C++ Programming

While Loops

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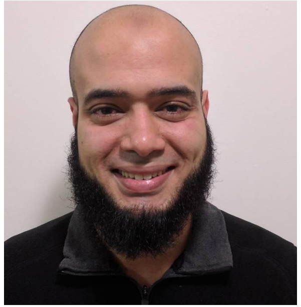

Loop

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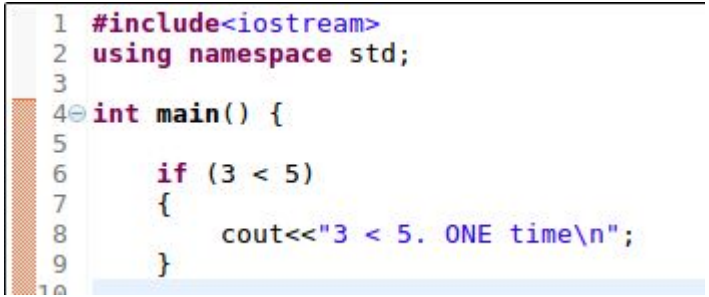
- Loop means circular.
- In our context, it is a way to command the computer to
  - **REPEAT** the same operations till we ask to **STOP**

Recall if condition



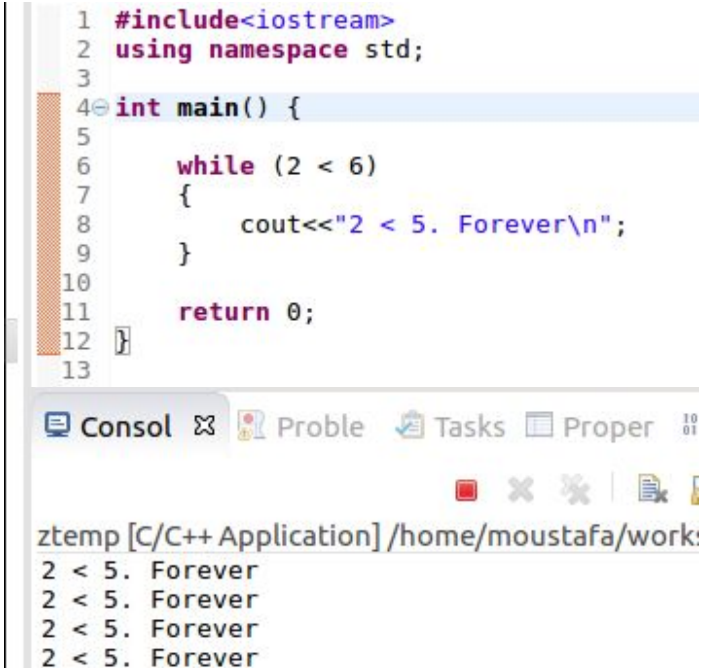
```
#include<iostream>
using namespace std;

int main() {

    if (3 < 5)
    {
        cout<<"3 < 5. ONE time\n";
    }
```

- This if statement is applied once
- What if we want it repeat forever?

Repeat forEVER



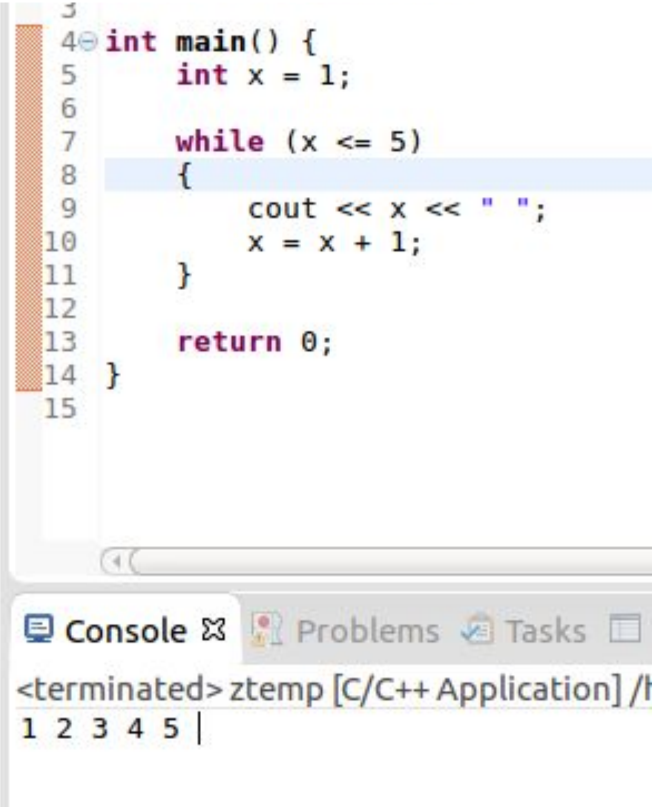
```
 1 #include<iostream>
 2 using namespace std;
 3
 4 int main() {
 5
 6     while (2 < 6)
 7     {
 8         cout<<"2 < 5. Forever\n";
 9     }
10
11     return 0;
12 }
13
```

ztemp [C/C++ Application] /home/moustafa/work

```
2 < 5. Forever
2 < 5. Forever
2 < 5. Forever
2 < 5. Forever
```

