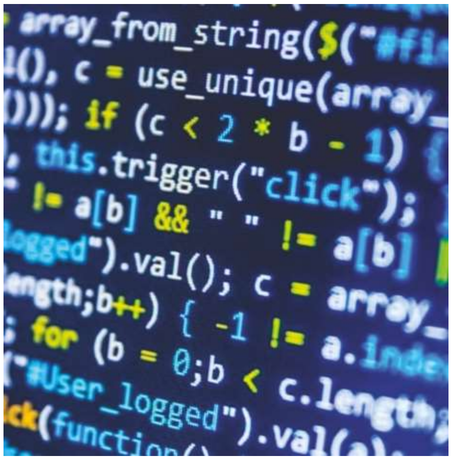
Chapter-1

INTRODUCTION TO CODING

Finally Coding!



In the year 2020, you must have come across a word "Coding". Computer coding has become very popular among kids. It's actually a buzzword!

But! Any guesses on what does computer coding or computer programming mean?

Go on; Write your definition of computer coding or computer programming in the below space

In the very simplest form, coding is doing code.

Coding = Code + ing

What is Code

First question that arise from above statement is *"What is Code".* Unless we understand "Code", we will not be able to understand "Coding".

Code:

It is an "instruction" that tells computer what action to take. Code can be a single line instruction or set of instructions.

Coding:

These set of code or instructions are written in a **specific computer language**. Writing set of instructions or block of code is called "Coding".

Confused !

Don't worry; we will understand code and coding with an example!

Let us understand with an example

1. **Let us add a number 2 with 3. This should result into 5.**

2. **How do you think a block of code (or instructions) to computer from human would look like?**

3. **Code (Or set of instructions) to computer will look something like**

   - Computer ! Open your calculator program.
   - Input a number 2.
   - Select add (+) operator.
   - Input a number 3.
   - Select equal (=) operator.
   - Show me the result (i.e 5)

4. **Now, the same set of instructions if you have to write in a computer language (like python) will look something like**

```
1  num1 = int(input("Enter first number to add: "))
2  num2 = int(input("Enter second number to add: "))
3  result = num1 + num2
4  print("The result of adding %d and %d is %d"%(num1,num2,result))
```

5. **Now, when you run your code. It will do exactly what you wrote and give you the result.**

```
C:\Users\Work\Desktop>python add.py
Enter first number to add: 2
Enter second number to add: 3
The result of adding 2 and 3 is 5

C:\Users\Work\Desktop>
```

Conclusion:

- **Step 3** above mentions **set of instruction** or **sequence** required to add two numbers. **This is a block of code** in human understandable language.
- **Step 4** above is converting this human understandable block of code into a **program** written in a **specific computer language python**. This is **coding** (Knowing how to write a code in a computer language)
- **Step 5** above is **running** your **program** using an **interpreter** or **compiler**.

Let us look into our code written in python language

We Wrote:

```
1  num1 = int(input("Enter first number to add: "))
2  num2 = int(input("Enter second number to add: "))
3  result = num1 + num2
4  print("The result of adding %d and %d is %d"%(num1,num2,result))
```

At line 1: We wrote -> num1 = int(input("Enter first number to add: "))

This basically means that when we run our program, computer will ask the user to enter the first number to add. We will store this number in variable num1.

```
C:\Users\Work\Desktop>python add.py
Enter first number to add: 2
```

At line 2: We wrote -> num2 = int(input("Enter second number to add: "))

This basically means that when we run our program, computer will ask the user to enter the second number to add. We will store this number in variable num2.

```
Enter second number to add: 3
```

At line 3: We wrote -> result = num1 + num2

This basically means add the value of num1 (i.e 2) with the value of num2 (i.e 3) and store the result (i.e 5) into a variable result.

At line 4: We wrote -> print("The result of adding %d and %d is %d"%(num1,num2,result))

This basically means that computer should print the final result (i.e 5) in a particular format to the user. This is why you see the below statement printed at the screen.

```
The result of adding 2 and 3 is 5
```

Why should you learn to code (Coding / Programming)

So far we learnt about code and coding. But the important question remain is

"Why should I learn to code?"

There are many advantages of learning to code at the early age. We will see some of the important aspect in the following pointers:

- **Problem Solving –** Writing to code is simply telling a computer to perform some tasks or actions. You need computer to solve a particular problem of yours. But remember, computer is just a machine. It does what you ask a computer to do. *So, coding or programming enhances your problem solving skills.* With an introduction to programming, *children learn to think laterally when faced with a problem in coding*: 'If A + B didn't work, then maybe A + C will.' Coding also equips kids with the ability to stick with a problem and work on finding a solution.

