Introduction to Computing

Lecture 9

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For Loop

For Loop

Definition:

For loop is just like **while loop** but provides a **concise way of writing the loop structure**.

Unlike a while loop, a **`for`** statement consumes the initialization, condition and increment/decrement in one line thereby providing a shorter, easy to debug structure of looping.

Re-visit While loop

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

int main()
{
    int i=0;

    while (i > 10)
    {


        i++;
    }

}
```

Re-visit While loop

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

int main()
{
    int i=0;

    while (i > 10)
    {


        i++;
    }

}
```

Initialization

Re-visit While loop

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

int main()
{
    int i=0;

    while (i > 10)
    {


        i++;
    }

}
```

Initialization

Condition

Re-visit While loop

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

int main()
{
    int i=0;
    while (i > 10)
    {

        i++;
    }

}
```

Initialization

Condition

increment

For loop

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

int main()
{
    for ( int i=0 ; i > 10 ; i++ )
    {



    }

}
```

Initialization

increment

Condition

For loop

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

int main()
{

    for ( int i=0 ;  i > 10 ;  i++ )
    {



    }

}
```

Example

C++ program that prints numbers from 0 to 10 using for loop.

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

int main()
{
   for (int i = 0; i <= 10; i = i + 1)
   {
      cout << i << endl;
   }
   return 0;
}
```

Exercise

Write a C++ program that prints even numbers from 0 to 10.

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

int main()
{
   for (int i = 0; i <= 10; i = i + 2)
   {
      cout << i << endl;
   }
   return 0;
}
```

Exercise

Write a C++ program that prints odd numbers from 0 to 10.

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

int main()
{
   for (int i = 1; i <= 10; i = i + 2)
   {
      cout << i << endl;
   }
   return 0;
}
```

Nested Loops

Definition:

A loop inside another loop is called a **nested loop.**

```
for ( initialization ; condition ; increment/decrement )
{
   statement(s);
   for ( initialization ; condition ; increment/decrement )
   {
      statement(s);
      … … …
   }
   … … …
}
```

Nested Loops

```
for ( initialization ; condition ; increment/decrement )
{

   for ( initialization ; condition ; increment/decrement )
   {
      statement(s);
      … … …
   }
   … … …
}
```

Nested Loops

```
for ( initialization ; condition ; increment/decrement )
{
   for ( initialization ; condition ; increment/decrement )
   {
      statement(s);
      … … …
   }
   … … …
}
```

10

Nested Loops

```
for ( initialization ; condition ; increment/decrement )
{
   for ( initialization ; condition ; increment/decrement )
   {
      statement(s);
      … … …
   }
   … … …
}
```

10

10

Nested Loops

```
for ( initialization ; condition ; increment/decrement )
{
    for ( initialization ; condition ; increment/decrement )
    {
        statement(s);
        … … …
    }
    … … …
}
```

How many times it will get executed

10

10

Nested Loops

