Repetition Structure

(CS 1002)

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Repetition Structure

- **Repetition Structure** or **Loops**: **Allows** you to **repeat a section** of your **program** a **certain number of times**
- **Repeats** until the **condition remains true**
- **Terminates** when the **condition** becomes **false**

Loops in C++

- **for** loop
- **while** loop
- **do** loop

for loop: **Counter-controlled loop**

while loop, **do** loop: **Conditional loop**

Loops

Counter-controlled Loops

Depends on the **value** of a **variable** known as **counter variable**. The **counter** is **changed** (**increased/decreased**) in **each iteration.**

Example: *for* loop

Conditional loop

A conditional loop keeps repeating until a specific condition is met

Example: *while* and *do* loops

while loop

while loop

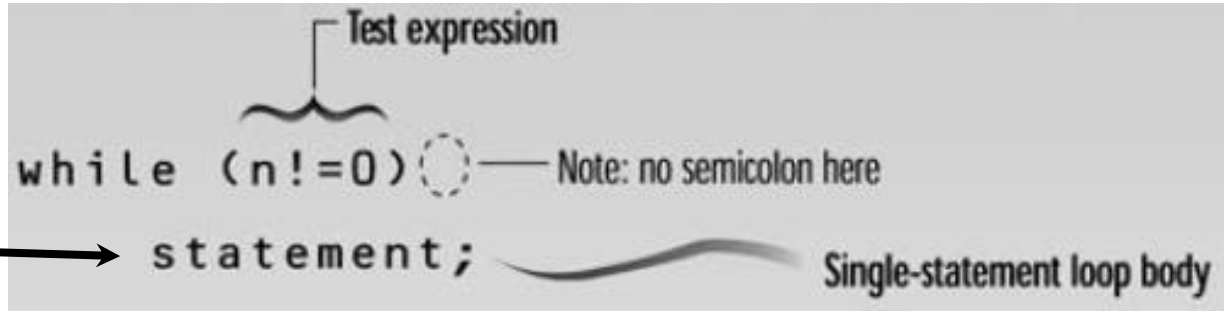
- **for loop does something** a **fixed number of times**.

- If you **don't know** how many **times** you **want to do something** before you start the loop?

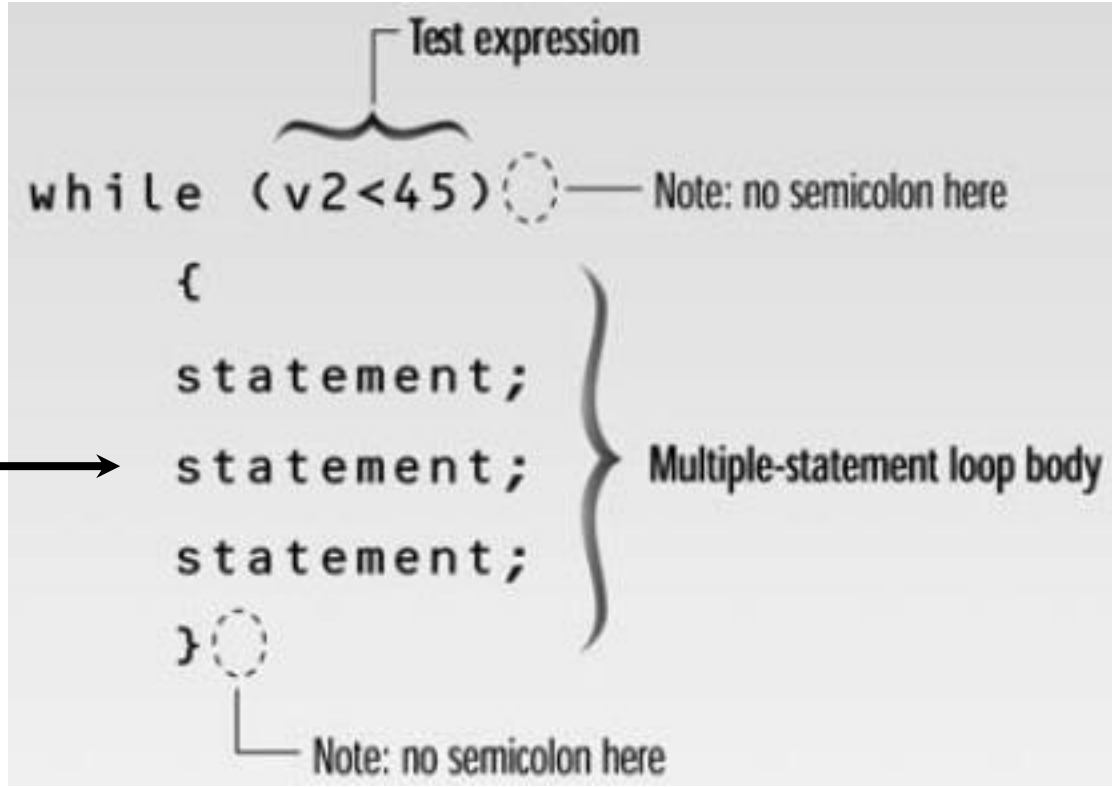
- In this case a different kind of loop may be used: the **while loop**