- While is same logic, but code goes as following
  - Line 6
  - Line 8
  - Line 6
  - Line 8
  - Line 6
  - Line 8
  - For ever
- Notice the red button in eclipse
  - It means the program is still running!
  - We have to click it to force stop!
- What if wanna it STOP at some time?
  - Change while (condition)

Let’s print first 5 numbers



```
 3
 4 int main() {
 5     int x = 1;
 6
 7     while (x <= 5)
 8     {
 9         cout << x << " ";
10         x = x + 1;
11     }
12
13     return 0;
14 }
15
```

```
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1 2 3 4 5
```
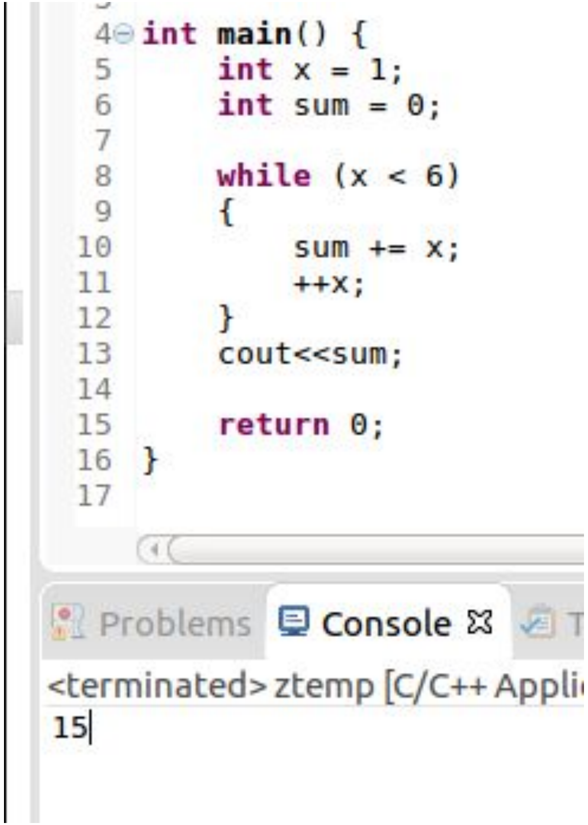

- Body from lines 7 to 11 repeats as LONG as condition is true (x <= 5)
- Let’s trace it
- 3 important parts
    - Line 5 = Initialization
    - Line 7 = Condition
    - Line 10 = increment step

Let’s sum 1 + 2 + 3 + 4 + 5



```
int main() {
    int x = 1;
    int sum = 0;

    while (x < 6)
    {
        sum += x;
        ++x;
    }
    cout<<sum;

    return 0;
}
```

```
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15
```
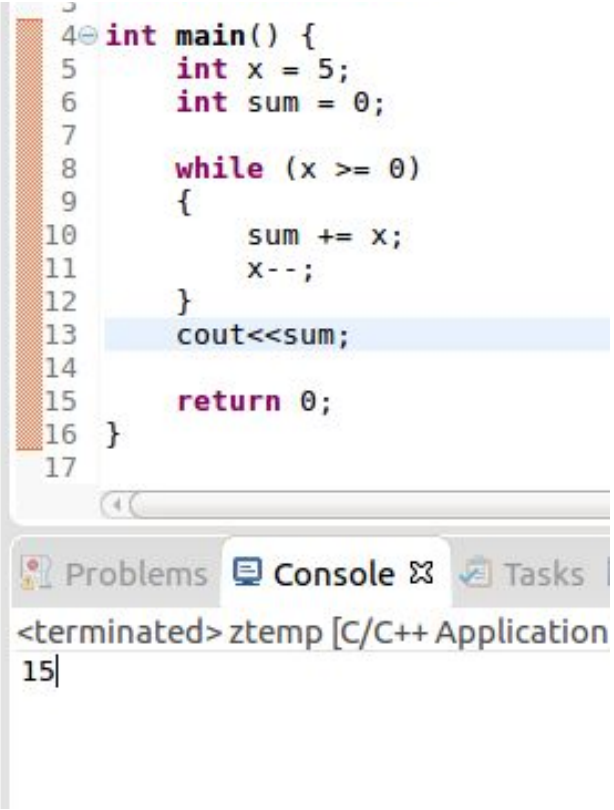

- We can now make any complex logic that requires repetition!
- Let’s trace the code

