Lecture 4 examples

November 5, 2018

1 Branching the code.

basic usage of:

- if()
- else, else if()
- inline if: a = a==b ? a : b
- sitch()

1.1 if()

if() is based on the concept of TRUE and FALSE, nonzero valus are TRUE and FALSE is zero
First let us see the effect of { } brackets on what is executed

```
In [6]: #include <stdio.h>
          int main()
          {
              if(1) //1 - true
                  printf("This is the first if!!\n");
                  printf("aaaa\n");
              if(0)
                  printf("This is the other one if!!\n");
                  printf("bbbb\n");
          }
```

```
This is the first if!!
aaaa
bbbb
```

```
In [7]: #include <stdio.h>
          int main()
          {
              if(1) //1 - true
              {// I have brackets here!!
                  printf("This is the first if!!\n");
                  printf("aaaa\n");
```

```
         }
             if(0)
             {
                 printf("This is the other one if!!\n");
                 printf("bbbb\n");
             }
         }
```

```
This is the first if!!
aaaa
```

So {} brackets are important since they allow as to execute multi-line instructions

Now for possible operations resulting in a logical value: >, <, >=, <=

```
In [7]: #include <stdio.h>

        int main()
        {
            int a = 5;
            int b = 4;
            if(a > b)
            {
                printf("A is greater\n");
            }
            if(a < b)//No ; here!!
            {
                printf("B is greater\n");
            }

            if(a >= b)
            {
                printf("A is greater\n");
            }
            if(a <= b)//No ; here!!
            {
                printf("B is greater\n");
            }

        }
```

```
A is greater
A is greater
```

and testing the equality is done with == (NOT a single =), inequality is tested with !=

```
In [12]: #include <stdio.h>
```

```
         int main()
         {
             int a = 5;
             int b = 4;
             //if(a = b) //this is very wrong!!!!
             //{
             //    printf("a=%d b=%d\n", a, b);
             //}
             if(a == b) //this is right!!
             {
                 printf("Equal!\n");
             }
             if(a != b) //this is right!!
             {
                 printf("Not Equal!\n");
             }
         }
```

```
Not Equal!
```

1.1.1 AND and OR

Logical OR and AND are coded as || and &&

```
In [2]: #include <stdio.h>

        int main()
        {
            int a = 5;
            int b = 4;
            if(a == 3 || b == 4) // OR
            {
                printf("1 The statment is true\n");
            }
            if(a == 3 && b == 4) // AND
            {
                printf("2 The statment is true\n");
            }
        }
```

```
1 The statment is true
```

```
In [4]: #include <stdio.h>

        int main()
        {
            int a = 5;
            int b = 4;
            if( (a == 3 || b == 4) && a == 3 )
            {
                printf("1 The statment is true\n");
            }
        }
```

1.1.2 if(), else if() and an else:

```
In [5]: #include <stdio.h>

        int main()
        {
            int a = 5;
            int b = 4;
            if(a == b)
            {
                printf("Equal!!\n");
            }
            else
            {
                printf("Else was executed!!\n");
            }
        }
```

```
Else was executed!!
```

```
In [6]: #include <stdio.h>

        int main()
        {
            int a = 5;
            int b = 4;
            if(a == b)
            {
                printf("Equal!!\n");
            }
            else if( a > b )
            {
                printf("A is greater!!\n");
            }
            else if( a < b )
            {
                printf("B is greater!!\n");
            }
            else
            {
                printf("This should not happen\n");
            }

        }
```

```
A is greater!!
```

An example of nested if(), i.e. if() in an if() in an if() ...

```
In [8]: #include <stdio.h>

        int main()
        {
            int a = 10;
            int b = 4;
            if(a > b) // nested if()
            {
                if(a > 2*b)
                {
                    printf("aaaa\n");
                }
                else if(a < 2*b)
                {
                    printf("bbbb\n");
                }
                else
                {
                    printf("cccc\n");
                }
            }
            else
            {
                printf("dddd\n");
            }
        }
```

```
aaaa
```

1.2 Inline if statment:

value = logical test ? value if true : value if false
I would like d to be the sum of a and greater of b and c

```
In [3]: #include <stdio.h>

        int main()
        {
            int a = 10;
            int b = 5;
            int c = 7;

            int d;

            if(b > c)
                d = a + b;
            else
                d = a + c;
            printf("%d\n", d);
        }
```

```
17
```

With an inline if statment

```
In [4]: #include <stdio.h>

        int main()
        {
            int a = 10;
            int b = 5;
            int c = 7;

            int d = b > c ? a + b : a + c;
            printf("%d\n", d);
        }
```

```
17
```

1.3 switch()

is used to select statments to be executed based on the value of an expression evaluating to an intiger

```
In [13]: #include <stdio.h>

         int main(){
           int a;
           //scanf("%d", &a);

           a = 6;
           int b = 3;

           switch(a-b)
           {
```

```
     case 1: // the value here is what needs to be evaluated in the switch statment
       printf("This is the first case\n");
       //possibly many lines
       break;

     case 3:
       printf("This is the second case\n");
       break;

     default :
       printf("Your choiche is unrecognized!!\n");
   }
 }
```

```
This is the second case
Your choiche is unrecognized!!
```

1.4 Example

Let us now solve the quadratic equation

$$ax^2 + bx + c = 0$$
$$\Delta = b^2 - 4ac$$
$$x_{1,2} = \frac{-b \pm \sqrt{\Delta}}{2a}$$

In [1]:
```
#include <stdio.h>
#include <math.h>

int main()
{
    double a, b, c;
    a = 5; b = 9; c = 1;

    double delta = b*b - 4*a*c;
    printf("%lf\n", delta);
    if(delta < 0)
    {
        printf("No solutions \n");
        return 0;
    }
    else if(delta == 0)
    {
        double x = -b/(2*a);
        printf("One solution x=%lf\n", x);
        return 0;
    }
    else
    {
```

```
                double x1 = (-b - sqrt(delta))/(2*a);
                double x2 = (-b + sqrt(delta))/(2*a);
                printf("Two solution x1=%lf x2=%lf\n", x1, x2);
                double x = -b/(2*a);
                return 0;
            }
        }
```

```
61.000000


/tmp/tmp1a2x3nel.out: symbol lookup error: /tmp/tmpq8ibnb6r.out: undefined symbol: sqrt
[C kernel] Executable exited with code 127
```

In [ ]: