

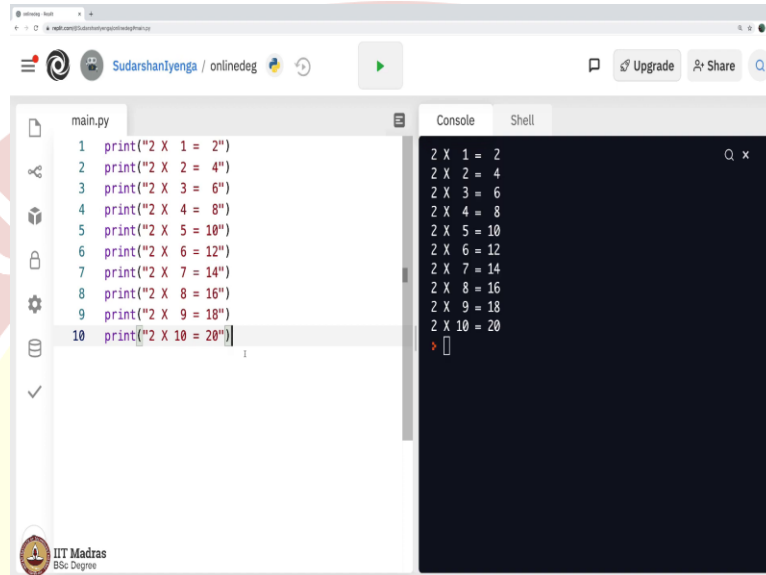


# IIT Madras

ONLINE DEGREE

**Programming in Python**  
**Professor Sudarshan Iyengar**  
**Department of Computer Science and Engineering**  
**Indian Institute of Technology, Ropar**  
**for Loop for Multiplication Tables**

(Refer Slide Time: 00:16)



The screenshot shows a web-based Python REPL interface. On the left, a file named 'main.py' contains ten lines of Python code, each using a print statement to output a multiplication fact for the number 2. On the right, the 'Console' tab displays the output of these statements, showing the multiplication table for 2 from 1 to 10. The interface includes a top navigation bar with the user's name 'SudarshanIyengar' and a sidebar with various icons. A large, semi-transparent watermark of the Indian Institute of Technology Ropar logo is visible in the background.

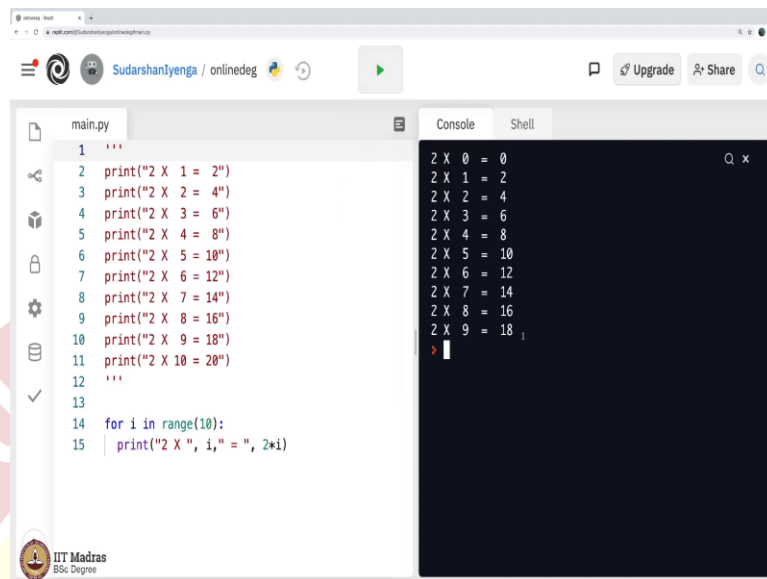
```
main.py
1 print("2 X 1 = 2")
2 print("2 X 2 = 4")
3 print("2 X 3 = 6")
4 print("2 X 4 = 8")
5 print("2 X 5 = 10")
6 print("2 X 6 = 12")
7 print("2 X 7 = 14")
8 print("2 X 8 = 16")
9 print("2 X 9 = 18")
10 print("2 X 10 = 20")
```

```
Console
2 X 1 = 2
2 X 2 = 4
2 X 3 = 6
2 X 4 = 8
2 X 5 = 10
2 X 6 = 12
2 X 7 = 14
2 X 8 = 16
2 X 9 = 18
2 X 10 = 20
```

So, now we have yet another example, which tells us the power of, for loop. So, what is it that you see here? The much familiar tables of 2. We all have memorised this in our school days. So, 2 ones are 2, 2 twos are 4 up to 2 tens are 20. So, as I execute this, I get the tables on this side. Why? That is because I use the print statement on the side of the replit portal and I get the output on this side, so far, so good.

Now the point is, what does your mind tell you right now? What is common sensical for a programmer right now? This appears a little tedious. Why would anyone do this, I see a pattern here. I see a 1 and a 2 and a 3 and a 4 here and I see multiples of 2 here on this side. So, is there any way I can automate this using a for loop?

