

COMP26020 Programming Languages and Paradigms -- Part 1

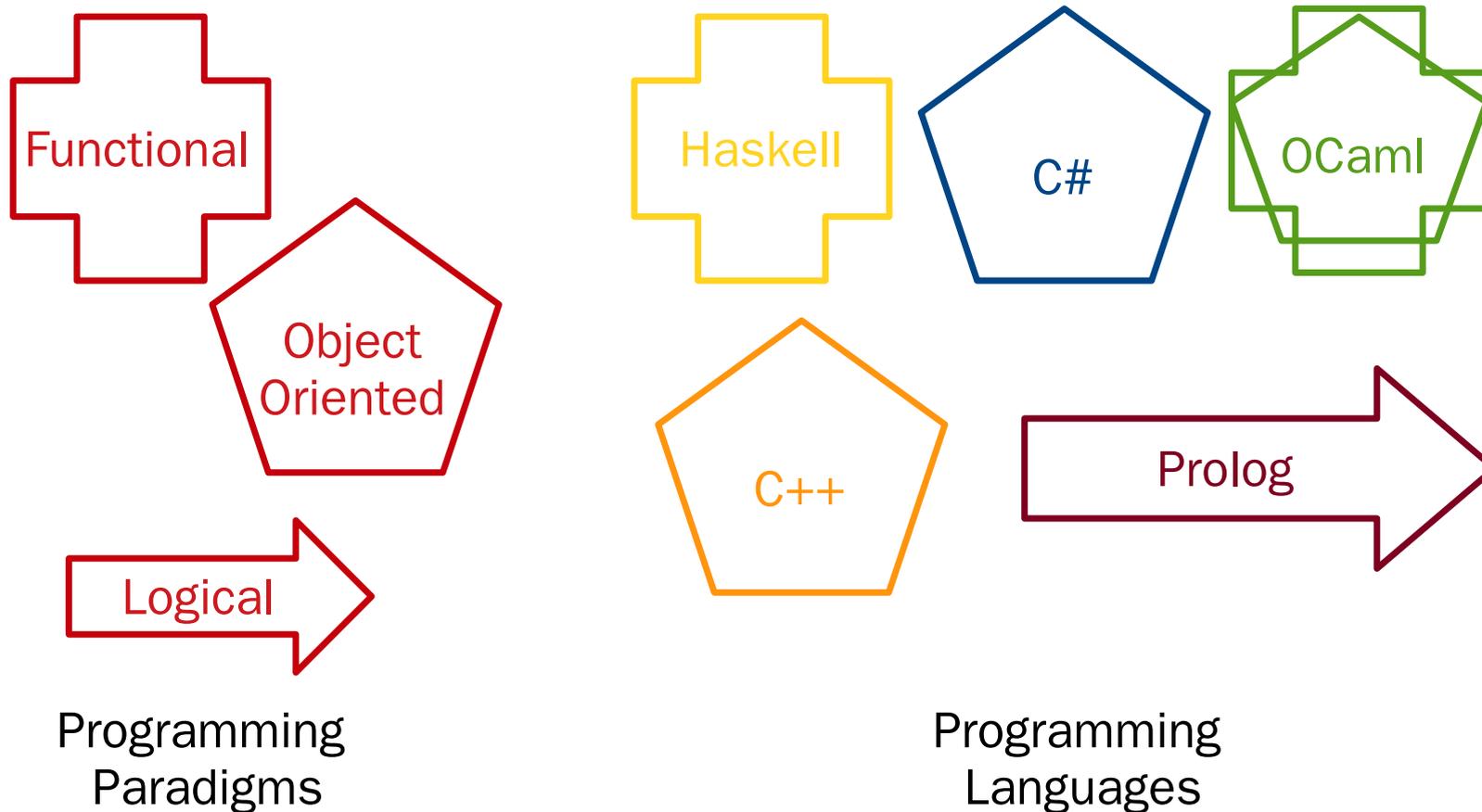
Programming Paradigms

What's a Programming Paradigm?

- A programming paradigm defines a **fundamental style of programming ...**
 - How the programmer can describe the program in the source code:
 - the **data** used by the program, and the **computations** manipulating the data

What's a Programming Paradigm?

- A programming paradigm defines a **fundamental style of programming ...**
 - How the programmer can describe the program in the source code:
 - the **data** used by the program, and the **computations** manipulating the data
- Programming paradigms can be used to classify programming languages



- A language belongs to one or several paradigms, it makes it easy to develop using the style defined by the paradigm

adapted from <https://www.janeve.me/software-programming/understanding-programming-paradigms>

***Some paradigms are (much) better suited
than others to solve a given kind of
software engineering problem***

A Paradigm is a Programming Style

Example: multiplying by 2 each element of an array in JavaScript

A Paradigm is a Programming Style

Example: multiplying by 2 each element of an array in JavaScript

1. Using the **imperative** paradigm:

```
function mult_by_two_imperative (array) {  
  let results = []  
  for (let i = 0; i < array.length; i++){  
    results.push(array[i] * 2)  
  }  
  return results  
}
```

[01-programming-paradigms/mult2-imperative.js](#) 

A Paradigm is a Programming Style

Example: multiplying by 2 each element of an array in JavaScript

1. Using the **imperative** paradigm:

```
function mult_by_two_imperative (array) {  
  let results = []  
  for (let i = 0; i < array.length; i++){  
    results.push(array[i] * 2)  
  }  
  return results  
}
```

[01-programming-paradigms/mult2-imperative.js](#) 

2. Using the **declarative** paradigm:

```
function mult_by_two_declarative (array) {  
  return array.map((item) => item * 2)  
}
```

[01-programming-paradigms/mult2-declarative.js](#) 

Result is the same, the way to describe the computations is different

A Programming Paradigm is a Programming Style

- Paradigm defines how the programmer describes the program **computations**
 - Can be sequences of statements, executed sequentially or in parallel
 - Can be divided into functions
 - Can also be *how the result should look like*
 - etc.

A Programming Paradigm is a Programming Style

- Paradigm defines how the programmer describes the program **computations**
 - Can be sequences of statements, executed sequentially or in parallel
 - Can be divided into functions
 - Can also be *how the result should look like*
 - etc.
- Paradigm also defines how the programmer describes the **data** computations are applied on
 - Basic types
 - Custom data structures
 - Local/global variables
 - etc.

Picking a Programming Paradigm

- Choosing a language to solve a given software engineering problem implicitly selects one (or more) paradigm(s)

This has huge consequences on how to design the solution and map it to the code

→ Impact the efficiency, size, complexity, clarity of the code/the resulting program

Wrapping Up

- Programming paradigm → programming style
 - Each programming language implements one or more paradigms
 - Choose the right paradigm for the right software engineering problem
-

Feedback form: <https://bit.ly/37p8WZ3>