while loop - syntax

Loop body contain single statement



Loop body contain Multiple statement

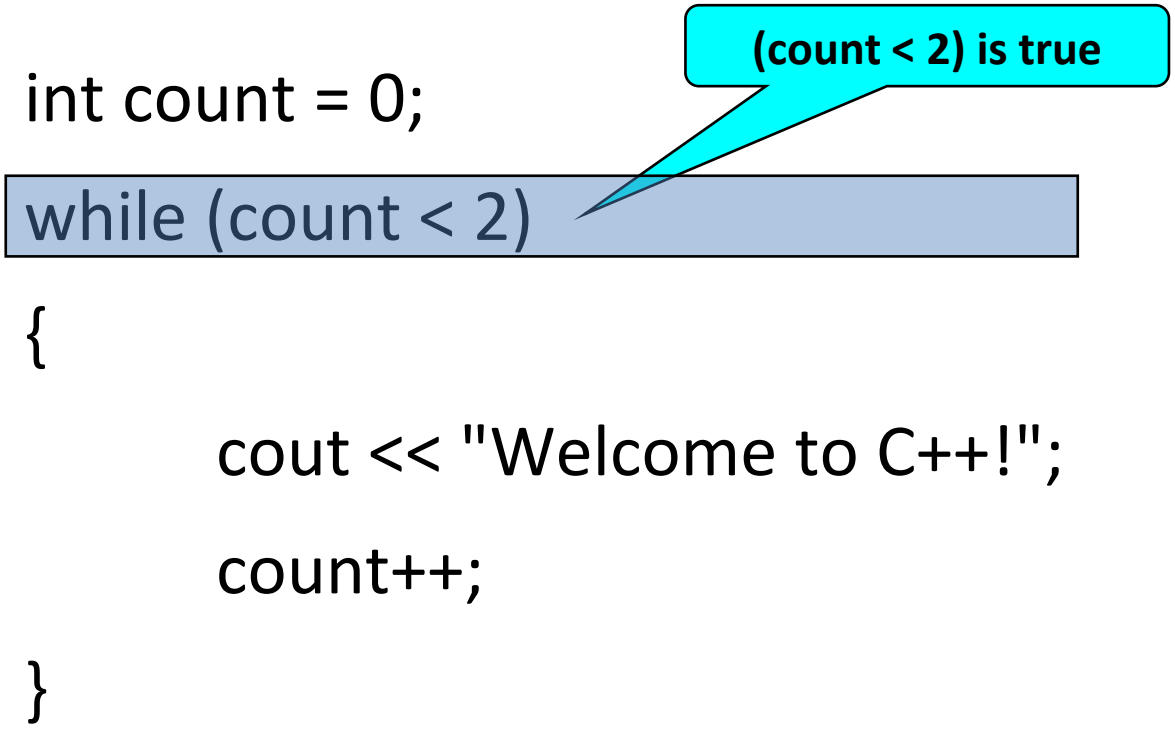


Example: Tracing a while Loop

Initialize count

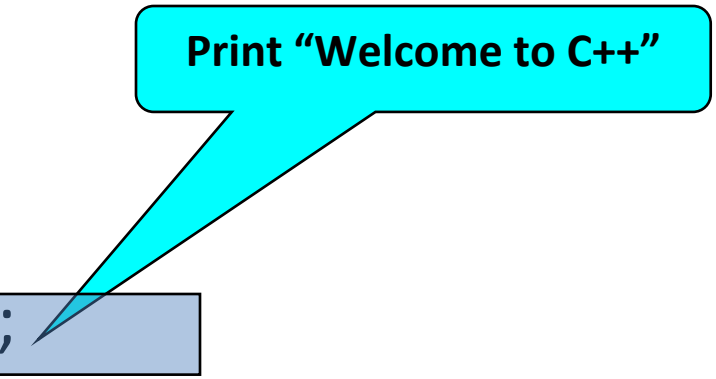
```
int count = 0;

while (count < 2)
{
        cout << "Welcome to C++!";
        count++;
}
```

Example: Tracing a while Loop



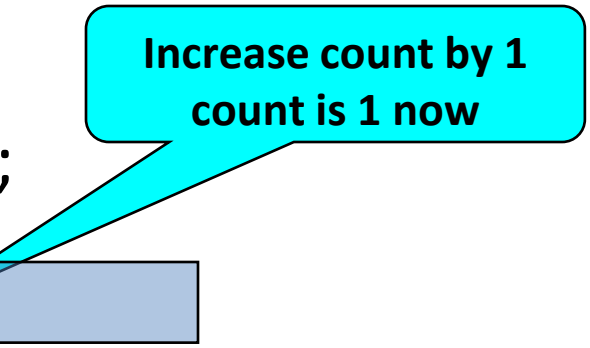
Example: Tracing a while Loop

```
int count = 0;

while (count < 2)

{

        cout << "Welcome to C++!";

          count++;

}
```