  - For Example: If you have a variable “A” with the value of “5”. And you have a variable “B” with the value of “7”. Now you have to use a logic to swap these values i.e a variable “A” should have value “7” and variable “B” should have value “5”. How would you achieve this?
  - Think ?

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- **Creativity –** Coding nurtures kid’s creative thinking. Writing to code is simply telling a computer to perform some tasks or actions. Every child is creative in their own ways. They have a different outlook on the world around them. There are always different ways available to solve a particular problem of a computer. *Every child needs to go back and forth with their ideas to arrive at a solution.* This helps them to be creative in the approach they choose.
  - We will see the different ways to swap a value of variable A and B mentioned in the above problem statement.

- **Coding is another language / skill –** Language is how we communicate. It is proven fact that a child should be exposed to different languages at the early age. This helps them to communicate with the world around them better. Coding is also a language, very specifically a computer language. Every letter or a command is a sequence of 0’s and 1’s. *Knowing a computer language helps a child to know and operate computer better.*

- **To relate with Science and Maths concepts –** *Coding helps you to relate with various science and maths concepts.* Simply ask a question on "Why 2 * 3 = 6". Once you know the coding, you will understand that we are simply doing the addition of 2 with itself 3 times (i.e 2 added with 2 and again added with 2). You can simply write a program and validate these concepts.

- **To reduce your work –** Assume that you have an assignment to add all the numbers of current date.
    - For example: Today's date is "18-Aug-2021", so the sum will be (1+8+0+8+2+0+2+1= 22).
    - Now you have to do this task of adding all the numbers of a date, daily.
    - You have to send the net result via email to your professor.
    - This is the example of ***repetitive*** task. In which you have to perform set of steps repetitive.
    - *This is where knowing a computer language helps.* You can simply write a block of code (program) to run every day at a particular time let's say 9:00 am. This program looks into your system date and simply adds all the numbers in it. Once the result is known, it can also send an email to your professor.

- **Getting future ready –** *Future is all about getting result or work done faster and efficiently.* This is exactly what we discussed in the previous example of "reducing your work". Future is all about Artificial Intelligence, Robotics and Automation. Knowing a computer language is going to be the essential skill. Learning skill of programming at a young age will help you grow up with technology, making you ready for the future.

Let's solve the problem we read in previous topic (i.e Swapping values)

For Example: If you have a variable **"A"** with the value of **"5".** And you have a variable **"B"** with the value of **"7".** Now you have to use logic to swap these values i.e a variable "A" should have value "7" and variable "B" should have value "5".

Let's first represent it pictorially

The picture represents that there are two containers.

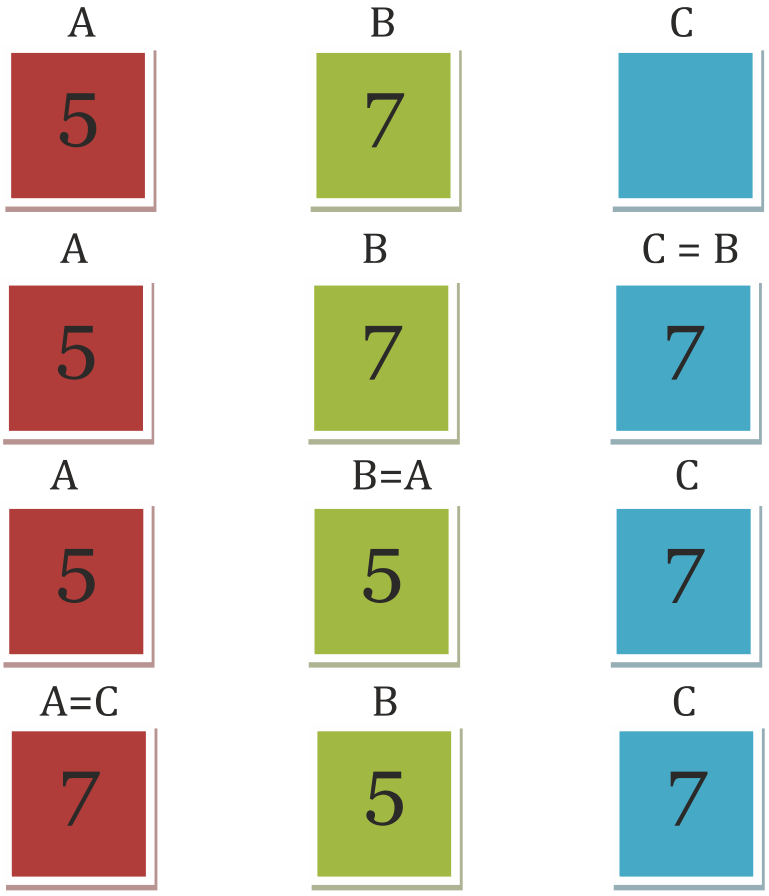
Left side container is named as A which has a value of 5. Right side container is named as B which has a value of 7.

