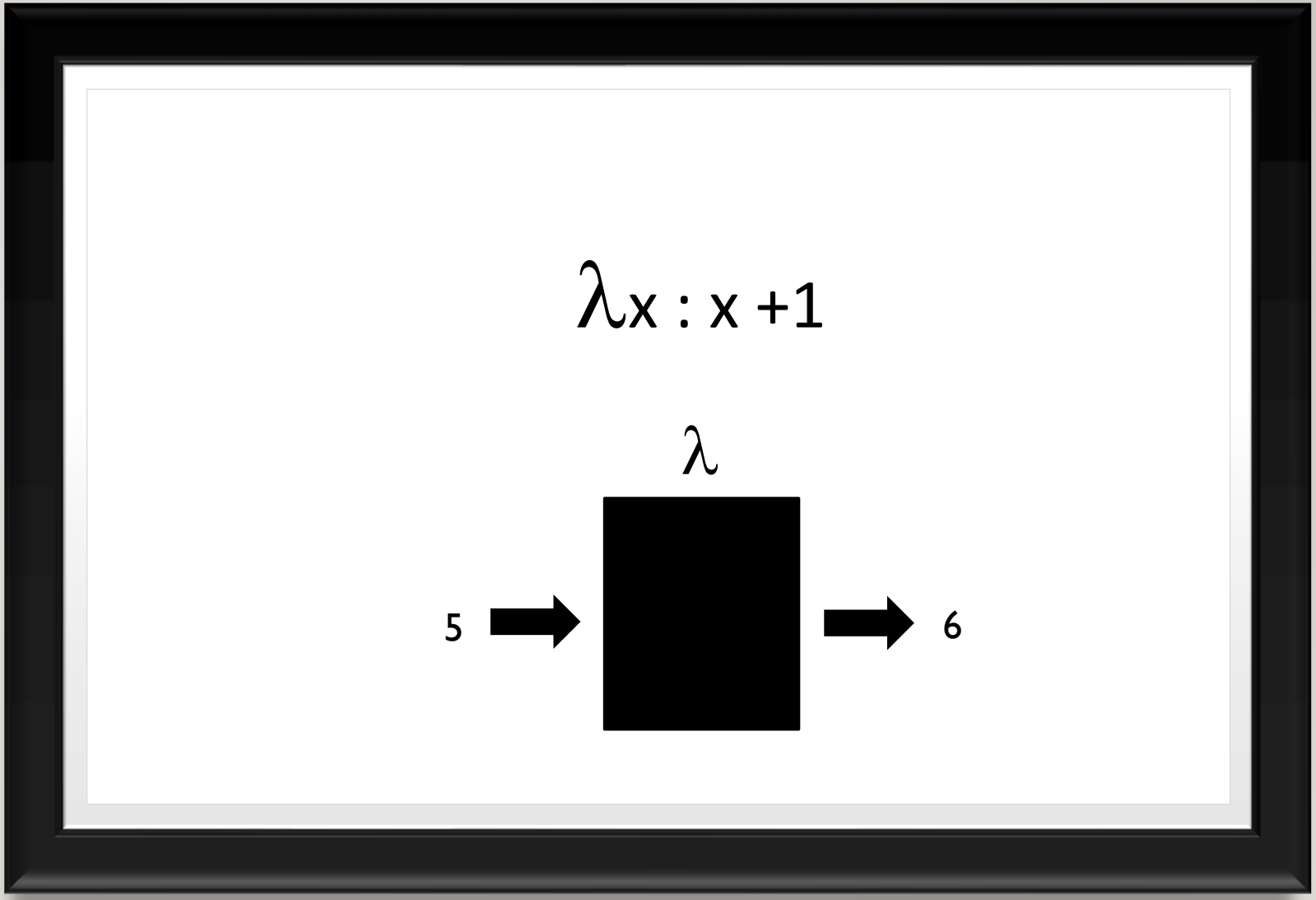
Alan Turing

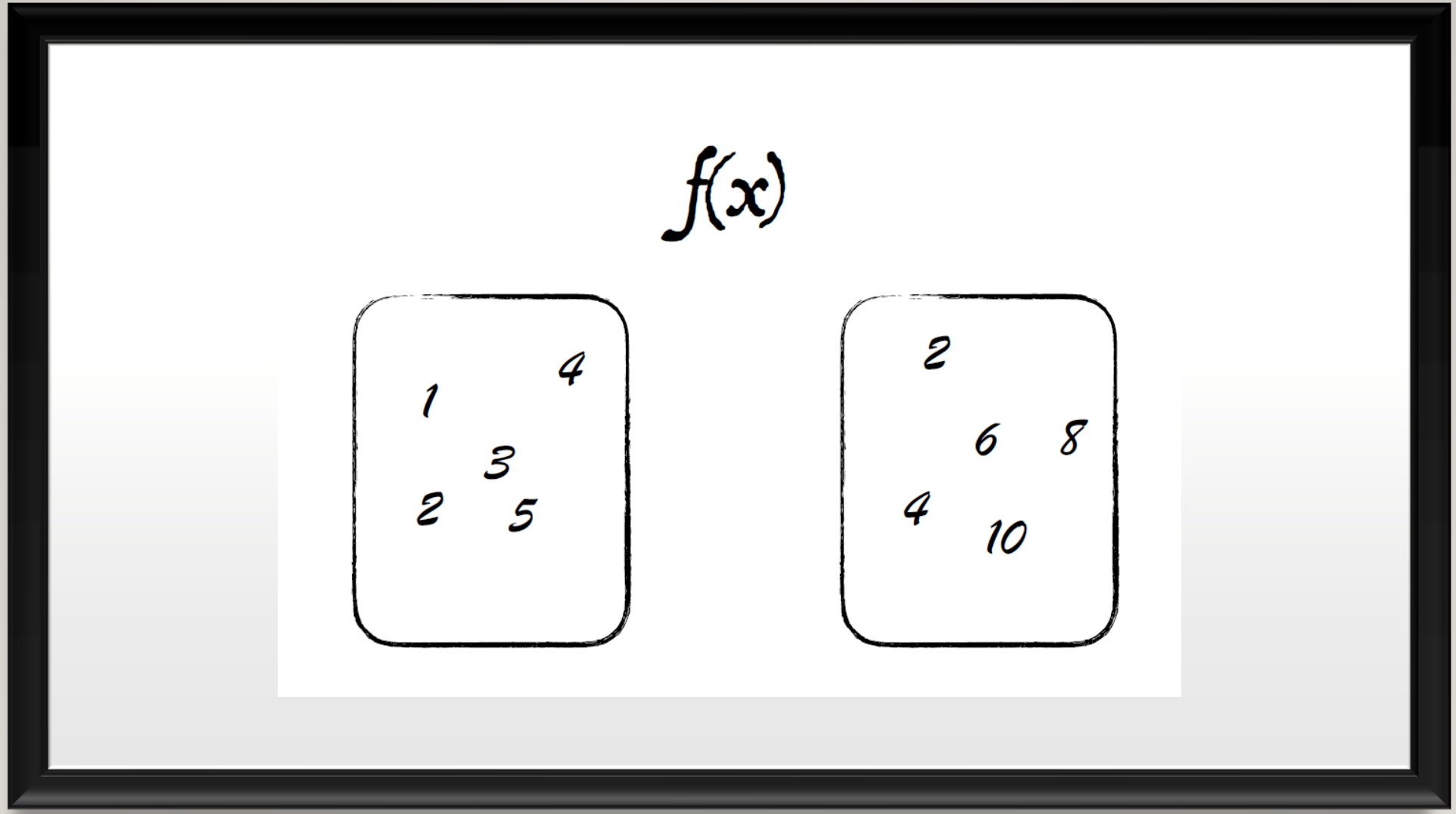
Alonzo Church

ALAN TURING DEVELOPS TURING MACHINE, - FINITE STATE MACHINE



ALONZO CHURCH – LAMDA CALCULUS




f(x)
1
4
3
2
5
2
6
8
4
10

FUNCTIONAL PROGRAMMING

INTRODUCTION

FUNCTIONAL PROGRAMMING

- A style of programming that treats computation as the evaluation of mathematical functions
- Eliminates side effects
- Treats data as being immutable
- Expressions have referential transparency
- Functions can take functions as arguments and return functions as results

WHAT DOES THE CODE DOES ?

