CS1100 – Introduction to Programming

Lecture 9

Instructor: Shweta Agrawal (shweta.a@cse.iitm.ac.in)

- Programming : From Turtle to C.
- Data Types in C, Representations, Operators.
- Formatting the Input and the Output.
- Execution of Programs, Compilers.
- Modifying the control flow in Programs `if-then-else`, `switch`.

So Far

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So Far

- `while`, `for`, `do while` constructs in C.
- Example problems.
- Programming for engineers.

Up Next

The **while** construct

- Syntax

  ```
  while (expression) {
          statements;
  }
  ```

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  statements;

  }
- Semantics
  1. As long as expression is true, execute statements.
  2. If expression is false, exit the loop.

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        statements;
  }
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- Semantics
  1. As long as expression is true, execute statements.
  2. If expression is false, exit the loop.
- Value of expression must be changed by the body of the loop, otherwise we have an infinite loop.

The **while** construct

- Syntax

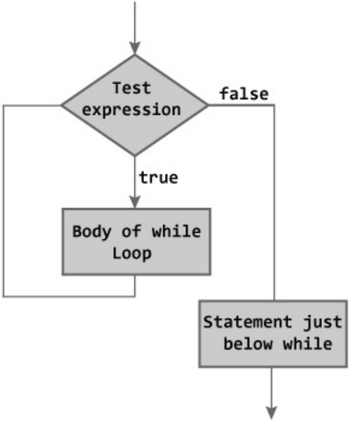
```
while (expression) {
        statements;
}
```

- Semantics

  1. As long as expression is true, execute statements.
  2. If expression is false, exit the loop.

- Value of expression must be changed by the body of the loop, otherwise we have an infinite loop.
- expression can contain relational, logical or equality operators.

Relational	<= < > >=
Equality	== ! =
Logical	&& ||



Reversing the digits of a given unsigned integer

```
#include "stdio.h"
int main () {
  int number, revNumber, remainder;
  revNumber = 0;
  printf ("Input number:");
  scanf ("%d", &number);
  while (number > 0) {
    remainder = number % 10;
    revNumber = revNumber*10 + remainder;
    number = number/10;
  }
  printf ("The reversed number is : %d\n", revNumber);
}
```

Example: Sum even and odd numbers

Accept integers from the standard input as long as the user does not enter -1. Once the user enters -1, print the sum of all integers entered so far, sum of even integers and sum of odd integers.

Two useful constructs:

while loop	repetitive statement
switch	multiple selection

Summing up odd and even numbers

Is the program correct?

```
#include<stdio.h>
int main() {
    int input;
    int sum, eSum, oSum;
    printf("Enter an integer: \t");
    scanf(" %d", &input);

    while (input != -1) {
        sum += input;
        switch (input % 2) {
            case 0: eSum += input; break;
            case 1: oSum += input;
        }
    }
    printf("sum = %d, oddSum = %d, evenSum = %d\n", sum, oSum, eSum);
    return 0;
}
```

Summing up odd and even numbers

Is the program correct?

```
#include<stdio.h>
int main() {
    int input;
    int sum, eSum, oSum;
    printf("Enter an integer: \t");
    scanf(" %d", &input);

    while (input != -1) {
        sum += input;
        switch (input % 2) {
            case 0: eSum += input; break;
            case 1: oSum += input;
        }
    }
    printf("sum = %d, oddSum = %d, evenSum = %d\n", sum, oSum, eSum);
    return 0;
}
```

- common mistake: forgotten initialization.
- expr. not modified in body of loop.

Summing up odd and even numbers

```
#include<stdio.h>
int main() {
    int input;
    int sum, eSum, oSum;
    printf("Enter an integer: \t");
    scanf(" %d", &input);
    sum = eSum = oSum = 0; // initialization.

    while (input != -1) {
        sum += input;
        switch (input % 2) {
            case 0: eSum += input; break;
            case 1: oSum += input;
        }
        printf("Enter an integer: \t");
        scanf(" %d", &input);
    }
    printf("sum = %d, oddSum = %d, evenSum = %d\n", sum, oSum, eSum);
    return 0;
}
```