```
for ( initialization ; condition ; increment/decrement )
{
    for ( initialization ; condition ; increment/decrement )
    {
        statement(s);
        ... ... ...
    }
    ... ... ...
}
```

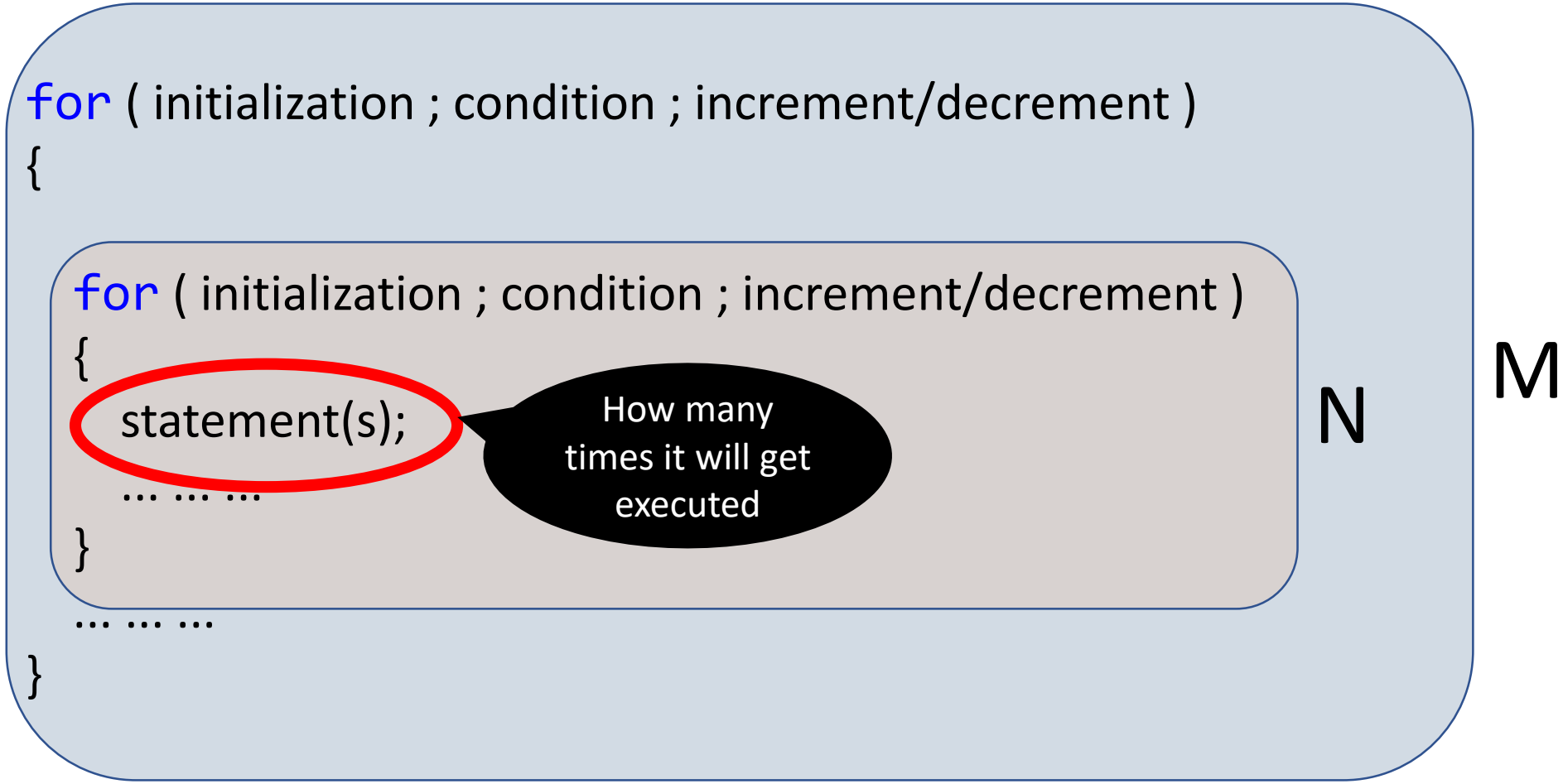
How many times it will get executed

10

10

10 X 10 = 100

Nested Loops



Total inner iterations= N x M

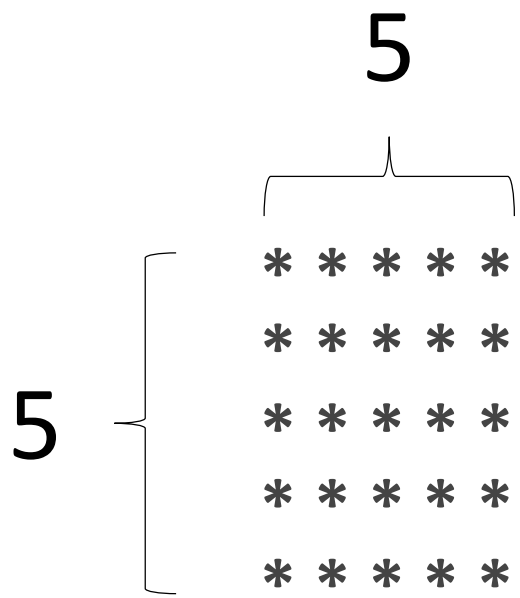
Nested Loops - Example

C++ program that draws the following square:

```
* * * * *
* * * * *
* * * * *
* * * * *
* * * * *
```

Nested Loops - Example

C++ program that draws the following square:



Nested Loops - Example

C++ program that draws the following square:

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

int main()
{
    for (int i = 0; i < 5; i = i + 1)
    {
        for (int j = 0; j < 5; j = j + 1)
        {
            cout << "*";
        }

        cout << endl;
    }
    return 0;
}
```

Nested Loops - Exercise

C++ program that takes the size from the user and draws the square.

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

int main()
{
    int size;
    cout << "Enter square size:";
    cin >> size;
        for (int i = 0; i < size; i = i + 1)
        {
            for (int j = 0; j < size; j = j + 1)
            {
                cout << "*";
            }
            cout << endl;
        }
    return 0;
}
```

Nested Loops - Example

Write C++ program that prints the following:

```
1 2 3 4 5
1 2 3 4 5
1 2 3 4 5
1 2 3 4 5
1 2 3 4 5
```

Nested Loops - Example

Write C++ program that prints the following:

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

int main()
{
    for (int i = 1; i <= 5; i = i + 1)
    {
        for (int j = 1; j <= 5; j = j + 1)
        {
            cout << j;
        }

        cout << endl;
    }
    return 0;
}
```

Nested Loops - Example

Write C++ program that prints the following:

```
1
1 2
1 2 3
1 2 3 4
1 2 3 4 5
```

Nested Loops - Example

Write C++ program that prints the following:

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

int main()
{
    for (int i = 1; i <= 5; i = i + 1)
    {
        for (int j = 1; j <= i; j = j + 1)
        {
            cout << j;
        }

        cout << endl;
    }
    return 0;
}
```

Thanks a lot

If you are taking a Nap, **wake up**.....Lecture Over