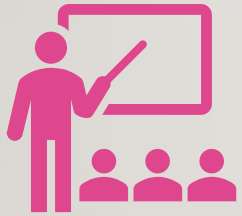
```
results = []
for v in vals:
    results.append(v * 2)
return results
```

WHAT DOES THE CODE DOES ?

```
return map(multiply_by_two, vals)
```

```
multiply_by_two = lambda x: x * 2
```

WHY DO FUNCTIONAL PROGRAMMING?



Allows us to write easier-to-understand, more declarative, more concise programs than imperative programming

Allows us to focus on the problem rather than the code

Facilitates parallelism

Python & functional programming

- Applying Functional Programming is hard
- Lambda keyword
- In FP documentation
  - Prefers using function instead of lambda (PEP 8 ,E731)
  - Indirectly imitate users to go with loop than reduce
- Implemented Functional Programming for market case
- Not Much Developers

LAMBDA

lambda

- FP is orchestration of small functions
- Lambda supports creating
  - Single expression anonymous function
  - Can take parameters
  - Method body should be only one line

LAMBDA - DEMO

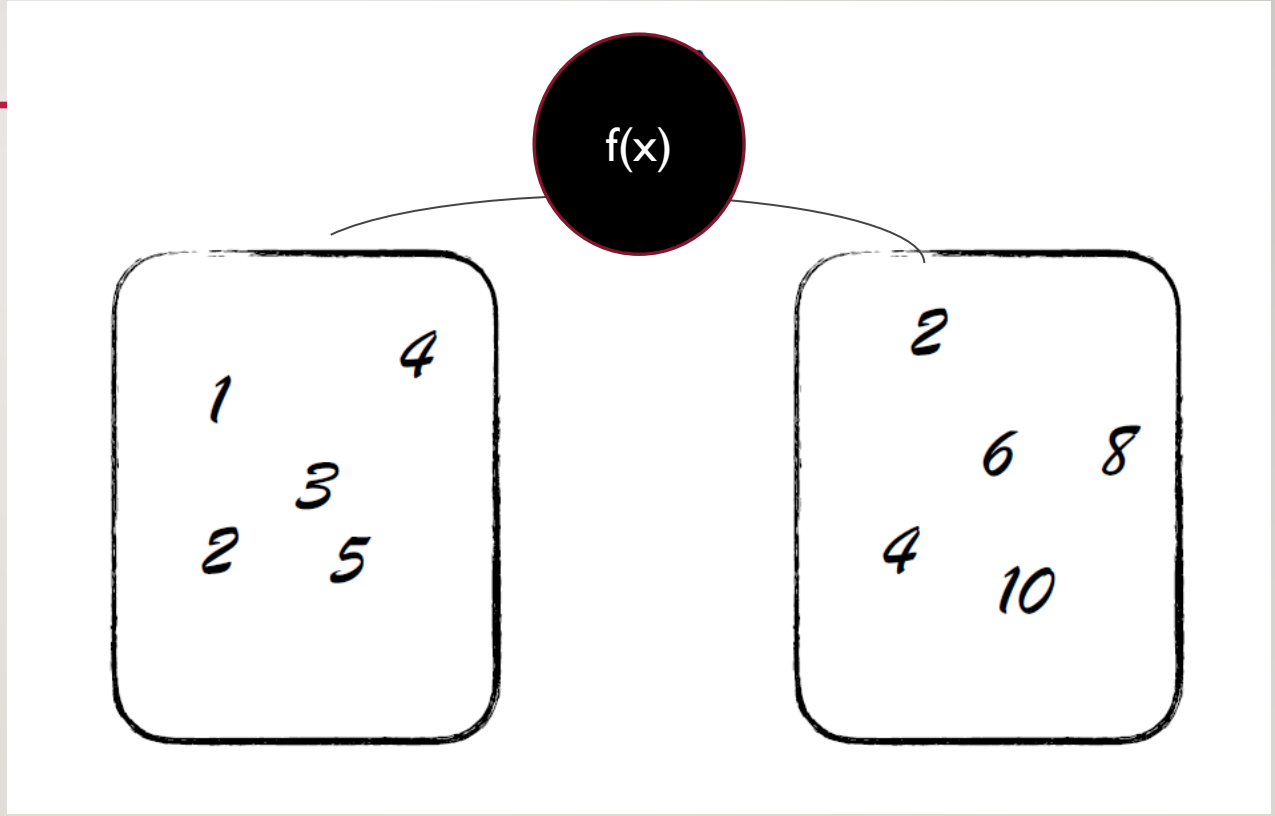
$$(a + b)^2 = a^2 + b^2 + 2ab$$

$$(a + b)^2 = a^2 + b^2 - 2ab$$

MAP

map

- Convert from one form to other
- Changing form to a group of values by passing through a function
  - Applied in ***numpy*** & most of packages

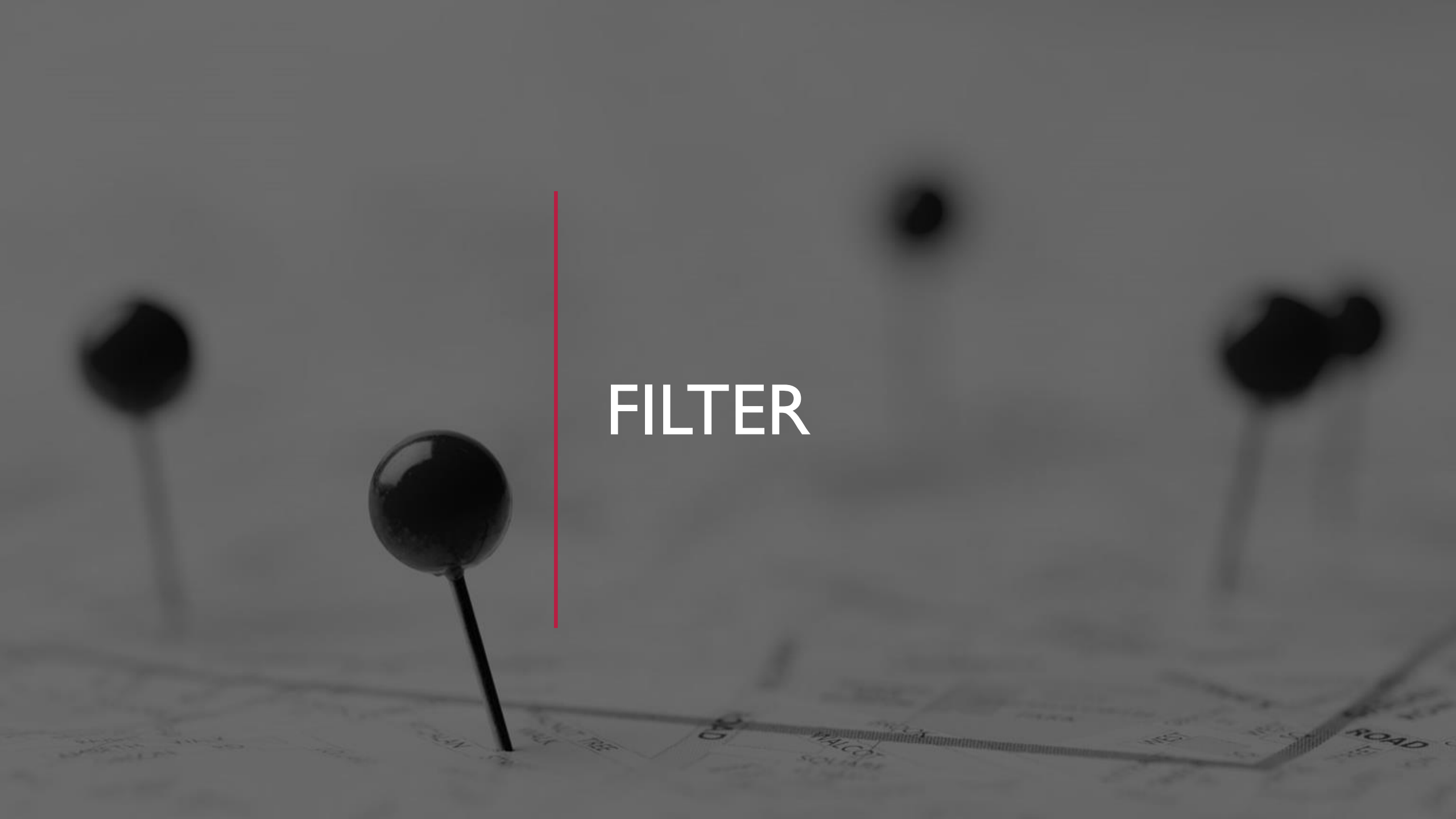


DATA

```
users =[
  {
    "id": 1,
    "first_name": "Mandy",
    "last_name": "Gowan",
    "email": "mgowan0@aol.com",
    "gender": "Female",
    "ip_address": "1.25.197.128",
    "salary": 119885
  },
  {
    "id": 2,
    "first_name": "Janessa",