Let’s sum 5 + 4 + 3 + 2 + 1



```
int main() {
    int x = 5;
    int sum = 0;

    while (x >= 0)
    {
        sum += x;
        x--;
    }
    cout<<sum;

    return 0;
}
```

```
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```
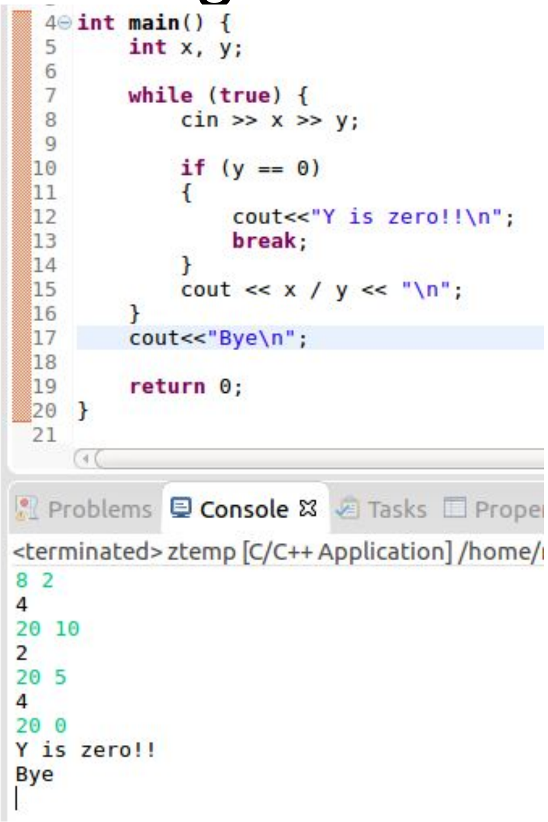

- We can do the reverse: go from high to low

Using break

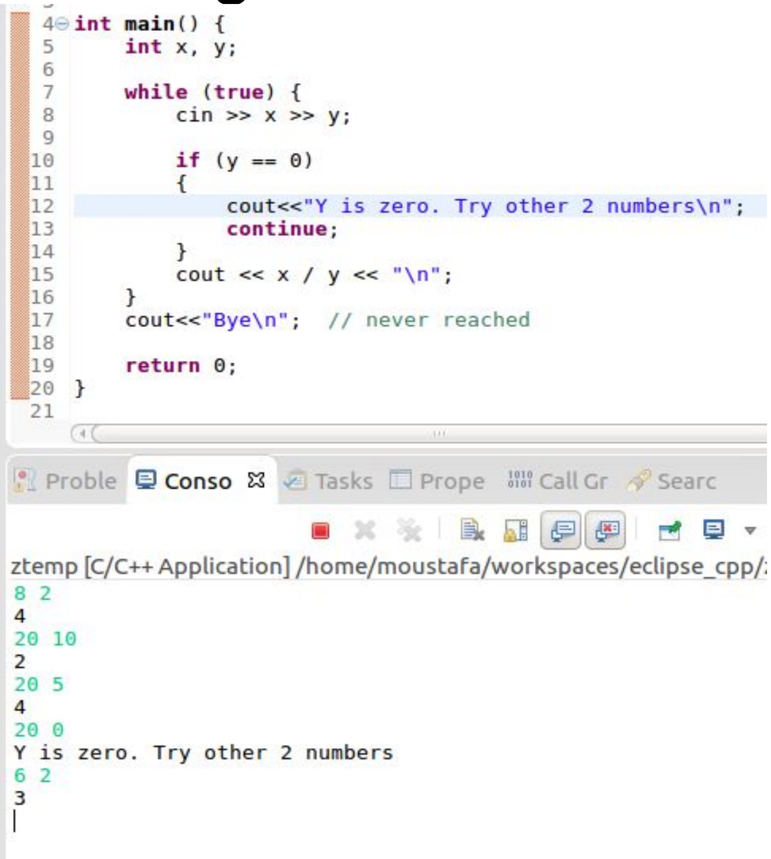


```
int main() {
    int x, y;

    while (true) {
        cin >> x >> y;

        if (y == 0)
        {
            cout<<"Y is zero!!\n";
            break;
        }
        cout << x / y << "\n";
    }
    cout<<"Bye\n";

    return 0;
}
```

```
<terminated> ztemp [C/C++ Application] /home/
8 2
4
20 10
2
20 5
4
20 0
Y is zero!!
Bye
```

- Write a program that KEEPs reading 2 integers and print their division
- If the 2nd number is zero
  - Print Bye
  - End the program
- We can use word break to stop the while and go AFTER it

Using continue



```
int main() {
    int x, y;

    while (true) {
        cin >> x >> y;

        if (y == 0)
        {
            cout<<"Y is zero. Try other 2 numbers\n";
            continue;
        }
        cout << x / y << "\n";
    }
    cout<<"Bye\n";  // never reached

    return 0;
}
```

```
ztemp [C/C++ Application] /home/moustafa/workspaces/eclipse_cpp/
8 2
4
20 10
2
20 5
4
20 0
Y is zero. Try other 2 numbers
6 2
3
```

- Continue tells computer to JUMP to the while start again and continue from there
  - So statements after it INSIDE the while body is skipped

"Acquire knowledge and impart it to the people."

"Seek knowledge from the Cradle to the Grave."