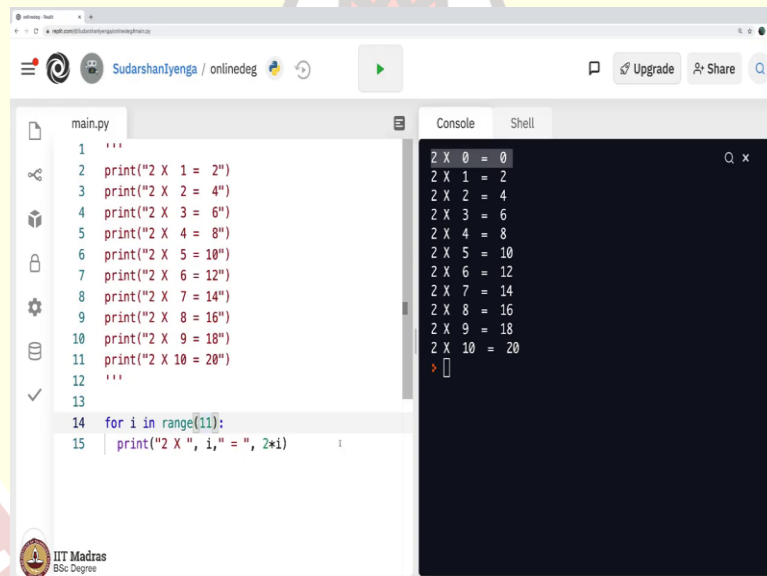
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The screenshot shows a web-based Python IDE interface. The editor on the left contains a Python script in `main.py` with 15 lines of code. Lines 2 through 11 use `print` statements to output multiplication results for `i` values from 0 to 9. Line 14 starts a `for` loop with `range(10)`, and line 15 prints the multiplication result for each `i`. The console on the right displays the output of the script, showing a list of multiplication equations from `2 X 0 = 0` to `2 X 9 = 18`. The interface includes a file explorer on the left, a top navigation bar with the user's name and a play button, and a bottom status bar with the IIT Madras logo.

```
1 '''
2 print("2 X 1 = 2")
3 print("2 X 2 = 4")
4 print("2 X 3 = 6")
5 print("2 X 4 = 8")
6 print("2 X 5 = 10")
7 print("2 X 6 = 12")
8 print("2 X 7 = 14")
9 print("2 X 8 = 16")
10 print("2 X 9 = 18")
11 print("2 X 10 = 20")
12 '''
13
14 for i in range(10):
15     print("2 X ", i, " = ", 2*i)
```

2 X 0 = 0  
2 X 1 = 2  
2 X 2 = 4  
2 X 3 = 6  
2 X 4 = 8  
2 X 5 = 10  
2 X 6 = 12  
2 X 7 = 14  
2 X 8 = 16  
2 X 9 = 18



This screenshot shows the same Python IDE interface as the first, but with the code and output updated to include `i = 10`. The script in `main.py` now has 15 lines, with the `for` loop using `range(11)` and the last `print` statement outputting `2 X 10 = 20`. The console output has been extended to include this final row. The interface elements, including the file explorer, top navigation bar, and bottom status bar, remain the same.

```
1 '''
2 print("2 X 1 = 2")
3 print("2 X 2 = 4")
4 print("2 X 3 = 6")
5 print("2 X 4 = 8")
6 print("2 X 5 = 10")
7 print("2 X 6 = 12")
8 print("2 X 7 = 14")
9 print("2 X 8 = 16")
10 print("2 X 9 = 18")
11 print("2 X 10 = 20")
12 '''
13
14 for i in range(11):
15     print("2 X ", i, " = ", 2*i)
```

2 X 0 = 0  
2 X 1 = 2  
2 X 2 = 4  
2 X 3 = 6  
2 X 4 = 8  
2 X 5 = 10  
2 X 6 = 12  
2 X 7 = 14  
2 X 8 = 16  
2 X 9 = 18  
2 X 10 = 20

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```
main.py
1 '''
2 print("2 X 1 = 2")
3 print("2 X 2 = 4")
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6 print("2 X 5 = 10")
7 print("2 X 6 = 12")
8 print("2 X 7 = 14")
9 print("2 X 8 = 16")
10 print("2 X 9 = 18")
11 print("2 X 10 = 20")
12 '''
13
14 for i in range(1,11):
15     print("2 X ", i, " = ", 2*i)
```

Console

