

# Introduction to Programming

## Part 2: Programming languages

Nikolay Koldunov

HCU  
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KlimaCampus

# Programming languages

A **Programming language** is an artificial language designed to express computations that can be performed by a machine, particularly a computer. Programming languages can be used to create programs that control the behavior of a machine.

# “Hello world!” program

## MATLAB

```
disp('hello world')
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## FORTRAN 90

```
PROGRAM HelloWorld  
  WRITE(*,*) "Hello World!"  
END PROGRAM
```

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## FORTAN 90

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PROGRAM HelloWorld  
  WRITE(*,*) "Hello World!"  
END PROGRAM
```

## C++

```
#include <iostream.h>  
main()  
{  
    cout << "Hello World!" << endl;  
    return 0;  
}
```

# "Hello world!" program

BrainF\*\*k

```
+++++++>|+++++>+++++++>++++<<<->|>+.+++++  
..+++>+<<<+++++++>+.+++.-.-.-.-.->+.
```

# “Hello world!” program

## BrainF\*\*k

```
+++++++>|+++++>+++++++>++++<<<-|++>+.+++++  
..+++>+<<+++++++>+.+++----->+.
```

## Bit

```
LINENUMBERZEROCODEPRINTZEROGOTOONELINENUMBERONECODEPRINTONEGOTOONEZEROLINENUMBE ←  
RONEZEROCODEPRINTZEROGOTOONEONELINENUMBERONEONECODEPRINTZEROGOTOONEZEROZEROLINE ←  
NUMBERONEZEROZEROCODEPRINTONEGOTOONEZEROONELINENUMBERONEZEROONECODEPRINTZEROGOT ←  
OONEONEZEROLINENUMBERONEONEZEROCODEPRINTZEROGOTOONEONEONELINENUMBERONEONEONECOD ←  
EPRINTZEROGOTOONEZEROZEROZEROLINENUMBERONEZEROZEROZEROCODEPRINTZEROGOTOONEZEROT ←  
EROONELINENUMBERONEZEROZEROONECODEPRINTONEGOTOONEZEROONEZEROLINENUMBERONEZERON ←
```

- Fortran (Mathematical **F**ormula **T**ranslating System)



# Popular programming languages for the Earth Sciences

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- NCL (NCAR Command Language)

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## Exercise

Find out how to write “Hello world!” program in Python



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## Exercise

Find out how to write “Hello world!” program in Python

### First variant:

```
print 'Hello world!'
```

### Second variant:

```
print('Hello world!')
```

# Pythob as a big free calculator

<http://www.compileonline.com/>

## Exercise

Calculate:

- $2 + 2$
- $\frac{7 + (19 - 6) \cdot 8^2}{4 - 3}$
- $\pi \cdot 1.17^2$
- $\frac{\sin(\frac{\pi}{2})}{\cos(\pi)}$
- $5!$