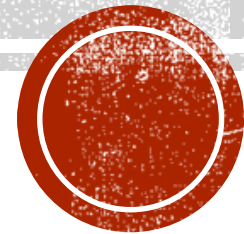


LOOP

Datat Sciences 2020-2021



Problem Statement

- If we want to write a program that displays the message “*Welcome to LU*” 100 times, then we have to write the instruction;

```
cout<< “Welcome to LU” ;  
cout<< “Welcome to LU” ;  
cout<< “Welcome to LU” ;  
.  
.  
.  
cout<< “Welcome to LU” ;  
cout<< “Welcome to LU” ;
```

100
times



- Using a Repetition Control Structure:
 - we can write the instruction `cout<<"Welcome to LU"` once, and put it in a loop thus it will be executed 100 times



Repetition control structure

- Repetition control structure
 - Execute the same piece of code several times
 - Elements: for, while, do...while



For Repetition structure



General format when using for loop

- for (counter initial value; LoopContinuationTest; increment/decrement counter statement)

Counter:

- Use of a counter *to count number of times the loop is run.*
- A counter should be an integer and has a name and an initial value
- Examples of a counter declaration and initialization:
 - int i = 1;
 - int j = 0;
 - int counter =5;

No semicolon After statement

```
for(i=1;i<=10;i++)  
    cout<<"Welcome to LU"<<"\n";
```

```
Welcome to LU  
Welcome to LU  
Welcome to LU  
Welcome to LU  
Welcome to LU  
Welcome to LU  
Welcome to LU  
Welcome to LU  
Welcome to LU  
Welcome to LU
```



for Repetition Structure

- **General format when using for loop**

- for (counter initial value; LoopContinuationTest; increment/decrement counter statement)

1- It sets the initial value of i to 1

2- It checks if the value of i is less than or equal to 10.

4- It applies the increment statement
By adding 1 to the value of i

```
for(i=1; i<=10; i++)  
cout<<i<<"\n";
```

3- execute the instructions inside the loop

How is it executed?

Step1: $i = 1$

Step2: Is $i \leq 10$

- If yes , enter the loop
- If No, exit the loop

Since $i=1$ so it is ≤ 10 , so enter the loop

Step3 :It displays : 1

Step 4: $i=1+1=2$

Returns to step2:



Ex :1 write a program that prints the numbers from 1 and 10.

```
1  #include <iostream>
2  using namespace std;
3
4  main(){int i;
5
6      for(i=1;i<=10;i++)
7          cout<<i<<"\n";
8  }
```



```
1
2
3
4
5
6
7
8
9
10
-----
Process exited after 0.1257 seconds with return value 0
Appuyez sur une touche pour continuer...
```

i=1
i<=10, yes =>
cout<<i<<"\n"
i=i+1=1+1=2

i=2
i<=10, yes =>
cout<<i<<"\n"
i=i+1=2+1=3

.....

i=10
i<=10, yes =>
cout<<i<<"\n"
i=i+1=10+1=11

i=11
i<=10, NO=> stop the loop



Ex:5 write a program that calculates the sum of even numbers between 0 and 100.



Exercises

Ex:2 write a program that calculates the sum of the numbers between 1 and 10.

```
1  #include <iostream>
2  using namespace std;
3
4  main(){int i,s;
5
6  s=0;
7
8      for(i=1;i<=10;i++)
9          s=s + i;
10
11     cout<<"the sum (somme) S="<<s;
12 }
```

the sum (somme) S=55

S=0;
i=1
i<=10, yes =>
s=s+i=0+1=1
i=i+1=1+1=2

i=2
i<=10, yes =>
s=s+i=1+2=3
i=i+1=2+1=3

.....

i=10
i<=10, yes =>
s=s+i=45+10=55
i=i+1=10+1=11

i=11
i<=10, NO=> stop the loop



Exercises

Ex:3 write a program that calculates the product of the numbers between 1 and 10.

```
1  #include <iostream>
2  using namespace std;
3
4  main(){int i,p;
5
6  p=1;
7
8      for(i=1;i<=10;i++)
9          p=p* i;
10
11     cout<<"the product (produit) P="<<p;
12 }
```

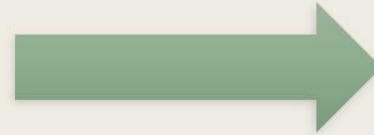


the product (produit) P=3628800



Ex:4 write a program that calculates the sum and product of the numbers between 1 and 10.

```
1  #include <iostream>
2  using namespace std;
3
4  main(){int i,s,p;
5      s=0;
6      p=1;
7          for(i=1;i<=10;i++)
8          {
9              s+=i;
10             p*=i;
11         }
12         cout<<"s="<<s<<"\n";
13         cout<<"p="<<p<<"\n";
14     }
```



```
s=55
p=3628800
-----
```




Exercises

Ex:5 write a program that calculates the sum of even numbers between 0 and 100.

```
1  #include <iostream>
2  using namespace std;
3
4  main(){int i,s;
5      s=0;
6
7          for(i=0;i<=100;i+=2)
8          {
9              s+=i;
10         }
11         cout<<"Sum is "<<s<<"\n";
12
13     }
```

Solution 1



```
Sum is 2550
```

```
-----
Process exited after 0.1758 seconds with return value 0
Appuyez sur une touche pour continuer...
```

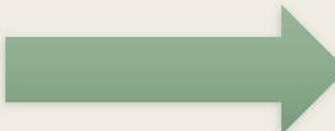


Exercises

Ex:5 write a program that calculates the sum of even numbers between 0 and 100.

```
1  #include <iostream>
2  using namespace std;
3
4  main(){int i,s;
5      s=0;
6
7      for(i=0;i<=100;i+=1)
8      {
9          if(i%2==0)
10             s+=i;
11      }
12      cout<<"Sum is "<<s<<"\n";
13
14 }
```

Solution 2



```
Sum is 2550
```

```
-----
Process exited after 0.1758 seconds with return value 0
Appuyez sur une touche pour continuer...
```