For simplicity, we will call these containers as variable. This means, a variable A has value 5 and a variable B has value 7. We need to **swap** (in other words, interchange these values).

There is only one rule,

At any point in time these containers ***can contain only one value***. As soon as you have new value, the previous value will be gone.

Logic 1: Use another container or variable C. This is temporary container.



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Logic 2: Use Maths ☺ . No new variable

1. Currently A = 5 and B = 7
2. A = A + B
    a. Now A has a value => A = 5 + 7 = 12
3. B = A – B
    a. A's value after step 2 is 12. Hence value of B = 12 – 7 = 5
    b. New values at this step are A = 12, B = 5
4. A = A – B
    a. Now A has a value => A = 12 – 5 = 7
    b. New values at this step are A = 7, B = 5

Hurray ! values of A and B are now swapped.

At step 1 => A = 5 and B = 7

At step 4 => A = 7 and B = 5

You can see; how a simple problem of swapping two numbers has more than one way to solve it.

Let's write your first program !

Ok, now that you know

- what is a "Code"
- what is "coding"
- what is a "programming language"

It's time to write your first program,

- Computer should first ask your first name.
- And it should store your first name in a memory.
- Computer should then ask your surname.
- And it should store your surname in a memory too.
- Finally it should print a greeting message like "Hello ! $firstname $surname, Welcome to the world of programming"
    - For example if first name is Rahul and Surname is Hinduja, then it should print a message like
    - "Hello ! Rahul Hinduja, Welcome to the world of programming"

Dont Worry ! Just follow the steps

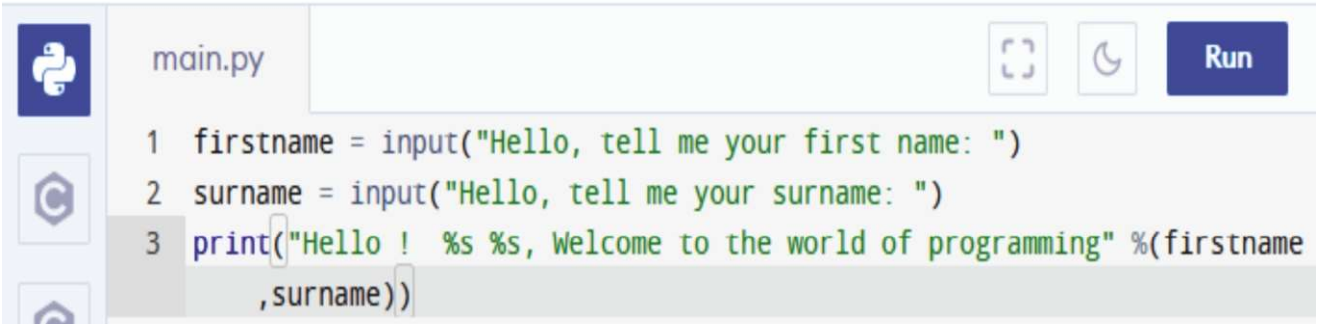
For simplicity, we will use online compiler to write and run our first python program.

Step 1: Open the website with the below url

https://www.programiz.com/python-programming/online-compiler/

Step 2: You can clear everything on the left hand side of the compiler.

Step 3: Now write your code as per the ask



a. At step 1 in the picture, we are initializing a variable "firstname" which is asking user "Hello, tell me your first name: " . Whatever, user types as input will be stored in a variable firstname.
b. At step 2 in the picture, we are initializing a variable "surname" which is asking user "Hello, tell me your surname: " . Whatever, user types as input will be stored in a variable surname.
c. At step 3 in the picture, we are printing the final greeting statement and replacing the values of variable firstname and surname.

Step 4: Click on RUN. This will start to run your program in "SHELL"

Step 5: Computer is now asking your firstname. Type it, and then press Enter key !

```
Hello, tell me your first name: Rahul
```

Step 6: Computer is now asking your surname. Type it, and then press Enter key !

```
Hello, tell me your surname: Hinduja
```

Step 7: Computer is finally printing a greeting message with your name and surname

```
Hello !  Rahul Hinduja, Welcome to the world of programming
```

Congratulations ! You just wrote and executed your first program.
We will have more fun with programming in the future !

Important Note:-

- This was a very short introduction on Coding.
- We also looked into the online python compiler and wrote our program.
- Now, we will focus on core code concepts. Where we will learn all the building blocks of coding.
- Note that we will not focus too much on the syntax of coding
- Let's get started