```
2 X 1 = 2
2 X 2 = 4
2 X 3 = 6
2 X 4 = 8
2 X 5 = 10
2 X 6 = 12
2 X 7 = 14
2 X 8 = 16
2 X 9 = 18
2 X 10 = 20
>
```

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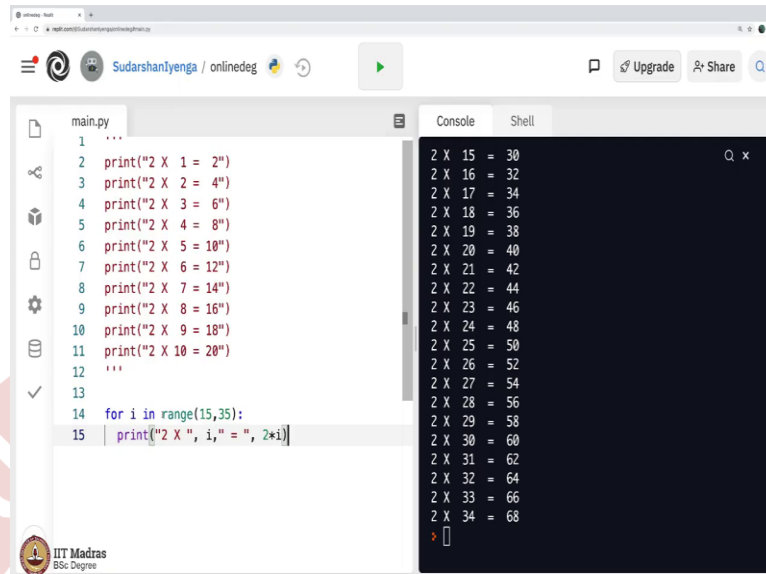
Sudarshantya / onlinedeg

```
main.py
1 '''
2 print("2 X 1 = 2")
3 print("2 X 2 = 4")
4 print("2 X 3 = 6")
5 print("2 X 4 = 8")
6 print("2 X 5 = 10")
7 print("2 X 6 = 12")
8 print("2 X 7 = 14")
9 print("2 X 8 = 16")
10 print("2 X 9 = 18")
11 print("2 X 10 = 20")
12 '''
13
14 for i in range(5,11):
15     print("2 X ", i, " = ", 2*i)
```

Console

```
2 X 5 = 10
2 X 6 = 12
2 X 7 = 14
2 X 8 = 16
2 X 9 = 18
2 X 10 = 20
>
```

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A screenshot of an online IDE interface. The left pane shows a file named 'main.py' with the following Python code:

```
1 ...
2 print("2 X 1 = 2")
3 print("2 X 2 = 4")
4 print("2 X 3 = 6")
5 print("2 X 4 = 8")
6 print("2 X 5 = 10")
7 print("2 X 6 = 12")
8 print("2 X 7 = 14")
9 print("2 X 8 = 16")
10 print("2 X 9 = 18")
11 print("2 X 10 = 20")
12 ...
13
14 for i in range(15,35):
15     print("2 X ", i, " = ", 2*i)
```

The right pane shows the console output, which lists multiplication results from 2 X 15 to 2 X 34. The output is:

```
2 X 15 = 30
2 X 16 = 32
2 X 17 = 34
2 X 18 = 36
2 X 19 = 38
2 X 20 = 40
2 X 21 = 42
2 X 22 = 44
2 X 23 = 46
2 X 24 = 48
2 X 25 = 50
2 X 26 = 52
2 X 27 = 54
2 X 28 = 56
2 X 29 = 58
2 X 30 = 60
2 X 31 = 62
2 X 32 = 64
2 X 33 = 66
2 X 34 = 68
```

Let me try doing that. As an always, let me comment this, just so that it does not get executed, I have commented this and nothing gets executed. Now, let me encapsulate this in a for loop. How do I do that? I would say for i in range 11. Why do I say 11? Let us say 10 and see what happens, print 2 times i, you see this is a string, it just displays as it is inside the print statement and then i will be the value 0 here. Then comma, then quotes is equal to then again, comma and what should it display? It should display 2 times i.

Let me, let me just go ahead and execute this without worrying about accuracy. I have a feeling; I should get the same thing. But I think I will not get it, you would have guessed why, a small mistake here. Although there will be no error in the execution of the program, the output will not be similar. You see what is happening? It is starting from 0 and going up to 9. That is because, when you say range 10, it goes up to 9.

When you say range 11, it will go up to, you guessed it right, go up to 10. So, it starts from 0 and goes up to 10. But if you are wondering, why cannot we get rid of this 2 into 0 is equal to 0. There is a smart way of doing it. I will just type something here. Please note, I will say 1, 11 and that would help me get rid of 2 cross 0. Now you see it became executed and it started with 2 cross 1. What is this? What is this new thing that was not discussed so far? Range of 1, 11 means start from 1 go up to 11 minus 1, that is 10.

If you simply say 5, 11, it will start from 5 and go up to 11 minus 1 that is 10. Let us execute. Starts from 5 and goes up to 10. So, can you guess what will happen, if I start from let us say 15

and go up to 35? Can you take a second and then tell me what will be the output of this? It will be outside the tables that we have memorised, of course, it starts from 2 times 15 and goes up to 2 times 34. 2 times 15 is 30, 2 times 16 is 32, 2 times 17 is 34 and so on up to 2 times 34 is 68. It does not go up to 35. It goes up to 1 less, which is 34.

Now, not only did you encapsulate the idea of multiplication tables using, for loop. You also saw how range can be used to not just start from 0 and go up to 10. As in the case of this, if we execute you get 2 times 0 to 2 times 9. But if you start with 1 comma and then go up to 11 you will get exactly this, you also understood how range can be used in a slightly different form. Now, go ahead, try to see if you can display all the tables starting from 2 to 3 to 4 up to 9, can you display all tables, in a for loop like this, is it easy?