    "last_name": "Cotterell",
    "email": "jcotterell1@delicious.com",
    "gender": "Female",
    "ip_address": "155.82.134.71",
    "salary": 107629
  },
  {
```

Map demo

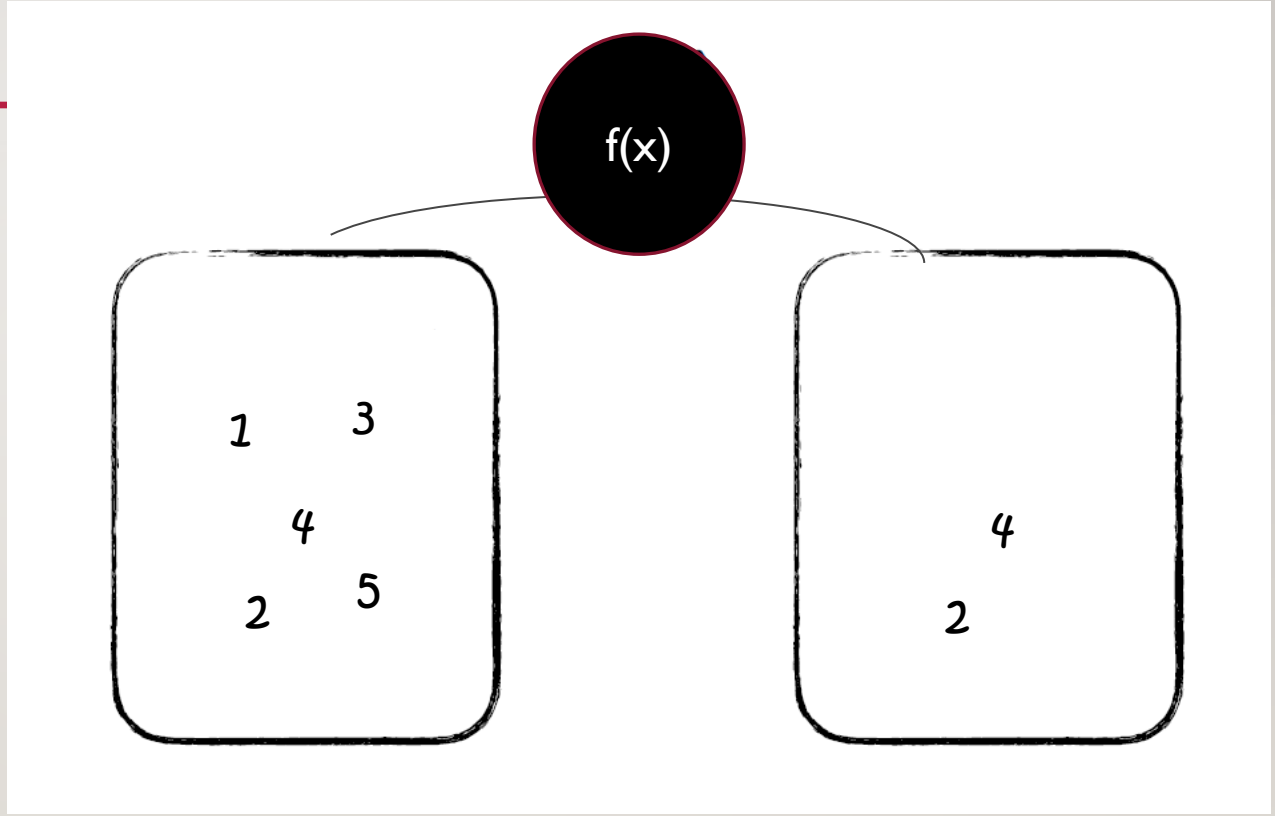
- Get ids of user
- Get names marked with prefix (Mr or Miss)



