For Loops

2025 Winter APS105: Computer Fundamentals
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Lecture 9
1.1.0

For Loops Usually Represent Bounded Repetition

The syntax of a for loop is:

```
for (<initialization stmt>; <conditional expr>; <increment expr>) <stmt>
```

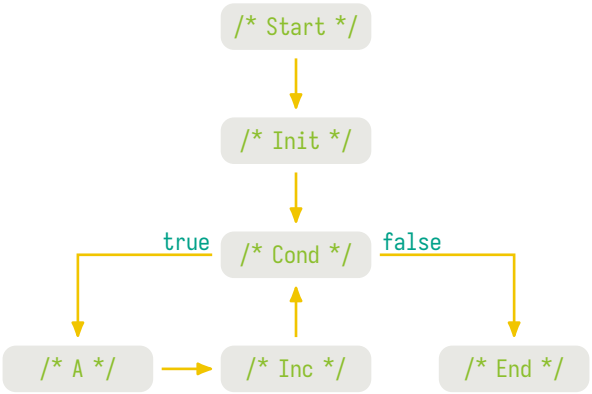
However, you should **always** write it like:

```
for (<initialization stmt>; <conditional expr>; <increment expr>) {
    <stmts>
}
```

The Flow of a For Loop

```
/* Start */
for (/* Init */; /* Cond */; /* Inc */) {
    /* A */
}
/* End */
```

becomes



A Single Repetition of a Loop is Called an Iteration

An iteration is a single step

The Initialization and/or Condition Can be Empty

You can write:

```
for (; a;) {
    /* A */
}
```

However, this is the same as a `while` loop:

```
while (a) {
    /* A */
}
```

Let's Write a Program to Count from 0 to 9

```
0
1
2
3
4
5
6
7
8
9
```

Previous Solution

```c
#include <stdio.h>
#include <stdlib.h>

int main(void) {
    for (int i = 0; i < 10; ++i) {
        printf("%d\n", i);
    }
    return EXIT_SUCCESS;
}
```

Let’s Write a Program to Print 15 Stars on a Line

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Previous Solution

```c
#include <stdio.h>
#include <stdlib.h>

int main(void) {
    for (int count = 1; count <= 15; ++count) {
        printf("*");
    }
    printf("\n");
    return EXIT_SUCCESS;
}
```

We Could (But Shouldn't) Use , For Multiple Expressions

This solution is equivalent to the previous:

```
#include <stdio.h>
#include <stdlib.h>

int main(void) {
    for (int count = 1; count <= 15; printf("*"), ++count) {
    }
    printf("\n");
    return EXIT_SUCCESS;
}
```

You Can Use `continue` and `break` for More Control

A break statement: `break;`
causes the current loop to immediately stop and go to the end

A continue statement: `continue;`
causes the current iteration of the loop to immediately restart,
checking the condition again

These statements are more advanced, and not encouraged for this course

Let’s Write a Program to Print a Triangle of Stars

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

Previous Solution

```c
#include <stdio.h>
#include <stdlib.h>

int main(void) {
    for (int row = 1; row <= 5; ++row) {
        for (int count = 1; count <= row; ++count) {
            printf("*");
        }
        printf("\n");
    }
    return EXIT_SUCCESS;
}
```