



ITCS110/CSC103

Computer Programming for Scientists and Engineers

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Part 2

Chapter 5 : Control Structures II Repetition

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The while Loop

The loop is repeated while the controlling boolean expression is true, when the expression is false the repetition ends.

Syntax

```
while (expression)  
Statement
```

or

```
while (expression)  
{  
  First_Statement  
  Second_Statement  
  ...  
  ...  
  Last_Statement  
}
```

int n = 0

(n != -1)

while (true)

}

}

2

Write a C++ program using a loop that reads information for patients undergoing surgery in a hospital. The information to be collected includes:

Cin

- Patient's CPR number (of type long integer)
- Surgery urgency: this can be either "urgent," "elective," or "emergency" (of type String in any letter case)
- Recovery time in days (of type integer)

Urgent
urgent URGENT

Your program should:

- (a) Count and display the number of all patients.
 - (b) Count and display the number of patients with "urgent" surgeries. *totalPatients = 0*
urgentCount = 0
 - (c) Count and display the number of patients with "emergency" surgeries. *emergencyCount = 0*
 - (d) Find and display the CPR number of the patient with the longest recovery time. *cpr of Longest Recovery = 0*
longestRecovery = -1
- If there's no patient's input, display "No Data"

The program should stop reading input when the user enters a negative CPR number.

2

Assume all inputs are valid.

***Your Program SHOULD FOLLOW the given sample Input/Output**

Sample run

```
Enter patient's CPR number (negative number to stop) ,  
Surgery urgency and Recovery time:
```

```
763789654 elective 5 ✓
```

```
463216542 URGENT 20 ✓
```

```
891233652 Emergency 27
```

```
901236542 urgent 15
```

```
951233654 elective 3
```

while

```
-1
```

```
Number of patients: 5
```

```
Number of patients with urgent surgeries: 2
```

```
Number of patients with emergency surgeries: 1
```

```
CPR patient with the longest recovery time: 891233652
```

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

```
int main ()
```

```
{
```

```
    long cprNumber;
```

```
    string urgency;
```

```
    int recoveryTime;
```

```
    int totalPatients = 0, urgentCount = 0, emergencyCount = 0;
```

```
    int longestRecovery = -1;
```

```
    long cprOfLongestRecovery = 0;
```

```
    cout << "Enter patient's data (negative number to stop),
```

```
    surgery urgency and recovery time: \n";
```

while (true)

{

cin >> cprNumber;
if (cprNumber < 0)
~~break;~~

cin >> urgency >> recoveryTime;

a) totalPatients ++;

b) if (urgency == "Urgent" || urgency == "URGENT")
urgency == "URGENT")
urgentCount ++;

c) else if (urgency == "emergency" || urgency == "EMERGENCY")
"Emergency" || urgency == "EMERGENCY")
emergencyCount ++;