FILTER

filter

- Filter from a set of values by applying through function



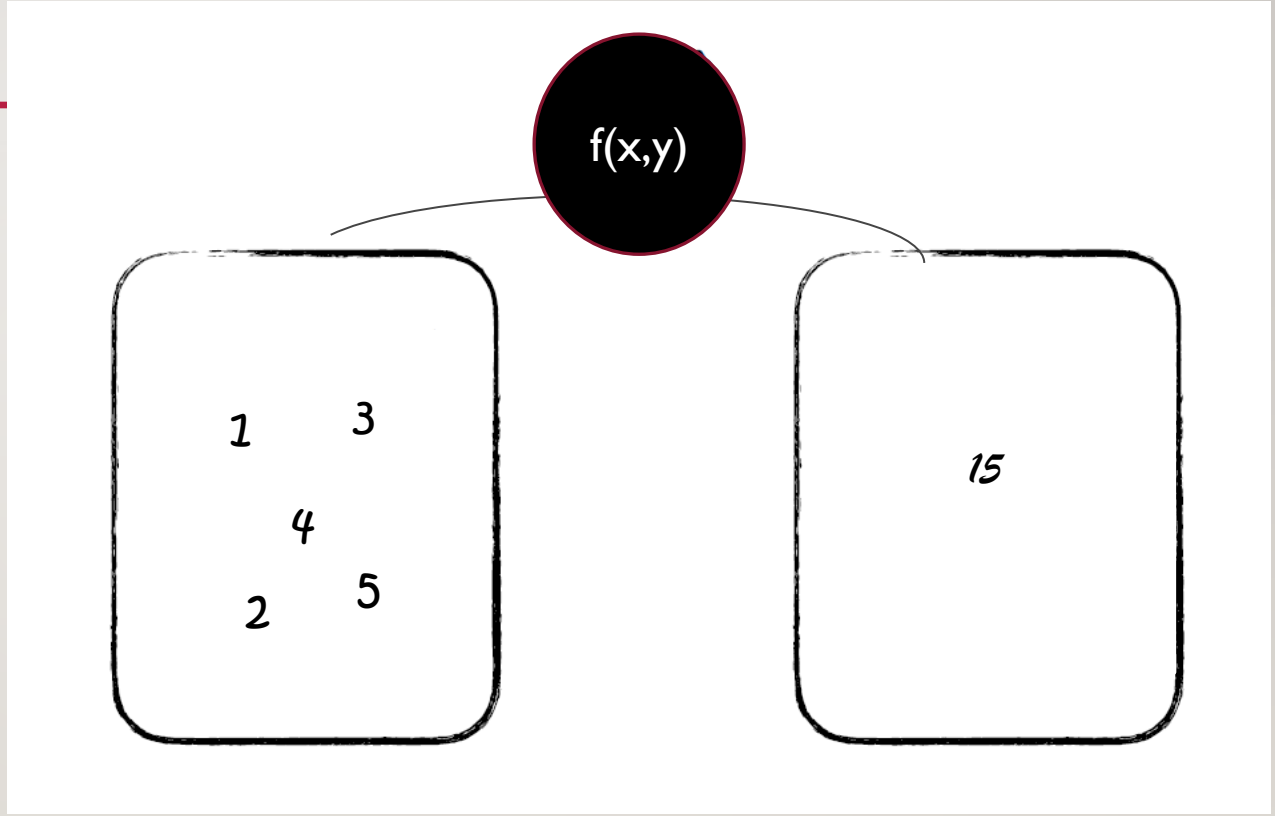
Filter demo

- Query users based on gender

REDUCE

reduce

- Reduce a group of values to a single value by applying a function f(x,y)
  - x- accumulator
  - y – current value



Reduce demo

- Find total salaries of users

END OF SESSION I