Example: Tracing a while Loop

```
int count = 0;
while (count < 2)
{
        cout << "Welcome to C++!";
        count++;
}
```



Example: Tracing a while Loop

```
int count = 0;
while (count < 2)
{
        cout << "Welcome to C++!";
        count++;
}
```

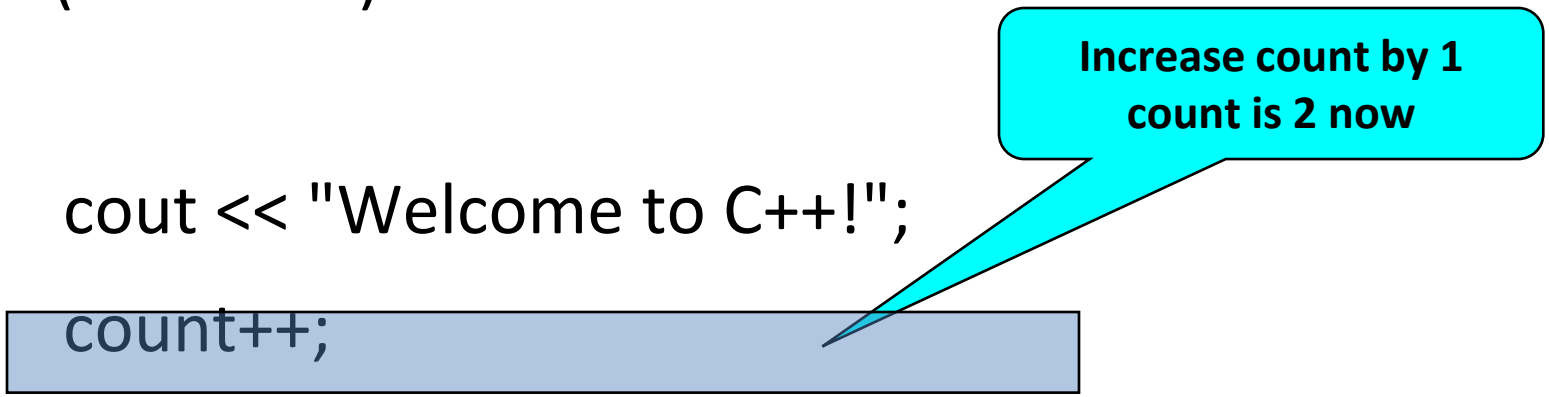
(count < 2) is still true since count is 1

Example: Tracing a while Loop

```
int count = 0;

while (count < 2)

{

        cout << "Welcome to C++!";

         count++;

}
```

Example: Tracing a while Loop

```
int count = 0;
while (count < 2)
{
        cout << "Welcome to C++!";
        count++;
}
```



Example: Tracing a while Loop

```
int count = 0;
while (count < 2)
{
        cout << "Welcome to C++!";
        count++;
}
```

(count < 2) is false since count is 2 now

Example: Tracing a while Loop

```
int count = 0;
while (count < 2)
{
        cout << "Welcome to C++!";
        count++;
}
```

Class Exercise-1

- Get a **number** from **user** and **calculate its factorial**

(while loop) – Example

infinite while loops…

```
while(true)
{
  cout<<"\n Infinite loop";
}
```

```
while(10)
{
  cout<<"\n Infinite loop";
}
```

```
while('A')
{
  cout<<"\n Infinite loop";
}
```

(while loop) – Example

```
while (numEntries = 3)  //always true
{
   cout <<"working … "; numEntries++;
}
```

```
while (numEntries = 0)  //always false
{
   cout << “never executed… ";
}
```

(while loop) -- Class Exercise

- Write a program that asks the user to enter two numbers (multiple of 10): ***speed1***, and ***speed2*** representing speeds in KPH (Kilo meters per Hour). Then the program should convert and show table of speeds in MPH (Miles per Hour) for all the speed values between ***speed1*** and ***speed2***.

MPH = KPH * 0.6214

speed1 and ***speed2*** variables should be multiple of 10. Each table entry (in KPH) should be updated by 5 in each iteration.

(while loop) – Exercise

- Write a program that inputs a value in an integer number from user. For this number the program returns the ***count*** for **how many times can we divide this number by 2 *to get down to 1***".

(while loop) – Exercise

- Write a program that inputs a value in an integer number from user. For this number the program returns the ***count*** for **how many times can we divide this number by 2 *to get down to 1***".

```
int count = 0; int num;  cin>>num;

//count how many divisions we've done
while (num > 1)
{
      num = num / 2;
      count++;
}
cout<<"\nWe have to divide: "<<count<<" times";
```

(while loop) -- Class Exercise

- Get a **number** from **user** and **calculate its factorial**

Any Questions!