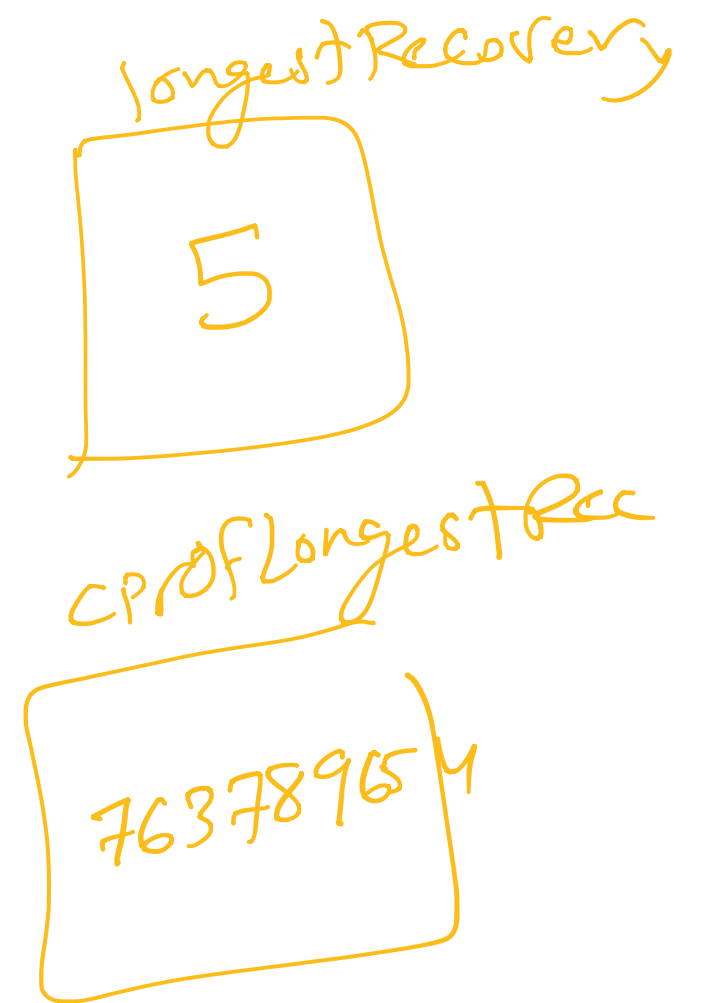
Valid
total
1

763789654
elective
5

```

d) if (recoveryTime 5 > longestRecovery)
    {
        longestRecovery = recoveryTime;
        CPR of Longest Recovery = CPRNumber;
    }
}

```



```

} // end while

```

```

if (totalPatients == 0)
    cout << "No Data";

```

```

else {
    cout << "Number of Patients : " << totalPatients << endl;
    cout << "Number of Patients with Urgent : " << urgentCount << endl;
    cout << " : " << emergencyCount << endl;
    cout << " CPR Patient with longest recovery time : " <<
        CPR of Longest Recovery << endl;
}
return 0;
}

```

An F1 formula race is a sport activity where racers compete to have the best finish time. Write a Java program using LOOP that read **10** F1-racers information as follow:

- racer's **id** of type long integer
- **type** : the type can be either *alpha*, *beta* (in any letter case) of type String
- finish **time** in seconds of type integer

Your program should:

- Count** and display the number of racers of type **alpha**.
- Calculate** and display the **average** finish time for all racers.
- Find** and display the **fastest** racer id of type **alpha** only with their fastest time. In case, there is no alpha racer, display No Alpha.

Assume all inputs are valid.

3

Assume all inputs are valid.

***Your Program SHOULD FOLLOW the given sample Input/Output**

Sample Input/Output

```
Enter 10 racer id, type and finish time:
```

```
2023001 alpha 1030
```

```
2023074 beta 2009
```

```
2023002 ALPHA 412
```

```
2023003 alpha 670
```

```
2023034 Beta 1051
```

```
2023012 alpha 473
```

```
...
```

```
2023274 BETA 240
```

```
Number of alpha racers is 4
```

```
Average of all racers is 794.7 seconds
```

```
Fastest alpha id's is 2023002 with time = 412 seconds
```

A factory manufactures cars, all of which are tested to find their engine power. Engines are classified as either powerful or not powerful based on their Horsepower (hp) as follows:

Horsepower (hp)	Car Power
300 or above	Powerful
Otherwise	Not Powerful

Write a C++ program that asks the user to enter the Horsepower (HP) of several cars until the user enters **negative value to quit**.

The program should find and display:

- The average of Horsepower (HP) for **Powerful cars ONLY**.
- The number of Horsepower (HP) for all cars.

Appropriate messages should be displayed if there is no input at all or if there is no powerful cars were entered by the user.

4

***Your Program SHOULD FOLLOW the given sample Input/Output**

Sample Input/Output(1)

Enter HP for cars (Negative to Quit):
180 345 285 133 415 -99

HP's average for powerful cars = 380.0
Number of cars = 5

Sample Input/Output(2)

Enter HP for cars (Negative to Quit):
-10

No input at all

Sample Input/Output(3)

Enter HP for cars (Negative to Quit):
180 145 -1

No powerful cars
Number of cars = 2